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Instructional designer's toolkit: A practical approach to the effective design of instruction

Andrew Casimer Masiewicz

INSTRUCTIONAL DESIGNER'S TOOLKIT: A PRACTICAL APPROACH TO THE EFFECTIVE DESIGN OF INSTRUCTION

A Project

Presented to the

Faculty of

California State University,

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In Partial Fulfillment

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in

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ABSTRACT

Instructional Design is a challenging discipline that attempts through a systematic process to provide effective and innovative solutions to instructional problems. While much research has been conducted in the area of instructional design, there are a number of theories that differ as to which approach is the most suitable. There are, however, a number of elements that the various approaches have in common, which suggests a generalized model applicable to most situations. Many of the theories have been based on traditional instruction, i.e. instructor-led classes. There is more limited research on the application of instructional design principles to technology-based solutions such as multimedia (Computer-Based Instruction) and hypermedia (Web-based Training).

This project, entitled "The Instructional Designer's Toolkit" is a web-based tool that is designed to provide guidance on the instructional design process to a subject-matter expert, trainer, or developer. It is based on the generalized model of Instructional Systems Design (ISD), but it is applicable to the design of instructional materials for delivery by an instructor, by Computer-Based Training (CBT), or a combination of instructor-led and technology-based delivery.

ACKNOWLEDGMENTS

I wish to express my deep appreciation to Dr. Amy Leh, and to Dr. Eun-Ok Baek of California State University, San Bernardino for providing support for this project, and to the faculty of the College of Education for providing the opportunities and challenges that made graduate school an important part of my career.

DEDICATION

This project is dedicated to my lovely wife Robin, and our two wonderful daughters, Melissa and Katie. Thanks to each of you for your love, support, and encouragement through a long and sometimes difficult journey. I love each of you more than I will ever be able to express.

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CHAPTER ONE

BACKGROUND

Introduction

Instructional Design is a challenging discipline that attempts through a systematic process to provide effective and innovative solutions to instructional problems. This process is useful in various situations including educational, corporate, academic and military contexts. Instructional designers implement prescriptive and descriptive theoretical constructs to assist them in the analysis, design, production, implementation and evaluation of instructional materials. (Nelson, et al., 1988)

There are a variety of theories, techniques, and opinions related to the subject of instructional design. Many different instructional design models have been proposed, each based on various educational theories. Add to this the increasing array of delivery methods available: Instructor-led, self-paced tutorials, multimedia, hypermedia, and web-based training.

No matter which delivery method (or combination of methods) is finally selected, it is critical that the resulting instruction be as effective as possible. If the

design does not meet the instructional objectives (or worse, the objectives were never identified in the first place), then the instruction may not solve the problem it was originally designed to address.

Knowing the basic principles of instructional design "... can help to ensure that what is produced serves a necessary purpose; meets the needs of students; is attractive and well organized; is delivered in an appropriate mode; and is continually evaluated and improved. Unlike professional instructional designers, however, the typical teacher is not likely to need formal expertise in the various instructional design processes. However, basic familiarity with major principles and procedures ... can be extremely helpful, both for their own work and for evaluating commercial educational products." (Morrison, et al. 2001, p.13)

Purpose of the Project

The purpose of the project was to develop a web-based instructional design tool. The tool provides guidelines, templates, and checklists to simplify the overall process, and give the designer a path to follow to help manage the instructional design project. The tool, called the "Instructional Designer's Toolkit", provides procedures

and related resources for each phase of the instructional design process from needs assessment to final implementation and evaluation. Supplemental background materials based on current instructional design theory are also included. This combination will provide the user with the method, materials, and information necessary to construct high-quality instructional materials for any subject.

Context of the Problem

Instructional design can be a time-consuming and labor-intensive endeavor. Given enough time and experience, most designers can produce adequate instructional materials. Time, however, is usually what we lack. We need to develop high-quality instructional materials as rapidly as possible. We don't have the luxury of figuring it out as we go along.

There are many approaches to creating instructional materials. Each approach may differ depending on whether the content is intended for instructor-led training, computer-based training, web-based training, or some other delivery method. Those tasked with creating instructional materials, whether they are content experts, teachers, trainers, project managers, or professional instructional

designers, may not be knowledgeable about instructional design principles. They may use methods that are not based on sound instructional theory, but rather simply mimic the methods used when they were taught. They may have tight deadlines or other restrictions that lead to the omission of critical steps in the process. The potential result is long hours, budget overruns, missed deadlines, unnecessary rework, and ineffective instruction.

Even training in instructional design may not be sufficient to solve these problems. Winn (1997) reports that in many programs, instructional design is being taught as a simple procedure often with the focus on media production as an end in and of itself. This approach ignores the complexity of this discipline and the necessary high-level communication, negotiation and other skills needed to successfully approach instructional problems.

The goal of this project is to provide a tool that will reduce cycle time for completing projects, make the designer's job easier, and convey the information that will reduce the learning curve. While based on current educational theories, the main purpose of the project is to assist the designer in applying instructional design

principles to the "real world". The focus of the collected forms and templates contained in the Toolkit is on the practical application of instructional design methods.

Significance of the Project

Instructional materials are utilized in schools, colleges, and universities the world over. They are also used for employee education and training in the business environment, medical facilities, and military applications. Some instructional materials are based on concrete objectives and are of high quality, but that is the exception rather than the rule. Many design projects experience problems and lead to frustration. Even for students that have been through formal training in instructional design, there is often a wide gap between their first real-life project and its inherent complexities and the simple case studies presented in class. The goal of this project is to assist the new instructional designer by providing a clear, reproducible method for designing high-quality materials that meet instructional objectives.

Assumptions

The following assumptions were made regarding the project:

1. The primary users of this tool will be adults.
2. Users may be content or subject matter experts, and new to the field of instructional design.
3. The use of the tool is not limited to any particular instructional theory. It may be applied to behavioral, cognitive, or constructivist projects.

Limitations

During the development of the project, the following limitations were noted. These limitations are presented in the next section.

Limitations

The following limitations apply to the project:

The initial release of the *Instructional Designer's Toolkit* will be based on the Instructional Systems Design, or ISD model.

While there are a variety of communication and interpersonal skills that may be required to work successfully as part of a team on an instructional

design project, those skills are not specifically addressed in the toolkit.

Cost Analysis, which determines the cost of the project, was not addressed in the initial release.

Definition of Terms

The following terms are defined as they apply to the project.

> Instructional Design: The science and art of creating detailed specifications for the development, evaluation, and maintenance of situations, which facilitate the learning of both large and small units of subject matter.
>
> Instructional Systems Design: An organized procedure for developing instruction that includes the steps of analyzing (defining what is to be learned), designing (specifying how the learning should occur), developing (authoring or producing the materials), implementing (using materials or strategies in context), and evaluating (determining the adequacy of instruction). (Seels & Glasgow, 1998, p. 331)

Organization of the Thesis

The thesis portion of the project was divided into five chapters. Chapter One provides an introduction to the context of the problem, purpose of the project, significance of the project, and definitions of terms. Chapter Two consists of a review of relevant literature. Chapter Three documents the steps used in developing the project. Chapter Four presents conclusions and

recommendations drawn from the development of the project. Project references follow Chapter Four. The Appendices for the project consists of: Appendix A Project Flowchart; Appendix B Storyboards; Appendix C Screenshots of Completed Project. Finally, the Project references.

