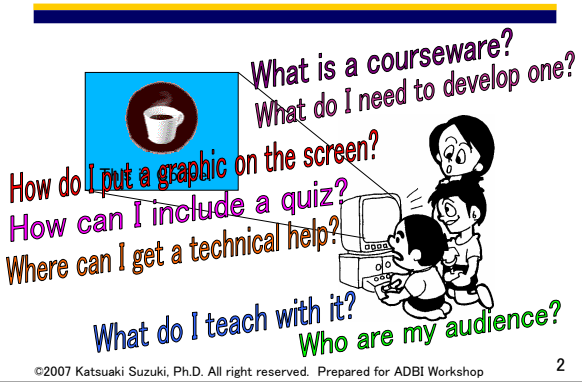
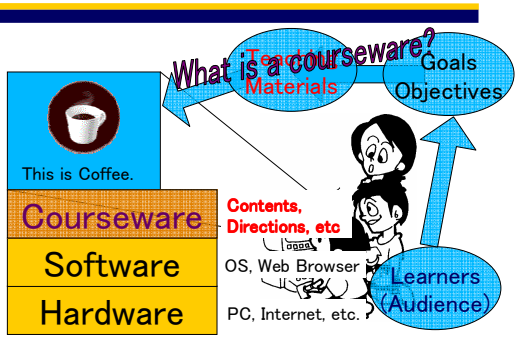
HOW TO DEVELOP COMPUTER COURSEWARE: MAJOR FACTORS TO BE CONSIDERED

THE UNIVERSITY OF THE AIR
ibstpi
BY
KATSUAKI SUZUKI, PH.D
Professor and Chair
Instructional Systems Program
Graduate School of Social and Cultural Sciences
Kumamoto University, JAPAN
ksuzuki@kumamoto-u.ac.jp
http://www.gsis.kumamoto-u.ac.jp/ksuzuki/

Develop A Computer Courseware?



Develop A Computer Courseware?



Courseware Development for Ms. Wonderful: A case study

Ms. Wonderful teaches a class of 5th graders. She joined a team to develop a computer courseware. But, she has no idea what to do? She has seen a class using the Internet, but she has never created a courseware before.

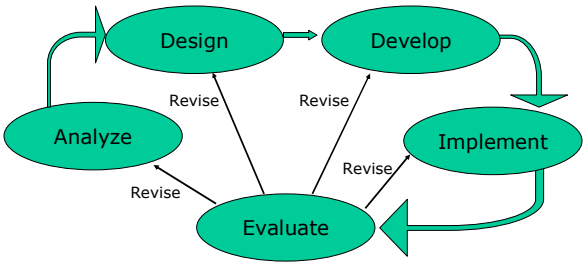
How to Develop Computer Courseware: Major Factors

- **ADDIE Model**
  - **What does a developer of a courseware do? Job specification**
- **Traditional vs. Systematic**
  - **What are the differences between traditional approach and systematic approach?**
- **Layer Model of e-Learning Quality**
  - **What are the characteristics of good courseware?**

How to Develop Computer Courseware: Major Factors

- **ADDIE Model**
  - **What does a developer of a courseware do? Job specification**
- **Traditional vs. Systematic**
  - **What are the differences between traditional approach and systematic approach?**
- **Layer Model of e-Learning Quality**
  - **What are the characteristics of good courseware?**

ADDIE model: a model for Instructional Design process

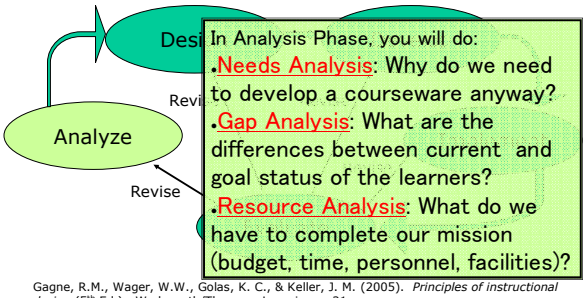


Gagne, R.M., Wager, W.W., Golas, K. C., & Keller, J. M. (2005). *Principles of instructional design* (5th Ed.). Wadsworth/Thomson Learning, p.21

