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Instructional Design for E-learning, Implication for the Gambia Educational system

Dr Nya Joe Jacob

Physics Department, University of the Gambia

(GAMBIA)

njjacob@utg.edu.gm

Abstract.

The field of instructional design and the actual practice of instructional design involve teams of people, from programmers and graphic artists, to subject matter experts and project managers. In a perfect world, every teacher would have access to such experts for help in designing new instruction. But in reality, we rely on our own experience and observation. In the real world of education, teachers function as "teacher-designers" who determine the need for instruction, design and develop, revise, and teach the materials they develop. As education moves toward eLearning environments, the issues and concerns with designing effective instruction seem to have intensified. And yet, with the application of sound instructional design principles, eLearning environments can be just as effective, interactive, and relevant as campus-based learning. The secret to success is to focus on teaching and learning NOT on the technology.

Keywords:- E-learning environment, Instructional design, Instructional goal, Teaching strategies, Instructional design models.

1. Introduction

There are essentially five phases to designing any instruction, from entire courses to individual lessons: Analyze, Design, Develop, Implement, and Evaluate. E-learning is the marriage of technology and education, and most often, the instructional designer's greatest role is that of "bridging" concepts between the two worlds. This vital role ensures that a subject matter expert's (SME) concepts are properly developed by graphic designers and programmers. Unfortunately, the role of instructional design (ID) in e-learning is often misunderstood - due to the perceived complexity of the process and to poor understanding of the pedagogical requirements of e-learning. To a large degree, ID is the process whereby learning, not technology, is kept at the center of e-learning development.

The *need* for instructional design is being noticed in e-learning - both in corporate training departments and education institutions. This paper explores ID in terms of: definitions, models, and usage. Like many models, ID is simply naming a process that many instructors and course developers already utilize. Often, when instructors first encounter an ID model (like ADDIE), the response is..."Oh, I do that already."

However, as we move into using newer technologies in the classroom, many faculty "forget" their good teaching practices to focus solely on the technology. What happens? Weak instructional practices and rather boring lessons: we default to the presentation of facts through a teacher-centered strategy. How many boring PowerPoint lectures have you seen lately? Using the principles and models of instructional design, we can avoid many of the problems often experienced by new teachers or anyone facing the requirement to use newer technologies in teaching.

Many definitions exist for instructional design - all of them are an expression of underlying philosophies and viewpoints of what is involved in the learning process. Distinguishing the underlying philosophy of learning (in terms of: How does learning occur? What factors influence learning? What is the role of memory? How does transfer occur?)

What types of learning are best explained by the theory? can instructors and designers select the design model most congruent with their education philosophies.

- Instructional Design is the systematic process of translating general principles of learning and instruction into plans for instructional materials and learning.
- Instructional design is a systematic approach to planning and producing effective instructional materials. It is similar to lesson planning, but more elaborate and more detailed.
- Instructional Design is the systematic development of instructional specifications using learning and instructional theory to ensure the quality of instruction. It is the entire process of analysis of learning needs and goals and the development of a delivery system to meet those needs. It includes development of instructional materials and activities; and tryout and evaluation of all instruction and learner activities.
- In general, ID theory needs to move in the direction of flexibility and learner-empowerment if it is to allow ID to keep up with technological and institutional changes...."Like the chiropractor who realigns your spine, we might become healthier from a realignment of our theories. If we admit to and attempt to accommodate some of the uncertainty, indeterminism, and unpredictability that pervade our complex world, we will develop stronger theories and practices that will have more powerful (if not predictable) effects on human learning."
- Instructional design is the process by which instruction, computer-based or not, is created. Instructional design provides a framework for the creative process of design, and ensures the learners' needs are met.

Instructional design ("ID", also known as instructional systems design or "ISD") is a tested and proven methodology for developing instruction. It first gained popularity in World War II, where the Instructional design approach fared so well that it was quickly co-opted into corporate training. In the fifty years that followed, ID has become the standard for producing excellent training in both the military and corporate realms, as well as textbook authoring and development of computer-based learning material Instructional design is a systematic approach to course development that ensures that specific learning goals are accomplished. It is an iterative process that requires ongoing evaluation and feedback.

Instructional Design is the art and science of creating an instructional environment and materials that will bring the learner from the state of not being able to accomplish certain tasks to the state of being able to accomplish those tasks. Instructional Design is based on theoretical and practical research in the areas of cognition, educational psychology, and problem solving.