CHAPTER TWO

REVIEW OF THE LITERATURE

Introduction

The literature reviewed for this project concentrated on three areas. The first area involves general principles of instructional design. The second area involved current instructional design models and their application to the development of instructional materials. The final area was a brief examination of learning theories as they apply to instructional design.

Principles of Instructional Design

The major goal of instructional design is to plan, develop, evaluate, and manage the instructional process so it will ensure competent performance by learners. Instructional Design, often abbreviated as ID, is a systematic method based on what we know about learning theories, information technology, systematic analysis, and management methods. (Morrison, et al., 2001) ISD procedures have evolved through practice, research, and expansion of theory and many models have been developed. Several core elements, however, can be found in all ISD models: analysis, design, development, implementation, and evaluation (Seels & Glasgow, 1998).

This systematic approach is also known as Instructional System Design (ISD), System Approach to Training (SAT), or ADDIE (Analysis, Design, Development, Implementation, and Evaluation).

Besides Instructional Systems Design, there are several traditional systematic approaches to training such as Performance-Based Training (PBT) and Criterion Referenced Instruction (CRI). These approaches have some common elements:

- *Competency Based (Job Related)*: The learners are required to master a Skill, Knowledge, or Attitude (SKA). The training focuses on the job by having the learners achieve the criteria or standards necessary for proper task performance.
- *Sequential*: Lessons are logically and sequentially integrated.
- *Tracked*: A tracking system is established that allows changes to the materials to be performed efficiently.
- *Evaluated*: Evaluation and corrective action allows continuous improvement and maintenance of training information that reflects current status and conditions. (Clark, 2000)

Key Elements of the Instructional Design Process

There are four fundamental planning elements in instructional design. These elements are addressed in almost every ID model. They can be represented by answers to these questions:

1. For whom is the program developed? (characteristics of learners or trainees)
2. What do you want the learners or trainees to demonstrate? (objectives)
3. How is the subject content or skill best learned? (instructional strategies)
4. How do you determine the extent to which learning is achieved? (evaluation procedures)

These four fundamental components—learners, objectives, methods, and evaluation—form the framework for systematic instructional planning. (Morrison, et al., 2001, p. 5)

Instructional Design Models

This section will examine three of the better-known ID models: the Gagne-Briggs Model, the Dick and Carey Design Model, and the Morrison-Ross-Kemp model. The systematic method of instruction is still widely used in

the military and business settings. Many of these models have been around for some time. As instructional delivery becomes more complex, however, more intentional instructional design is likely to become increasingly important. This is particularly true as new technologies and methods of delivery become available.

The Gagne-Briggs Model

The Gagne-Briggs theory of instruction was first developed in the 1960s, although its development has continued to date. It is affectionately known by many as the granddaddy of instructional theories. It was the first major attempt to integrate a wide range of knowledge about learning and instruction (from many theoretical perspectives) into a comprehensive theory of instruction. Its impact on the field has been immense (Reigeluth 1987).

The Gagne-Briggs model of instructional design categorizes learning outcomes and then organizes instructional events for each kind of learning outcome. There are nine instructional events, tailored to the kind of outcome to be achieved that provide prescriptions in the form of activities and interactions. These can be applied in any order (Gagne, et al., 1992). One of the most outstanding features of this model is that it is so comprehensive. It prescribes the nature of instruction for

all three of Bloom's domains of knowledge: cognitive, affective, and psychomotor; and within the cognitive domain it prescribes methods for teaching verbal information (remember-level knowledge), intellectual skills (application of generalizable knowledge), and cognitive strategies (the higher thought processes)(Reigeluth, p.11). The nine instructional events are listed in table 1.

Table 1. The Nine Events of Instruction

Instructional Event	Lesson Activity
1. Gain Attention	Show learners 3 objects (e.g. old wire rim glasses, glass globes filled with water, two lenses combined on a pole (crude microscope).
2. Recall Information	Ask the students to state what the objects have in common (i.e. used for magnification).
3. Inform Learner of Objective	Tell students they will be learning the names and dates associated with the invention and development of magnification.
4. Present Stimulus Material	Show the students slides that trace the development of magnification.
5. Provide Learning Guidance	Present a chronological list of development of magnification (e.g. engraver using globe, people wearing glasses).
6. Elicit Performance	Have students place events related to the history of magnification on a timeline.
7. Provide Feedback	Ask students to evaluate other student's timelines.

Instructional Event	Lesson Activity
8. Assess Performance	Ask students to write a short history of magnification as part of the final exam.
9. Enhance Retention	Relate the history of microprocessors to the history of the development of other technologies.

Adapted from "A Lesson based on the Gagne-Briggs Theory of Instruction" by Barbara Petry, Harry Mouton, Charles Reigeluth in Charles M. Reigeluth (Ed.), 1985, Instructional Theories in Action.

The Dick and Carey Design Model

The Dick and Carey Design Model uses a systems approach for designing instruction. One of the best-known models, its approach to designing instruction is similar to that of software engineering. The design model describes all the phases of an iterative process that starts by identifying instructional goals and ends with summative evaluation. This model is applicable across a range of context areas (for example, K-12 to business to government) and users (novice to expert)(Braxton, et al.,1998).

The Dick and Carey model is a behaviorally oriented model, which stresses the identification of skills students need to learn. The dotted lines indicate that previous steps may need to be revisited as the project

progresses. Results from a formative evaluation, for example, may influence the objectives, which in turn influence the criterion tests and instructional strategy.

In designing their ID model, Lou Carey and Walter Dick were influenced by the work of instructional design authors Robert Gagne, Leslie Briggs, and Robert Cronbach originally done in the early 1970's (Dick and Carey, 1990).