ADDIE for Ms. Wonderful: A case study

Ms. Wonderful wondered what to do. She analyzed her children like stars, but having hard time to explain how they move. So, she designed a sketch to show how stars move. She asked a computer engineer to help her develop a star simulation on the computer screen. She then implemented by asking her students to use the courseware to see if they understood. She evaluated which parts were not clear, and asked for revision.

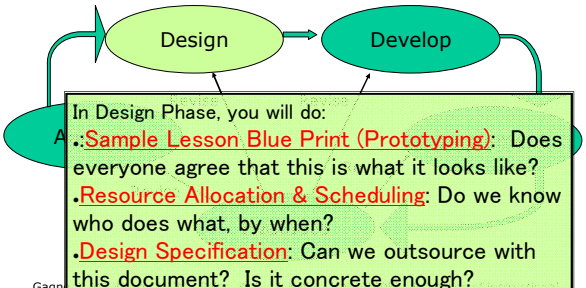
ADDIE model: a model for Instructional Design process



In Analysis Phase, you will do:
- Needs Analysis: Why do we need to develop a courseware anyway?
- Gap Analysis: What are the differences between current and goal status of the learners?
- Resource Analysis: What do we have to complete our mission (budget, time, personnel, facilities)?

Gagne, R.M., Wager, W.W., Golas, K. C., & Keller, J. M. (2005). *Principles of instructional design* (5th Ed.). Wadsworth/Thomson Learning, p.21

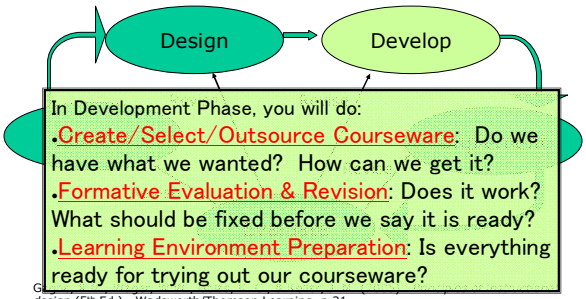
ADDIE model: a model for Instructional Design process



In Design Phase, you will do:
- Sample Lesson Blue Print (Prototyping): Does everyone agree that this is what it looks like?
- Resource Allocation & Scheduling: Do we know who does what, by when?
- Design Specification: Can we outsource with this document? Is it concrete enough?

Gagn
design (5th Ed.). Wadsworth/Thomson Learning, p.21

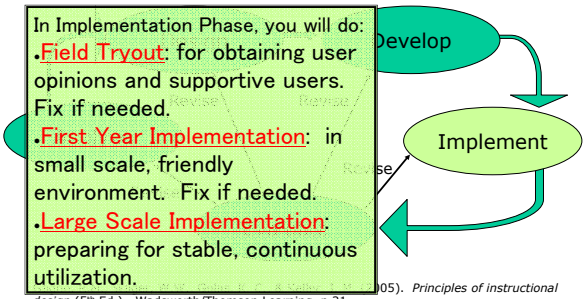
ADDIE model: a model for Instructional Design process



In Development Phase, you will do:
- Create/Select/Outsource Courseware: Do we have what we wanted? How can we get it?
- Formative Evaluation & Revision: Does it work? What should be fixed before we say it is ready?
- Learning Environment Preparation: Is everything ready for trying out our courseware?

design (5th Ed.). Wadsworth/Thomson Learning, p.21

ADDIE model: a model for Instructional Design process

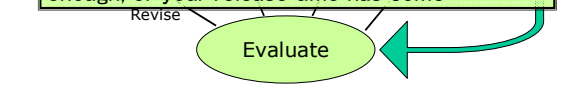


In Implementation Phase, you will do:
- Field Tryout: for obtaining user opinions and supportive users. Fix if needed.
- First Year Implementation: in small scale, friendly environment. Fix if needed.
- Large Scale Implementation: preparing for stable, continuous utilization.