The first element, the consideration of the curriculum requirements and the actual need for instruction is a realistic first step in planning any course or lesson and is certainly true of eLearning environments. Let's say that you are teaching a freshman composition course (the one everyone picks on as an example). Your school administration has asked you to redesign your successful campus-based course for eLearning. Lately, this has become an all too real scenario: for whatever reason, you are faced with putting technology at the forefront of your course development. What do you do? First, don't panic. Second, don't think you may simply turn lectures into web pages and go home. You are about to create a new approach to the class that will provide a rich learning environment for a new group of students.

In Phase 1 (analyze), you first consider the course curriculum. What is covered in this course? In this case, you know there is a need for the course (everyone has to take freshman composition or at least test out of it) before moving on to higher level courses. The major part of your activities in this early phase will be listing the constraints (demands) on this lesson. You must somehow use the web (when and where it makes sense.). You must present the materials in such a way that students do not get lost in the materials. You must consider your own web skills (assume you know how to use DWL or Moodle) and the time you have to design, develop, and "go live" with your on-line course. What else might be a limitation? The sample (below) from a constraints list for an on-line college course is a good example. Other constraints that could be listed might be the need for small group work or clinical components or students' lack of familiarity with the technology:

Table 1.

Constraint	Solution
Not all student will have access to the internet.	Student may use the computer lab on campus to

	access the course.
Student may not know how to create html files or work with web 2.0 applications for their presentations and projects.	Provide links to easy walkthrough and example exercises.
Student might feel hesitant to participate in online discussion.	Assign point to participation and actively encourage and foster discussion.
Some student may have little experience with distance learning. Others may begin to feel lost in the course without some contact.	Schedule 3 face-to-face meetings with an instructor during the semester to provide life feedback and help.

2. Instructional Goals

Determining and analyzing the instructional goals, learners' needs, and their prior knowledge make up the next two elements in the design model and process. These elements are always examined simultaneously when following good design practices. Often, however, goals are developed for a course with little consideration for entry level skills needed by new learners. Or goals are written in such a way that they may or may not coincide with the kinds of learning intended by the instructor. Robert Gagne's description of learning outcomes (goals) is a useful and relevant way to think about the kinds of learning you intend to take place in your course and how you can write the goals in such a way that they reflect your intentions:

Table 2

Learning Outcomes	Description	Sample Objectives
Discrimination (intellectual skill)	discriminations are demonstrated by discriminating between the sameness or differences of stimuli	Given a sample of a sonnet as a reference, the learner discriminates between sonnets and other poetic forms in a set of sample poems by indicating which poem is the sonnet.
Concrete Concepts (intellectual skill)	concrete concepts are demonstrated by identifying	Given a set of 8 recordings of blood pressure readings, the learner identifies when to write down the diastolic reading by correctly noting the pressure at the appropriate aural cue.
Defined Concepts (intellectual skill)	defined concepts are demonstrated by labelling or classifying	When asked to identify differences in tools, the learner classifies a random set of tools into ratchets, flat tools, and impact tools and labels them appropriately.
Rules (intellectual skill)	rules are applied and principles are demonstrated	Given two types of t-tests (one and two-tailed) and specific problems, the learner applies the correct test with 100% accuracy.
Higher Order Rules (problem solving intellectual skill)	problem solving generates solutions or procedures	Given the dimensions of a site, a limited budget, and building needs; the learner generates a design for a daycare center and explains his or her reasons for choosing the design.
Cognitive Strategies	thinking and learning strategies are selected or adopted for learning	When asked to recall the developmental theory of Jean Piaget, the learner adopts a key-word mnemonic technique for memorizing the major elements of Piaget's developmental theory.
Verbal Information	basic information and facts are stated	Given a verbal question, the learner can state at least two causes for World War II.
Motor Skills	movements are performed or executed	Using a standard keyboard and mouse, the learner designs a personal web site that includes at least two graphics, a resume, and relevant examples of lesson plans.

Attitudes	changes in attitudes are demonstrated by preferring or choosing options	When confronted with a "flame" during an email discussion, the learner will choose to ignore the flame or will temper a response rather than continue to argue.
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Once the curricular requirements are identified and the constraints, resources, and limitations for this course have been determined, it is time to move into the design phase. There are two elements that are usually considered simultaneously: focusing on the instructional goals (and how to accomplish them) and the learner (including needs, characteristics, and skills needed to begin the course). Assessments should always be created or selected after the goals of instruction, learner analysis, and curriculum requirements have been determined. Waiting to create or select assessment tools after instruction has taken place often produces inappropriate assessments at best. More often, assessments that are not closely aligned with the goals of instruction and the scope and sequence of content become inaccurate measures of a student's understanding.