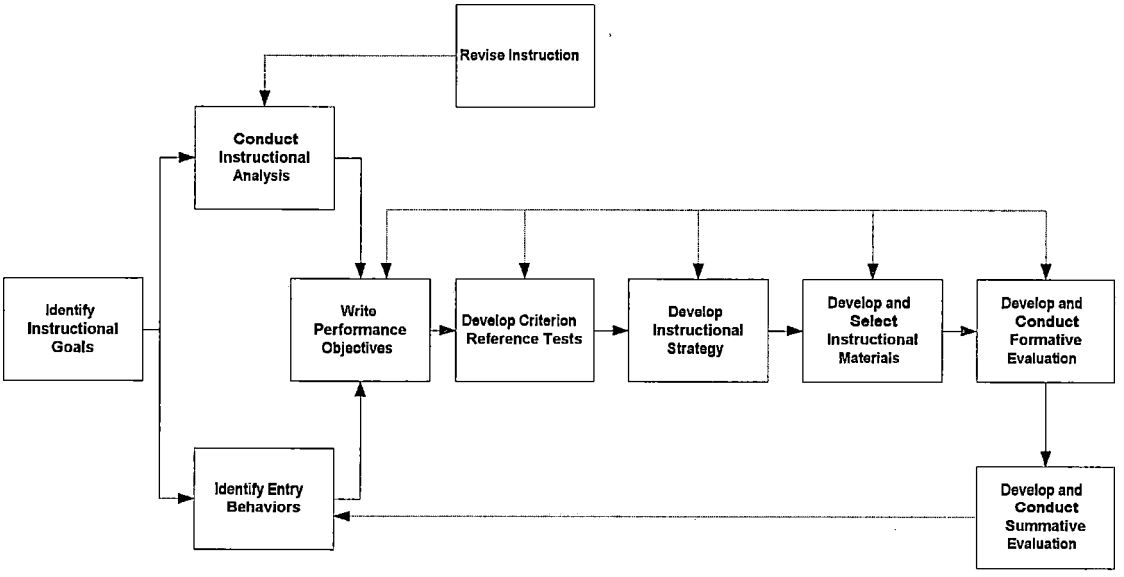


Figure 1. The Dick and Carey Design Model Adapted from The Systematic Design of Instruction (3rd ed.), by W. Dick, L. Carey, 1990.

The Morrison-Ross-Kemp Model

The Morrison-Ross-Kemp model depicts the instructional design process as a series of nine elements. The elements form a logical, clockwise sequence of events, however the order in which the designer approaches the individual elements is not predetermined.

The elements are not connected with lines or arrows. Connections could indicate a sequential, linear order. The intent of this model is to convey flexibility yet some order in the way the nine elements may be used. Also, some instances may not require treating all nine elements. (Morrison, et al., 2001, p. 7).

Another reason for the oval form is that a flexible interdependence exists among the nine elements. Decisions related to one affect other decisions. As instructional objectives are stated, items of subject content may be added or reordered. This procedure allows for additions and changes as the instructional design takes shape. Another part of the model is the two outer ovals that illustrate the feedback feature, which allows for changes in the content or treatment of elements at any time during development. These elements include data collected during instructional tryouts (formative evaluation) or at the end of the course (called summative evaluation). The model

also includes elements for project planning and management, both of which encompass the entire project.

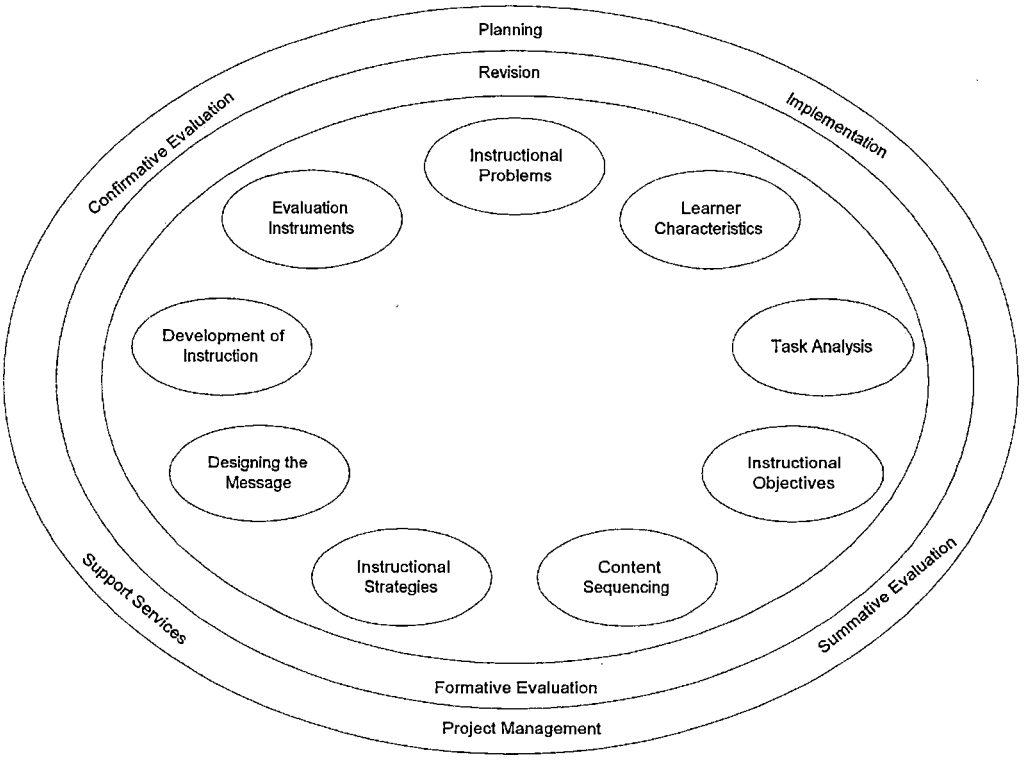


Figure 2. The Morrison-Ross-Kemp Instructional Design Model. From Designing effective instruction, (3rd ed.), by G. Morrison, S. Ross, and J. Kemp, 2001.

The Complete Instructional Design Plan. The nine elements in a comprehensive instructional design plan in the Morrison-Ross-Kemp model are:

1. Identify instructional problems and specify goals for designing an instructional program.

2. Examine learner characteristics that will influence your instructional decisions.
3. Identify subject content, and analyze task components related to goals and purposes.
4. Specify the instructional objectives.
5. Sequence content within each instructional unit for logical learning.
6. Design instructional strategies so that each learner can master the objectives.
7. Plan the instructional message and develop the instruction.
8. Develop evaluation instruments to assess objectives.
9. Select resources to support instruction and learning activities. (Morrison, et al. p.6)

Learning Theories and Their Relation to Instructional Design

An understanding of learning theory is an important component to deciding how best to approach instructional design. Learning theory addresses two questions: First, what methods should be used in the design of instruction? Second, when should each be used? These two concerns can be labeled as *methods* and *situations*. Statements that link situations and methods are called "principles" or "theories" (Reigeluth 1987, p. 1-2). Different

instructional theories prescribe different approaches to answering each of these questions. This section will briefly examine three of the most prominent learning theories: Behaviorism, Cognitivism, and Constructivism.

Historical Trends

The field of instruction began with an emphasis on philosophical concerns, which entailed the expression of opinions and conjecture, such as those outlined in Dewey's "Democracy and Education". With the advent of Skinner's focus on programmed instruction in the 1950s, this phase gave way to a focus on validated prescriptions, which require the scientific testing of opinions and conjecture through research. Initial research tended to focus on very general, vague variables, such as discovery versus expository methods and lecture methods versus discussion formats. However, in that research two different discovery methods often differed more than an expository method and a discovery method differed, making it impossible to identify reliable causes of superior outcomes (Reigeluth, p.3).

Over time, the discipline entered an analysis phase in which phenomena were broken down into manageable components upon which research was conducted. Today, much

piecemeal knowledge is integrated into progressively more comprehensive models and theories.