design (5th Ed.). Wadsworth/Thomson Learning, p.21

ADDIE model: a model for Instructional Design process

In Evaluation Phase, you will do:
- Expert Reviews: for accuracy of contents
- Audience Tryouts: for learner verification
- Stakeholder Reviews: for approval and support
- Formative Evaluation & Revision: throughout all phases until your courseware becomes good enough, or your release time has come



Gagne, R.M., Wager, W.W., Golas, K. C., & Keller, J. M. (2005). *Principles of instructional design* (5th Ed.). Wadsworth/Thomson Learning, p.21

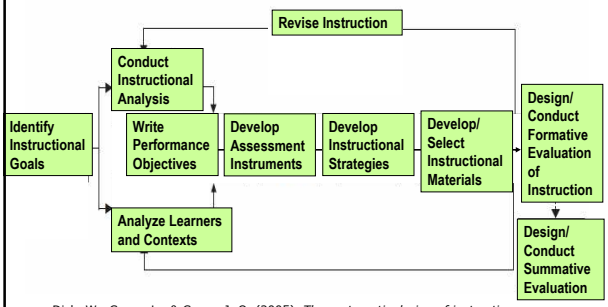
13

What does a developer of a courseware do? Job specification

- **Analyze-Design-Develop-Implement-Evaluate (ADDIE) Model**
  - **++Development is not the only phase**
  - **++Design before Development**
  - **++Analysis before Design**
  - **++Design for Implementation**
  - **++Evaluation in Analysis and Design**
  - **++Evaluation during Development**

14

FYI, Dick & Carey Model: ID Model for Beginners



Dick, W., Carey, L., & Carey, J. O. (2005). *The systematic design of instruction* (6th Ed.). Boston, MA: Allyn and Bacon.

15

How to Develop Computer Courseware: Major Factors

- ADDIE Model
  - What does a developer of a courseware do? Job specification
- **Traditional vs. Systematic**
  - **What are the differences between traditional approach and systematic approach?**
- Layer Model of e-Learning Quality
  - What are the characteristics of good courseware?

16

Systematic Approach for Ms. Wonderful: A case study

- **Ms. Wonderful wonders…**

Having participated in a courseware development, Ms. Wonderful was happy to see her class liked the courseware and seemed understand well. But, she was not sure why all of those steps are required. What are different from her everyday teaching?

17

Traditional vs. Systematic: Which of the followings are familiar for you?

- **Goals and objectives are tied to an external referent, such as a job or life task.**

SYSTEMATIC **TRADITIONAL**

- **Goals and objectives are derived from a textbook or traditional content or instructor's knowledge.**

Gange, R.M, & Madsker, K.L. (1996). The conditions of learning: Training applications. Harcourt Brace, ASTD, Table 2-1.

18

Traditional vs. Systematic:
Which of the followings are familiar for you?

- **Teaching strategies are based on tradition, on the instructor's skills, or on convenience.**

SYSTEMATIC | TRADITIONAL

- **Teaching strategies are based on empirical evidence of effectiveness.**

Gange, R.M, & Madsker, K.L. (1996). The conditions of learning: Training applications. Harcourt Brace, ASTD, Table 2-1.

19

Traditional vs. Systematic:
Which of the followings are familiar for you?

- **Objectives and testing criteria are established from the beginning so that learners know what they are expected to be able to do. No surprises.**

SYSTEMATIC | TRADITIONAL

- **Learners often must guess at desired performances, and test questions may come as a surprise.**

Gange, R.M, & Madsker, K.L. (1996). The conditions of learning: Training applications. Harcourt Brace, ASTD, Table 2-1.