For the freshman composition class, the student carefully matched her overall course outcomes to her unit level goals. Activities and projects allow students to practice using the new skills and knowledge. Assessments were designed to be similar to projects but also challenge students to use their skills to demonstrate understanding.

Table 3.

Goals & Outcomes	Examples	Comments
1. analyzing the need for instruction (needs analysis)	Sample list of curriculum requirements, constraints	Comments
2. analyzing the instructional goals, learners' needs, and their prior knowledge (entry level skills and task analysis)	Course Description and Outcomes	Comments
3. constructing assessments	Projects Grade Requirements	Comments
4. determine instructional strategies and select instructional media	Strategies selected for web delivery	Comments
5. implementing the design: teaching/learning experience		Comments
6. evaluate the connection between goals and understanding, effectiveness of instructional strategies and media. Revise for the next course or lesson. Revise for the next time you teach the class.		Comments

3. Teaching Strategies.

Teaching strategies or methods are determined first by the objectives and goals of instruction and secondly, by the constraints (examined in the first element). In our sample, we must use one of the course management packages (D2L or Moodle) and have much of the class offered "on-line." This will clearly limit our choices in some respects!

Below are sample strategies that match the objective for each type of learning outcome.

Table 4.

Sample Teaching Strategies		
Learning Outcomes	Sample Objectives	Sample Strategies
Discrimination	Given a sample of a sonnet as a reference, the learner discriminates between sonnets and other poetic forms in a set of sample poems by indicating which poem is the sonnet.	Students are given a sonnet structure and asked to diagram the form. Focus on the distinctive features of the sonnet (such as the final couplet). The structure is presented as text and practice. Demonstration.
Concrete Concepts	Given a set of 8 recordings of blood pressure readings, the learner identifies when to write down the diastolic reading by correctly noting the pressure at the appropriate aural cue.	Students hear many different recordings of blood pressure readings and see the mercury rise to the point of no sound and drop to the final sounds for appropriate readings. Demonstration.
Defined Concepts	When asked to identify differences in tools, the learner classifies a random set of tools into ratchets, flat tools, and impact tools and labels them appropriately.	Students have several examples of tools. Distinctive features are identified for each type. Demonstration.
Rules	Given two types of t-tests (one and two-tailed) and specific problems, the learner applies the correct test with 100% accuracy.	Students must run t-tests on data in a variety of situations. Demonstration.
Higher Order Rules (problem solving)	Given the dimensions of a site, a limited budget, and building needs; the learner generates a design for a daycare center and explains his or her reasons for choosing the design.	Students must have an understanding of the correct calculations and measurements demonstrated by correctly practicing on smaller forms. Demonstration.
Cognitive Strategies	When asked to recall the developmental theory of Jean Piaget, the learner adopts a key-word mnemonic technique for memorizing the major elements of Piaget's developmental theory.	Demonstrate the power of mnemonic memory strategies, rehearsal strategies, method of Loci, etc. Show examples of each.
Verbal Information	Given a verbal question, the learner can state at least two causes for World War II.	Present facts about the war from many perspectives.
Motor Skills	Using a standard keyboard and mouse, the learner designs a personal web site that includes at least two graphics, a resume, and relevant examples of lesson plans.	Demonstrate web site development using an html editor (software). Discuss layout, graphics and formats, copyright issues, linking, and content.

Attitudes	When confronted with a "flame" during an email discussion, the learner will choose to ignore the flame or will temper a response rather than continue to argue.	Propose several scenarios that allow students to compare reactions and motivations of speaker and listener. Demonstration.
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Notice that most strategies you would use involve some kind of demonstration (models) of the behavior or actions you expect from the students.

Now that the goals have been defined and learner needs, characteristics, and entry level skills have been determined, appropriate assessments can be created. Creating and selecting appropriate assessments is an entire field in itself, your assessments MUST be based on the goals and objectives you wrote earlier. Many of you can probably recall taking a class that seemed to cover certain topics in one way, while the tests seemed to be measuring something quite different. For example, a unit in a history class may have covered many facts about the Civil War. The students are drilled on dates, places, events. At test time, the instructor gives an essay test that calls for students to interpret nuances, explain interactions, and compare and contrast perceptions. The instructor has TAUGHT verbal information but is TESTING on intellectual skills and cognitive strategies. That creates a mismatch between the goals of instruction, the scope of the material covered, the analysis of learner skills, and how students might demonstrate new knowledge. Think about YOUR course. Carefully consider the goals and objectives you've written. Notice that assessment development is part of the design phase and development phase. Assessment instruments interact with the goals and learner analysis and are further modified as teaching strategies are determined. Test items MUST be examined together with the goals of instruction and the scope of what was covered.