Behaviorism

The use of behaviorism in education is based on the principle that instruction should be designed to produce observable and quantifiable actions by the learner. Behaviorists consider the mental state of a learner to be merely a predisposition. Because mental states cannot be observed, behaviorists do not believe that teaching should be directed at students strengthening the mind, but should be aimed at producing desirable outcomes in students (Thompson, et al., 1996). In other words, behaviorists expect any effective instructional activity to change the student in some obvious and measurable way. After completing a lesson, students should be able to do something that they could not do, or not do well, before the lesson.

Behaviorism is governed by an objective view of the nature of knowledge and what it means to know something. The theorist most closely associated with behaviorism is B. F. Skinner. Skinner viewed the study of learning as a science. Skinner believed that there were two types of learning. The first was Pavlov's classical conditioning, where a stimulus was applied to an organism to produce a

response. Learning would occur when there was a transfer from stimulus control for a response from one stimulus to another stimulus (Thompson, et al., 1996).

The second kind of learning, and the category most often associated with Skinner, is called operant conditioning. This approach for producing behaviors uses reinforcers that follow a response or that are produced by a response. Operant conditioning includes the use of reinforcement to promote desirable changes in behavior.

Behaviorism has had considerable impact on education. First, and most important, is the behaviorist principle that all instruction should be designed to produce observable and measurable outcomes in students. Instruction should be based on objectives that clearly state what is expected of the learner. Next, behaviorist thought promotes the use of pre-assessment of students so that they can be placed in an instructional sequence at a point where they can achieve at the 90% level. Following pre-assessment, students are expected to continue participating in learning activities until they can demonstrate a 90% level on their new material. This 90% principle is one of the basic tenets of the mastery learning movement, a subcategory of behaviorist theory (Thompson, et al., 1996, p. 10).

Paul Saettler, in his book "The Evolution of American Educational Technology" (1990), states that behaviorism did not have an impact on educational technology until the 1960's, which was the time that behaviorism actually began to decrease in popularity in American psychology. Saettler identified six areas that demonstrate the impact of behaviorism on Educational Technology in America: the behavioral objectives movement; the teaching machine phase; the programmed instruction movement; individualized instructional approaches, computer-assisted learning, and the systems approach to learning (Saettler, 1990).

Cognitivism

Although cognitive psychology emerged in the late 1950s and began to take over as the dominant theory of learning, it wasn't until the late 1970s that cognitive science began to have its influence on instructional design. Cognitive science began a shift from behavioristic practices, which emphasized external behavior, to a concern with the internal processes of the mind and how they could be utilized in promoting effective learning. Behaviorists tend to ignore the cognitive changes that occur internally during learning. They maintain that it is impossible to design learning based on what happens in the learner's brain because these changes are not observable

or measurable (Thompson, et al). The design models that had been developed in the behaviorist tradition were not simply tossed out, but instead the "task analysis" and "learner analysis" parts of the models were embellished. The new models addressed component processes of learning such as knowledge coding and representation, information storage and retrieval, and the incorporation and integration of new knowledge with previous information (Saettler, 1990).

Cognitive theory concentrates on the conceptualization of student's learning processes. It focuses on the exploration of the way information is received, organized, retained, and used by the brain. When instruction is designed, proponents of cognitive theory believe that the cognitive structure of the learner, and groups of learners, should be taken into account. Several persons have been influential in advocating the cognitive approach, including Jerome Bruner, Jean Piaget, and Seymour Papert (Thompson, et al.).

Cognitive theorists believe that instruction must be based on a student's existing state of mental organization, or schema. How knowledge is internally structured or organized by a student has considerable impact on whether new learning will occur. New learning is

based on using prior knowledge to understand situations, and changing prior knowledge structures to deal with new situations. According to cognitive theory, information must be organized in a way that helps learners connect new information with current knowledge in a meaningful way (Thompson, et al.)

Cognitive theory gives several guidelines to educators interested in designing instruction. They are:

- Predisposition to learning is important. Instruction needs something to get it started, to keep it going, and to keep it from being random. Jerome Bruner would call this activation, maintenance, and direction.
- The learner must be actively engaged in the learning process; students create knowledge by making connections with previously learned material. Learning environments must allow and encourage students to make these connections.
- The structure and form of knowledge must be considered. Specifically, the body of materials to be learned should be organized in some optimal way.
- Sequencing of instructional material is important. Sequencing must take into account the

limited capabilities of learners to process information. Attempts have been made to identify the cognitive styles of learners, such as their brain hemisphere dominance, their level of field dependence, and their visual processing ability.

- New information must be connected in a meaningful way to information previously learned. Use of advance organizers prior to instruction is one approach.
- Discovery learning is one important technique that applies to much of cognitive theory. The assumption is that with minimal help from the teacher the student will learn more by discovering the lesson found in the situation.

Cognitive theory provides educators with a missing piece of the puzzle. Where behaviorists look at outcomes, cognitive theorists look at learners and processes (Thompson, et al.).

Constructivism

Constructivism and situated cognition have captured the attention of teachers and technology specialists. Constructivism is founded on the belief that there is a real world that is experienced and that meaning and understanding of the world is imposed by the person. There

are many ways to structure the world, and there are many perspectives for any event or concept. Learners construct their own meaning from instructional activities. Meaning is rooted it, and indexed by, experience. Each instructional experience must be examined to understand learning, and more constructivists believe that the experience with concepts and ideas in school are quite different from those concepts in the real world. Constructivists emphasize situating cognitive experiences in authentic activities (Thompson, et al).

Constructivist principles are causing a rethinking of technology-based learning. First, learner control and the use of realistic and authentic information are critical to effectiveness. The lesson must be flexible and rich in content so that the student can draw upon what they experience in order to construct knowledge. Second, use of multimedia such as visuals, graphics, sound, motion segments are important. The impact of constructivism will most likely increase as design models become more sophisticated and as the widespread availability of powerful multimedia computers increases.

Summary

Learning theories such as Behaviorism, Cognitivism, and Constructivism have shaped the way that educators and designers view the instructional process. Although each of these theories began life in the field of educational psychology, they are being used as the framework for designing instructional models with applications in the real world. The trend has been away from the purely behavioral model to the constructivist view, while still utilizing many of the principles of the cognitive theory. Most ID models, however, while still stressing specific objectives and outcomes, can be adapted for use in constructivist learning projects. This chapter reviewed three of the best know ID models: Gagne-Briggs, Dick and Carey, and the Morrison-Ross-Kemp model, as well as the educational theories upon which they are based.

CHAPTER THREE

DESIGN AND DEVELOPMENT

Introduction

Chapter Three documents the steps used in developing the project. The development methodology used is based upon the generalized Instructional Systems Design model, which is also the subject of the project. The following section briefly describes the development of the project, the tools that were used, and the rationale for using this approach.

Development Process

Methodology

This project was developed following the generalized Instructional Systems Design methodology. The development did not follow a particular model (e.g. Dick and Carey, or Gagne-Briggs), but rather utilized those tasks that were common to each of the various ISD models. The main tasks are briefly discussed below.