20

Traditional vs. Systematic:
Which of the followings are familiar for you?

- **Student achievement is expected to vary, perhaps according to a normal distribution.**

SYSTEMATIC | TRADITIONAL

- **Very high performance levels are expected for most or all learners.**

Gange, R.M, & Madsker, K.L. (1996). The conditions of learning: Training applications. Harcourt Brace, ASTD, Table 2-1.

21

Traditional vs. Systematic:
Which of the followings are familiar for you?

- **If the students do not learn well, students (or instructor) may need to work harder.**

SYSTEMATIC | TRADITIONAL

- **If the students do not learn well, instruction needs to be revised.**

Gange, R.M, & Madsker, K.L. (1996). The conditions of learning: Training applications. Harcourt Brace, ASTD, Table 2-1.

22

Traditional vs. Systematic Approach to Training (Gagne & Madsker, 2002)

SYSTEMATIC	TRADITIONAL
Goal and objectives tied to job or life task	Derived from a textbook, tradition or instructor's knowledge
Teaching strategies based on empirical evidences	Based on tradition, instructor's skills, or convenience
No surprise on test	Students must guess what's tested
High performance expected for all	Student scores may vary, in the shape of a normal curve
If not working well, instruction must be revised	Students/instructor may need to work harder

23

Teacher-students relationship in the 20th Century (Traditional)

TEACHER	STUDENTS
• Manger • Expert • Disciplinarian • Controller • Dispenser of information • Goal setter • Time-keeper	• Listener • Receiver • Novice • Passive learner

- **ENVIRONMENT: Objectivist, directed or teacher-centered, high teacher scaffolding, use of supplantive strategies, structured**

Ingram, A.L., & Hathorn, L.G. (2003). Designing your Web site for instructional effectiveness and completeness: First step. Tech Trends, 47 (2), 50–56.

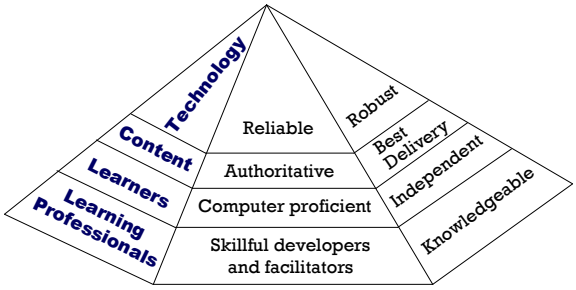
24

Teacher-students relationship in the 21st century (on-line Learning)

TEACHER	STUDENTS
• Resource • Co-participant • Scaffolder • Co-learner • Moderator • Facilitator • Coach • Monitor • Advisor	• Problem-solver • Explorer • Researcher • Collaborator • Goal-setter • Moderator • Facilitator • Scaffolder • Participant

- **ENVIRONMENT: constructivist, learner-centered, emphasizes collaborative learning, use of generative learning strategies, lower or adaptive teacher scaffolding, peer scaffolding**

Key attributes of successful e-Learning (Broadbent, 2002)



Broadbent,B.(2002). *ABCs of e-learning: Reaping the benefits and avoiding the pitfalls.* Jossey-Bass/Pfeiffer, ASTD, Figure 6.2, p. 129.

How to Develop Computer Courseware: Major Factors

- ADDIE Model
  - What does a developer of a courseware do? Job specification
- Traditional vs. Systematic
  - What are the differences between traditional approach and systematic approach?
- **Layer Model of e-Learning Quality**
  - **What are the characteristics of good courseware?**

Layer Model of e-Learning Quality (Suzuki, 2005)

What are the characteristics of good courseware?