4. Research Design and Data

Instructional Systems Design model is an organized procedure that includes steps of analyzing, designing, developing, implementing and evaluating instruction to improve the quality and effectiveness of instruction and to enhance learning. The characteristic includes- to guides the preparation of instruction to accomplish specific goals and objective, to emphasizes the congruency among the objectives, instruction, and evaluation, and to focus on the system of instruction, which is "the intentional arrangement of experiences, leading to learners acquiring particular capabilities" (Smith& Ragan, 1999).The research design of this model is focus on the following- (i) Classroom focus: the goal is to do better job of instruction within the constraints of the situation, in which a teacher, students, a curriculum and facility already exist. The emphasis is on selecting and adapting existing materials and instructional strategies.(ii) Product focus: The goal is production of instructional products. The development of the product, and the product's objectives may have been given. (iii) Systems focus: The goal is to develop instructional output, which may include material, equipment, a management plan or an instructor's training package. The focus demands extensive analysis of the use of environment, the characteristics of the task, and whether or not development should even take place. It is a problem solving approach requiring data collection to determine the precise nature of the problem.

The system includes major processes: conducting needs assessment, establishing overall goals, conduct task analysis, specify objectives, develop assessment strategies, select media, produce materials, conduct formative evaluation and summative evaluation. Formative evaluation: gathering information on adequacy and using this information as a basis for further development - during the development of improvement of a program or product . Summative evaluation: gathering information on adequacy and using this information to make decisions about utilization after completion and for the benefit of some external audience or decision maker agency, or further possible users It indicates the generic procedural framework that includes the steps of analyzing, designing, developing, implementing and evaluating instruction.

5. Analysis and Use of Data

In conducting the Systems Analysis of ID on needs assessment is to collect and analyze data about problems with instructional solution or problems with other solutions. The designers must know the goals, functions ,resources, constraints ,chain-of-command culture of the school system. Data is collected on the specific school population to

determine their general characteristics, motivation, sophistication of learners, and performance levels. The school environment is studied based on the on-job training, formal instruction and small group interaction. The analysis would determine whether there are any gaps between what is and what should be, and to determine the causes of the problem, whether it is instructional, motivational or environmental.

If the solution lies on instruction, then we would proceed with task in task, content, learner analysis, testing and measurement, media selection and production, and evaluation. In need analysis we would determine to what extent the problem can be classified as instructional in nature, identify constraints, resources, and learning characteristics of the learner. Determine the gap between what it is and what it should be (the gap between the capabilities of performers and the desired performance), and prioritize the needs of the learner. Then identify the causes of the problem and propose instructional or non-instructional solutions depending on the situation. The task analysis involved analysis of the learner, the task, and the context. However, task analysis is essential to identify the content and the process that are required to achieve the desired learning goals. For instructional designers, we have to determine whether an instructional need exist, and then specify what to be learned in order to develop how to learn and how to evaluate the learning process. The analysis of the context is much more strongly influenced by systems theory and sociological theories. The attention given to the analysis of the learner has grown since the learner plays a constructive role according to cognitive theory. The learner's characteristics. i.e. attitudes, motivations, attributions, and interests, are considered in the design.

6. INSTRUCTIONAL DESIGN MODELS

Instructional design, very loosely defined, is a system or process of organizing learning resources to ensure learners achieve established learning outcomes. As such, it is essentially a framework for learning. From a designers perspective, various models can be followed in the instructional design process. It is important to note that, at best, a model is a representation of actual occurrences and, as such, should be utilized only to the extent that it is manageable for the particular situation or task. Put another way, perhaps one model is more effective for designing a math course, and another model is more effective for designing soft skill courses (like managing people, customer service, etc.). Instructional Design Models offers an excellent visuals depicting various models. Here is an overview of some different models for instructional design: ADDIE - refers to Analyze, Design, Develop, Implement, Evaluate. This is possibly the best known design model, and is frequently used in academic field. Algo- Heuristic- "The theory suggests that all cognitive activities can be analyzed into operations of an algorithmic, semi-algorithmic, heuristic, or semi-heuristic nature. Once discovered, these operations and their systems can serve as the basis for instructional strategies and methods. The theory specifies that students ought to be taught not only knowledge but the algorithms and heuristics of experts as well." Dick and Carey Model "The Dick and Carey model prescribes a methodology for designing instruction based on a reductionist model of breaking instruction down into smaller components. Instruction is specifically targeted on the skills and knowledge to be taught and supplies the appropriate conditions for the learning of these outcomes." Robert Gagne's ID Model "Gagné's approach to instructional design is considered a seminal model that has influenced many other design approaches and particularly the Dick & Carey systems approach. Gagné proposed that events of learning and categories of learning outcomes together provide a framework for an account of learning conditions. Minimalism " The Minimalist theory of J.M. Carroll is a framework for the design of instruction, especially training materials for computer users. The theory suggests that (1) all learning tasks should be meaningful and self-contained activities, (2) learners should be given realistic projects as quickly as possible, (3) instruction should permit self-directed reasoning and improvising by increasing the number of active learning activities, (4) training materials and activities should provide for error recognition and recovery and, (5) there should be a close linkage between the training and actual system." Rapid Prototyping "Generally, rapid prototyping models involve learners and/or subject matter experts (SMEs) interacting with prototypes and instructional designers in a continuous review/revision cycle. Developing a prototype is practically the first step, while front-end analysis is generally reduced or converted into an on-going, interactive process between subject-matter, objectives, and materials "