Analysis Phase

Identify Instructional Problems. In this step the problems related to the development of effective instructional materials were examined. Three major problems were identified:

1. Lack of knowledge - the developer may be a content expert, but they do not know how to develop effective instructional materials.
2. Development is too time-consuming - the developer may make costly mistakes, leading to time and budget overruns.
3. Materials are ineffective - the problem that the instruction is designed to solve was not adequately identified; the instructional materials do not address the real problem.

Goal of the Project. The goal of the project was to create a tool that provides instruction, guidelines, templates, and checklists to simplify the overall process of instructional design, and to give the designer a path to follow to help manage the instructional design project.

Examine Learner Characteristics. The second step was to examine the characteristics that would influence instructional decisions. The target audience was identified as adults with little or no formal training in instructional design. These individuals may be content experts, trainers, or others tasked with creating instructional materials for schools, corporations, health care, military, or other types of organizations.

Identify Subject Content Related to Goals. Research was conducted to compare the major types of instructional design models, and to find specific tools and techniques that could be applied to the development of various types of instructional materials. Emphasis was given to the analysis activities that are common to instructor-led, self-paced, or technology-based training.

Specify Objectives. Based on the identified goal and subsequent research, the project objectives were identified. These included the following:

1. The project would have an instructional module covering each of the main phases of the instructional design cycle.
2. The project would provide a structured method of creating instructional materials, but would not require tasks to be done in any particular order.
3. The project would provide forms and templates that could be used for analysis, design, development, and evaluation of different types of instructional materials.

Design Phase

Selecting a Delivery Strategy. The delivery strategy selected was to develop web pages that could be accessed via Internet, intranet, or CD-ROM. Macromedia Dreamweaver,

Fireworks, and Flash were the tools chosen to construct the web site. Forms were created with Microsoft Word. This approach was selected to maximize access, to make the material easy to update, and to allow for the addition of new resources as they become available.

Sequencing the Content. An outline of the major topics was developed, and a flowchart illustrating the relationship between the sections was created. The content sequence was based upon the Instructional Systems Design cycle. Appendix A contains the complete ID Toolkit flowchart.

Designing the Interface. The intent of the interface design was to make each major section accessible from any page. This would be accomplished by using a navigation bar containing drop-down menus. The user could access any major section from whichever page they might be viewing.

Usability Issues. Usability guidelines were developed to keep the layout and navigation consistent from one page to another and one section to another. Animations and superfluous graphics were kept to a minimum to prevent distracting the user from the content.

Storyboards. Storyboards were created to represent the screen layout for pages that contained text, graphics, interactive elements, or some combination of these

elements. Appendix B contains storyboards illustrating the main project pages. The appearance of the completed project differs from the storyboards somewhat due to minor changes in design.

Development Phase

Developing the Prototype

The prototype was constructed using Macromedia Dreamweaver (a WYSIWYG html editor), Fireworks (a graphics tool), and Flash (an animation/interface design tool). Template pages containing the navigational elements were created, and the content and graphics were added to each page. Additional content was created in Microsoft Word, PowerPoint, and Visio.

Evaluation Phase

Conducting the Formative Evaluation

The prototype was tested with the assistance of three individuals. Two of the individuals are employed as training specialists, and the third individual is employed as an instructional developer. All of the testers work in the Human Resources Development department of a Fortune 500 company, and have a range of experience developing instructional materials.

Each individual was provided with the Instructional Designer's Toolkit on CD-ROM, and asked to provide informal feedback on the overall design and content of the

project. They were also asked to note any broken links or other problems they encountered.

Revising the Prototype. Based on the feedback of the test subjects, additional hyperlinks were added to the menus to improve the overall navigation, broken links were fixed, and adjustments were made to the layout of some of the specific sections to improve readability.

Implementation Phase

Implementing the Revised Prototype. Once the prototype had been revised, it was rolled out to the Human Resources Development division of the company for use as a development tool. The ID Toolkit will continue to undergo iterative development based on the feedback obtained from users of the project.

Summary

Chapter three detailed the methodology used in the development of this project. Additionally, each of the steps in each phase of development process was described.

CHAPTER FOUR

CONCLUSIONS AND RECOMMENDATIONS

Introduction

Included in Chapter Four is an overview of the project. Further, the recommendations extracted from the project are presented. Lastly, the Chapter concludes with a summary.

Overview

Instructional design and development is a challenging discipline that attempts to provide effective solutions to instructional problems using a systematic approach. While some organizations have instructional designers on staff, many do not. The task of designing and developing instruction often falls to the subject matter expert or technical writer, who may not have the skills necessary to develop effective instruction.

The purpose of the Instructional Designer's Toolkit is to provide a systematic process for the design and development of instructional materials, whether they are utilized for classroom instruction, self-paced instruction, or technology-based applications. The Toolkit is a web-based resource that addresses the entire development cycle: Analysis, Design, Development,

Implementation, and Evaluation. While not exhaustive in scope, it provides templates and guidelines for each phase of the project, and links to additional resources.

Conclusions

The conclusions extracted from the project follows.

1. The traditional Instructional Systems Design model is linear, which may be too restrictive for some applications. ISD relies heavily on the analysis conducted by the instructional designer. It requires that the designer make certain assumptions about how learners will use the end product and which approach will work best for the majority of users, and design accordingly. This model works well when the instructional problem is clearly and accurately defined, but it may not be as well suited for developing learner-centered instruction such as discovery-based learning.
2. Following the ISD process is time-consuming, but it does result in a higher-quality end product. The design tasks such as creating flowcharts and storyboards are particularly useful for planning the project and

eliminating unnecessary rework. It also reduces the possibility of scope creep, which may occur if the scope of the project is not adequately defined.

3. Evaluation is critical, and should be practiced on a continual basis. While the traditional ISD model has evaluation as a separate phase, other models describe evaluation as an ongoing process. Continual feedback may have a profound impact on the quality and success of the project.

Recommendations

The recommendations resulting from the project follows.

1. Models such as the Kemp-Morrison-Ross (KMR) model provide structure without imposing a particular sequence of events. The KMR model also takes into account issues such as project planning and continuous evaluation. In addition, techniques such as rapid prototyping, where the product is designed and produced in stages and modified based on input directly from the

learners, may be better suited to some situations.

2. While it may be unnecessary to complete every task in the ISD process for every project, the needs analysis and planning stages are critical. The developer should make an effort to utilize these tasks to make sure that the project is addressing real problems, and that instruction is the solution to the problem. Analysis and planning also help to reduce unnecessary rework.