5. ++(engaging)----------(not engaging)—
4. ++(effective)----------(not effective)--
3. ++(easy to use)------(difficult to use)--
2. ++(accurate)----------(inaccurate)--
1. ++(stable)----------(unstable)--

LAYER MODEL OF E-LEARNING QUALITY

Layer Model for Ms. Wonderful: A case study

Ms. Wonderful had many trouble for her first attempt. Computer went down, because electricity was not stable. She found a mistake in one of the star names (not accurate). Courseware was first not easy to use for her students. A part of explanations seemed difficult to understand for her class. They liked computer, because it was new to them, but they gradually lost interests as they got used to seeing the courseware.

Layer Model of e-Learning Quality (Suzuki, 2005)

What are the characteristics of good courseware?

5. ++(engaging)----------
4. ++(effective)----------
3. ++(easy to use)----------
2. ++(accurate)----------
1. ++(stable)----------

Stable courseware has:
- No Pain in using
- Adequate network speed & PC power
- Stability of service
- Feeling of security

LAYER MODEL OF E-LEARNING QUALITY

Layer Model of e-Learning Quality (Suzuki, 2005)

Kumamoto University

What are the characteristics of good courseware?

5. ++(engaging)--------
4. ++(effective)---------
3. ++(easy to use)-----
2. ++(accurate)---------
1. ++(stable)----------

Accurate courseware has:
.No Deception
.Valid Content
.Source Identified
.Fair use of Intellectual Property

LAYER MODEL OF E-LEARNING QUALITY

Layer Model of e-Learning Quality (Suzuki, 2005)

Kumamoto University

What are the characteristics of good courseware?

5. ++(engaging)--------
4. ++(effective)---------
3. ++(easy to use)-----
2. ++(accurate)---------
1. ++(stable)----------

Easy-to-use courseware has:
.High operatability
.High usability (e.g., navigation, layout)
.Good technical writing

LAYER MODEL OF E-LEARNING QUALITY

Layer Model of e-Learning Quality (Suzuki, 2005)

Kumamoto University

What are the characteristics of good courseware?

5. ++(engaging)--------
4. ++(effective)---------
3. ++(easy to use)-----
2. ++(accurate)---------
1. ++(stable)----------

Effective courseware has:
.Strategies matching task & learner
.Group collaboration
.Support self-regulated learning

LAYER MODEL OF E-LEARNING QUALITY

Layer Model of e-Learning Quality (Suzuki, 2005)

Kumamoto University

What are the characteristics of good courseware?

5. ++(engaging)--------
4. ++(effective)---------
3. ++(easy to use)-----
2. ++(accurate)---------
1. ++(stable)----------

Engaging courseware has:
.Continuing motivation
.Appeal of practicality
.Individual taste
.Brand & Pride
.Community of Practice

LAYER MODEL OF E-LEARNING QUALITY

Layer Model of e-Learning Quality (Suzuki, 2005)

Kumamoto University

How can we make quality in each layer higher?

5. ARCS MODEL, ANDRAGOGY
4. 9 EVENTS OF INSTRUCTION
3. USABILITY/NAVIGATION DESIGN
2. CONTENT/JOB-TASK ANALYSIS
1. MEDIA SELECTION MODEL

LAYER MODEL OF E-LEARNING QUALITY

How to Develop Computer Courseware: Major Factors

Kumamoto University

- **ADDIE Model**
  - **What does a developer of a courseware do? Job specification**
- **Traditional vs. Systematic**
  - **What are the differences between traditional approach and systematic approach?**
- **Layer Model of e-Learning Quality**
  - **What are the characteristics of good courseware?**


HOW TO DEVELOP COMPUTER COURSEWARE: MAJOR FACTORS TO BE CONSIDERED
THE UNIVERSITY OF THE AIR
ibstpi
BY
KATSUAKI SUZUKI, PH.D
Professor and Chair
Instructional Systems Program
Graduate School of Social and Cultural Sciences
Kumamoto University, JAPAN
ksuzuki@kumamoto-u.ac.jp
http://www.gsis.kumamoto-u.ac.jp/ksuzuki/
©2007 Katsuaki Suzuki, Ph.D. All right reserved. Prepared for ADBI Workshop
37