6.1 Epathetic Instructional Design

5-step process: Observe, capture data, reflect and analyze, brainstorm for solutions.

7. IMPORTANT OF INSTRUCTIONAL DESIGN

With a foundation of what instructional design is, and various models for implementation, we will now focus on the WHY of ID in e-learning. Many classroom activities don't leave a "trail" that can be viewed by others (at least not directly - successes of graduates of a program can be evaluated and the relevance of courses assessed). Online learning is far more transparent. Classroom discussion is generally not archived (though certain lectures can be taped and shown to students)...whereas every aspect of e-learning is transparent and can be used as a resource for subsequent courses. Content, discussions, interactions, etc. can all be evaluated and reviewed by persons other than the instructor. As such, quality can be assessed more objectively in e-learning. ID is a quality process. It seeks to ensure that critical concepts are explored through content presentation and learning activities. Beyond quality and transparency issues, the greatest value ID offers is to students of online programs. The greatest objective of **ID is to serve the learning needs and success of students through effective presentation content and fostering of interaction.** "Distance learning courses are likely to fail if they are delivered as if they were traditional courses." (Smith, 1996) "Pedagogy must drive the choice of instructional technology, not the other way around." (Chizmar & Walbert, 1999) "Compared with a human instructor, technology is less adaptive. Once a plan of integration is implemented, it is less likely to change it according to student's reactions. This is why instructional design plays an important role in bridging pedagogy and technology. Subject contents have to be well organized and strategies for teaching via a chosen medium have to be well-thought-out. Instructional design can help educators making the best use of technology; therefore guarantee a successful integration." Provides consistency between various courses developed by various instructors/designers. The general look and process of content exploration is standardized. In a classroom, an instructor can adjust "on the fly"...if, during the design process, a concept was not communicated clearly, a classroom instructor can clarify. Online, this type of adjustment is usually not possible. The design process must anticipate and meet potential concerns/ambiguities...or put another way ID tries to do online what the instructor does in a classroom.

ID focuses on the most effective way to present content

ID begins with the learner and the learner experience

Quality of course is ensured through ID - covers all the phases of good development

ID gives structure to the student's process of working through course material

Appropriate use of technology: "With e-learning and blended learning proving to be no more effective than traditional classroom methods, why are so few training professionals recognizing this simple fact: Technology, no matter how advanced, cannot compensate for its misapplication. Here's why instructional design is - and always has been - the key to unlocking the true potential of available learning technologies." Accelerate development. A current concern in e-learning is development time. ID can speed up development time.

Creates a transparent process - easier to track and utilize the experiences of development teams (a knowledge management issue). "Too much of the structure of educational technology is built upon the sand of relativism, rather than the rock of science. When winds of new paradigms blow and the sands of old paradigms shift; then the structure of educational technology slides toward the sea of pseudo-science and mythology. We stand firm against the shifting sands of new paradigms and "realities." We have drawn a line in the sand. We boldly reclaim the technology of instructional design that is built upon the rock of instructional science."

8. Conclusion

The growth and success of e-learning is closely linked to the design of quality learning, enabled through the use of technology. Instructional designers play the pivotal role of bringing together these disparate fields - for the benefit of students, instructors, and organizations. Many of the concerns of online learning drop out rates, learner resistance, and poor learner performance can be addressed through a structured design process. The resulting benefits - reduced design costs, consistent look and feel, transparency, quality control, standardization - make organizational investment in ID a simple decision.

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