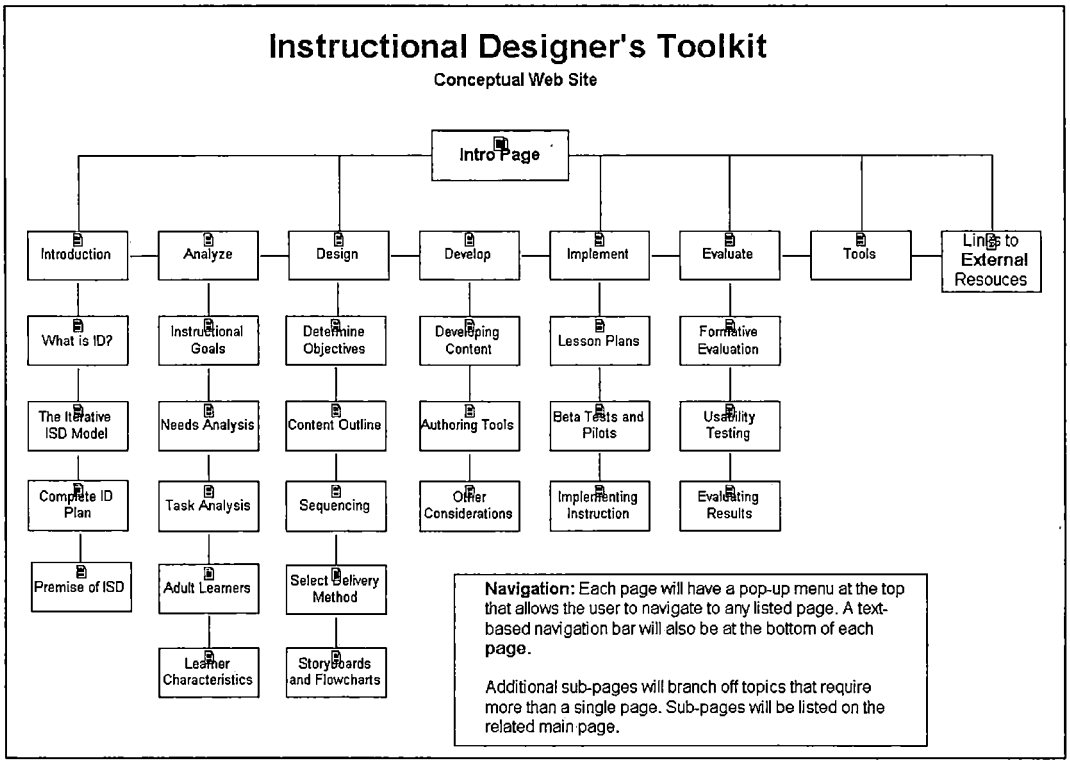
3. Utilize prototypes to fine-tune development efforts. This allows the developer to get direct feedback from the learners, and to make necessary changes before everything has been finalized. It is much easier to change a mock-up or prototype than it is to change the entire project. One suggestion is to develop a "vertical slice" of the finished product, showing the look and feel, one of the interactions, one of the assessments used, etc., and evaluate each of those sections before major work is done on the remaining sections.

Summary

Chapter Four reviewed the conclusions extracted from the project. Lastly, the recommendations derived from the project were presented.

APPENDIX A:

PROJECT FLOW CHART


Instructional Designer's Toolkit
Conceptual Web Site
Intro Page
Introduction
Analyze
Design
Develop
Implement
Evaluate
Tools
Links to External Resouces
What is ID?
The Iterative ISD Model
Complete ID Plan
Premise of ISD
Instructional Goals
Needs Analysis
Task Analysis
Adult Learners
Learner Characteristics
Determine Objectives
Content Outline
Sequencing
Select Delivery Method
Storyboards and Flowcharts
Developing Content
Authoring Tools
Other Considerations
Lesson Plans
Beta Tests and Pilots
Implementing Instruction
Formative Evaluation
Usability Testing
Evaluating Results
Navigation: Each page will have a pop-up menu at the top that allows the user to navigate to any listed page. A text-based navigation bar will also be at the bottom of each page.
Additional sub-pages will branch off topics that require more than a single page. Sub-pages will be listed on the related main page.

APPENDIX B:

STORYBOARDS

Instructional Designer's Toolkit

Introduction | Analyze | Design | Develop | Implement | Evaluate | Tools | Links

Page Title

Topic Title

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Topics for this section:

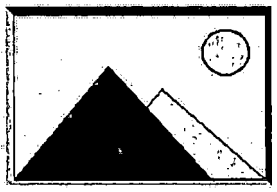
Introduction

What is Instructional Design?

Benefits of Instructional Design

The Instructional Design Model

Summary



Topic Description

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ID Principles | Analysis | Design | Development | Implementation | Evaluation | Toolkit | Links

Storyboard: Instructional Designer's Toolkit

Instructional Designer's Toolkit

Introduction | Analyze | Design | Develop | Implement | Evaluate | Tools | Links

Example

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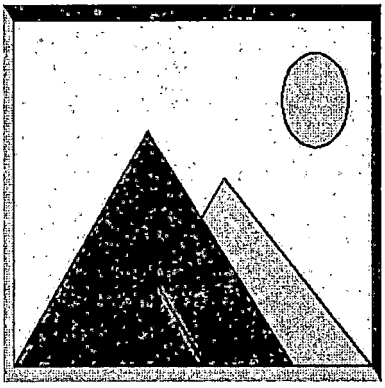
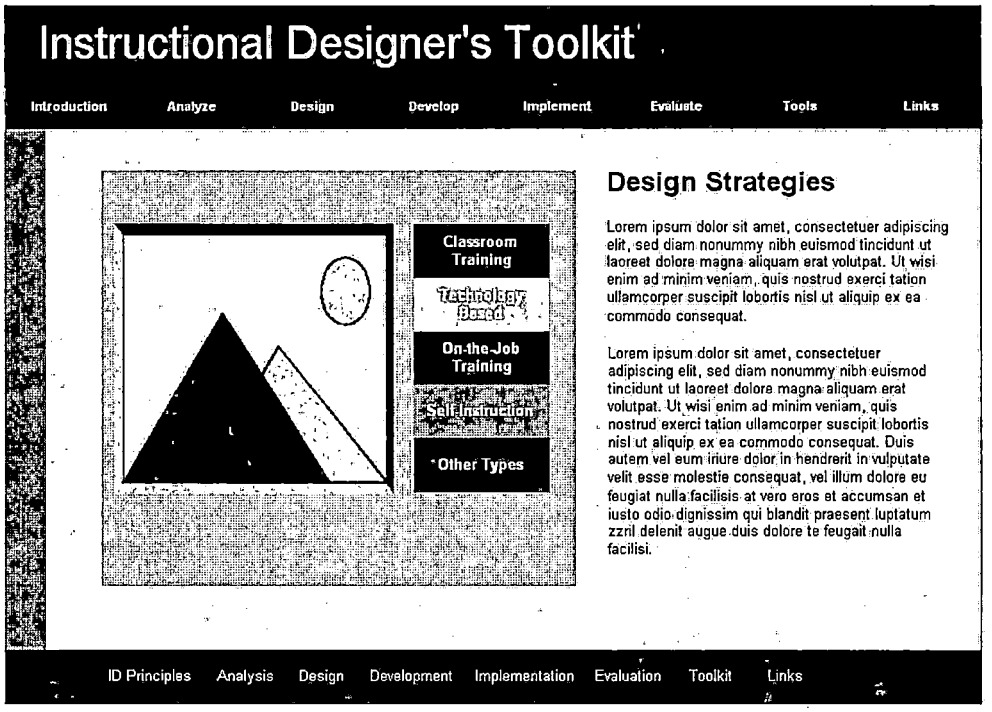
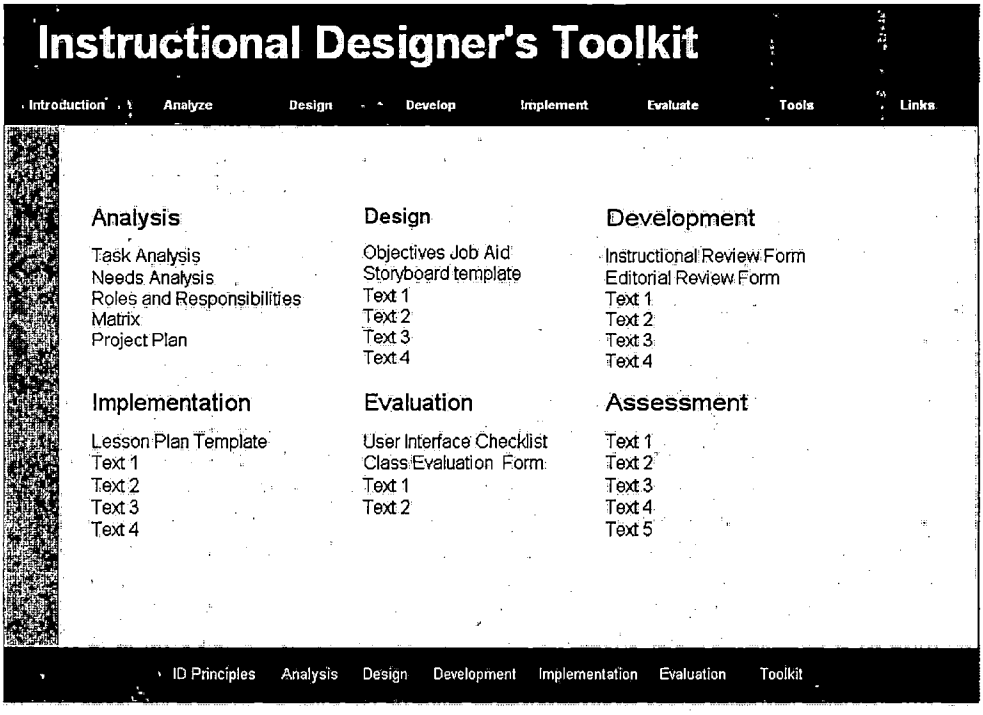


Introduction | Analysis | Design | Development | Implementation | Evaluation | Toolkit | Links

Storyboard: Instructional Designer's Toolkit
© Andrew Masiewicz 2003



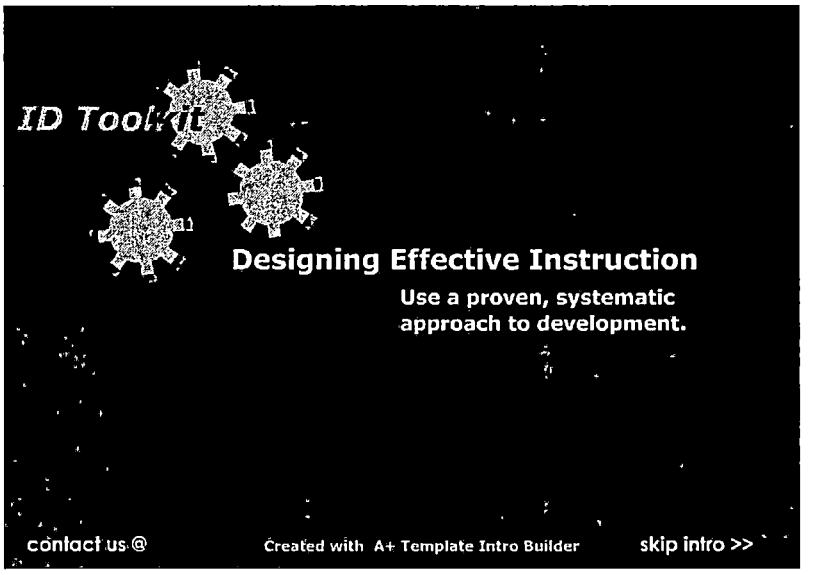
Storyboard: Instructional Designer's Toolkit - Strategies



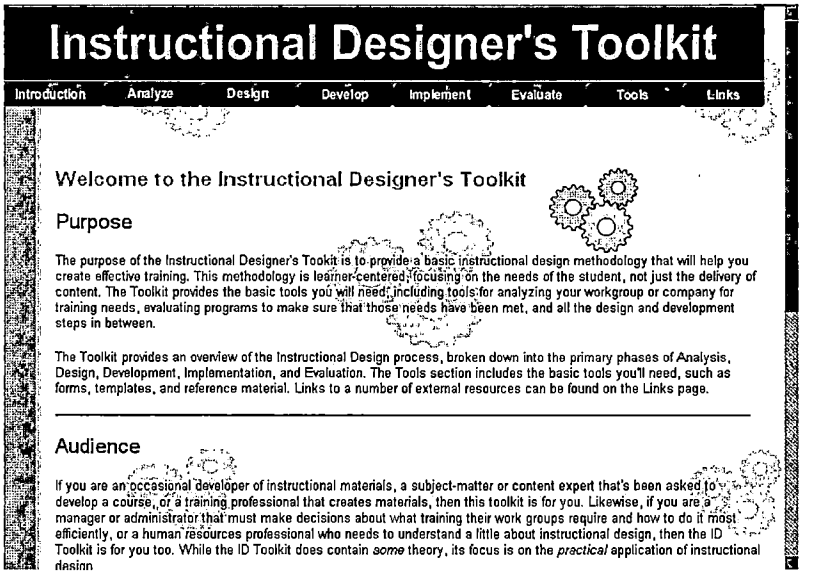
Storyboard: Instructional Designer's Toolkit - Tools Page

APPENDIX C:

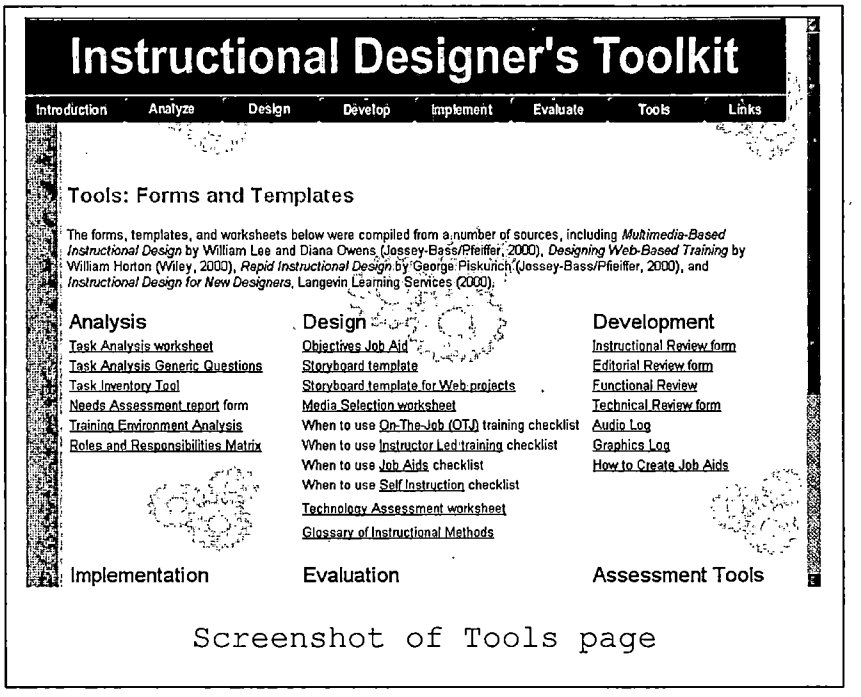
SCREEN SHOTS OF COMPLETED PROJECT



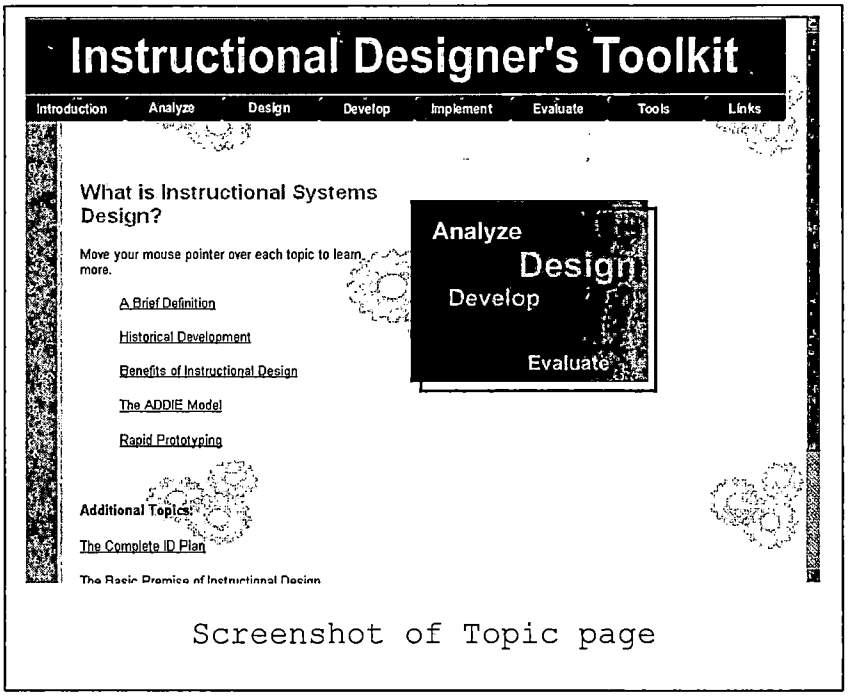
Screenshot of animated introduction



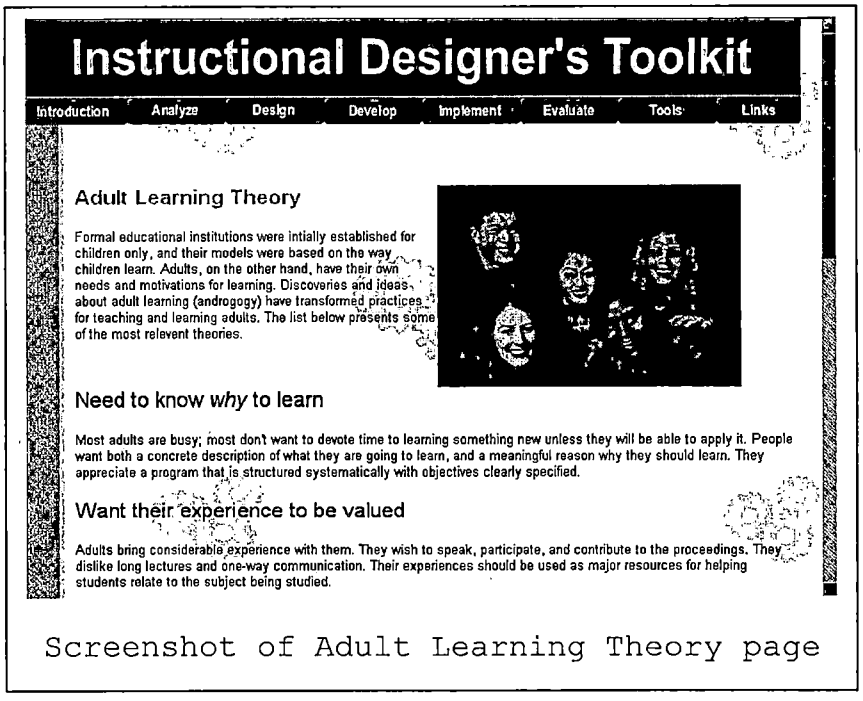
Screenshot of Introduction page



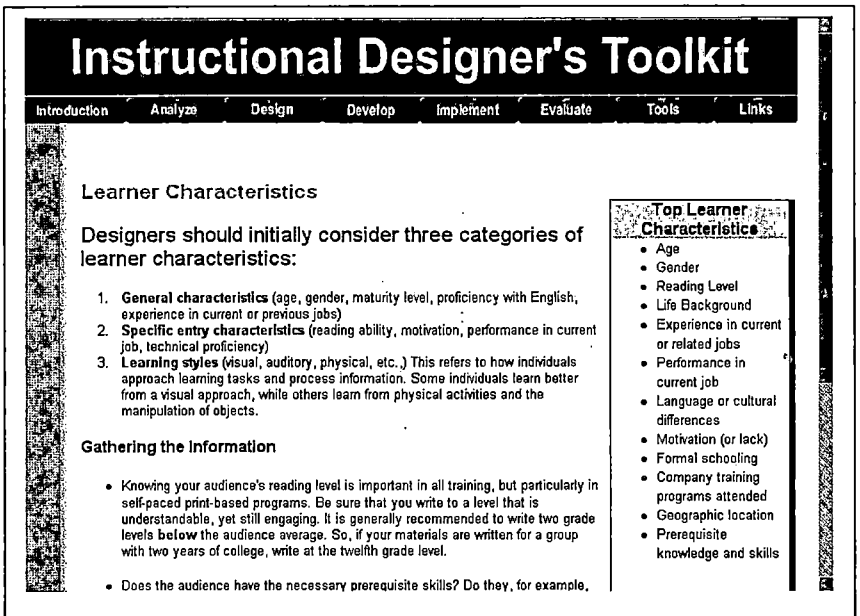
Screenshot of Tools page



Screenshot of Topic page



Screenshot of Adult Learning Theory page



Screenshot of Learner Characteristics

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