

INSTRUCTIONAL DESIGN FOR MULTIMEDIA

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***ABSTRACT:** Instructional design concepts are not new regardless of how little they may be discussed (or ignored) in technology projects. Part of the problem is that instructional design is often viewed by information systems (IS) educators as synonymous with structured design. Unfortunately, as IS educators move into the world of using and teaching with multimedia technologies, such simplifications can lead to projects that become structured failures. This overview highlights key areas associated with instructional design that should allow the reader to avoid many pitfalls associated with multimedia utilization in higher education and training.*

***KEYWORDS:** Multimedia, Instructional Design, Videodisc, Information System Curriculum, Training*

INTRODUCTION

Multimedia projects require more skills than covered in a systems analysis or structured programming class. Therefore, educators and trainers considering the use of multimedia tools should first become familiar with what skills they are going to need. Equipped with the proper expectations and goals, an instructional design project using multimedia technologies should be a story of excitement, progress, success and learning. Done wrong, however, a multimedia project can become a story of agony, frustration, heartbreak and disappointment. This overview highlights key areas associated with instructional design that should allow the reader to avoid many pitfalls associated with multimedia utilization in higher education and training.

Before starting an instructional multimedia project, the instructor or project manager must decide whether multimedia is the most cost effective tool for meeting the learning objectives. Even if multimedia looks like a good fit, the designer must still be on guard against using every bell and whistle available. While the new technologies allow for new creative solutions, technology also can become a stumbling block when used in excess. For, according to Norman (1), while "it is a

common belief that the human mind excels in reasoning . . . the belief is overrated. Conscious thought is slow, serial, pedestrian, and severely constrained by a limited working memory. In fact, poor performance may result from paying too much attention to the application of the relevant information." From the instructional designer's point of view, you can never underestimate the confusion possible in a learner's mind.

What follows is a distillation of the key topics that must be considered when planning, organizing, directing and controlling the instructional design process.

INSTRUCTIONAL DESIGN OVERVIEW

Before considering the application of instructional design (ID) techniques to multimedia projects, it is essential that a common perspective of the field be explicitly stated. Dick and Carey recommend approaching an ID task through a detailed process outlined in Table 1. (2)

If followed slavishly, this process could leave an IS educator or student on step five (or less) at the end of a semester . . . lots of analysis with no product. Making the trade-off of efficiency for effectiveness, a shortened version makes sense when

considering teaching and implementing multimedia projects of a small scale. Romiszowski, in a chapter titled Why Projects Fail, has only three main steps: design stage, development stage, and dissemination stage. (3)

Table 1: ID Process

1. identify instructional goals
2. conduct instructional analysis
3. write performance objectives
4. develop criterion-referenced test items
5. develop instructional strategy
6. develop and select instructional materials
7. design and conduct formative evaluation
8. design and conduct summative evaluation

Some balance between these two approaches should be selected based on the value of the project being undertaken and the resources available. At the least, the instructional goals should be charted to detail the steps the learner must follow. Next, performance objectives that break down what student performance would

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satisfy the goals must be explicitly documented. Finally, the methodology and criteria for testing learners also should be documented in advance. The omission of the last two steps can result in a fine project being viewed as a failure.

ID PROBLEMS IN MULTIMEDIA

Certain difficulties impact multimedia projects more than in a typical lesson plan development cycle. Other problems are new. The troubles often come from overly enthusiastic goals coupled with an overly complex environment. The next five areas emphasize the need for controlling the goal definition stage of a multimedia project.

Project selection

Those just beginning to work in multimedia environments should beware of attempting to do what they want to do. Dreams of leaping forward with a new educational paradigm should be cut back in content, cost, and time to a seemingly small size. Projects should be selected based on instructional value, people availability, people commitment, and, very importantly in a video-based project, content stability. Projects of the "gee, that would be neat" type are best left for later.

Media mix

Multimedia is just that -- more than one medium used together. However, what

media are in the mix is widely variable. Some authors (and companies) seem to consider hypertext and CD-ROM hardware as the full range of multimedia. Others validly recognize that music, voice, sounds, still-camera images, graphics, animation, live video, and videodisc sources also should be considered in many projects. Each additional selection significantly increases design and implementation complexity.

Skills mix

Once beyond the relative safety of a text-based realm, instructional developers will need to have available a wide range of skills. The traditional computer-based training skills must remain: subject matter knowledge, project management mastery, design competence, and teaching skills. The new skills needed may include radio, television, and graphic arts proficiencies. These new requirements for talent may call for the inclusion of additional members to the development team.

Learner mix

As with almost any educational setting, the entry level knowledge and learning styles of the students will not be consistent. Carlson (4) studied such independent variables as: "format (individualized and small group); design for instruction (inductive and deductive); and match of learning style and design of instruction (matched and unmatched)." She reported significant differences leading her to postulate that

an inductive learner in deductive instruction did not have sufficient opportunity to intellectually engage in and digest the information and derive meaningful personal categorizations. A deductive learner in inductive instruction was likely to become frustrated and lose attention when the instruction seemed unclear, with consequent loss in opportunities for instruction.

Another difficulty comes when teaching educators about multimedia instruction. Basically, the problem "is

that few of (them) have actually ever used interactive media to learn anything themselves" (5) and they have trouble relating to the process from the learner's viewpoint.

Multimedia interference

As suggested earlier, too much use of flashy technology can lead to trouble. Carliner (6) refers to this as adding noise to the message to the learner.

Communication is needed to motivate students. Sometimes, this motivation is overt -- such as beginning a (corporate) videotape with a message from the company president -- to tell the students that the training module that follows is important. Sometimes, this motivation is covert, such as the enthusiasm in instructors' voices that demonstrates their love for a subject. Although it is essential to any learning activity, communication also has the tendency to generate noise. Noise is information that is not part of the message but gets transmitted with it anyway.

Extraneous buttons, graphics or other "screen enhancements" will cause students to look for meaning . . . a reason for the presence of such items on the screen. In other instances, what starts out as noise may change into information as the student develops a new grain-size (the more you know about a topic, the more distracting details that meant nothing become the really interesting areas of inquiry). Currently there are instructors who put too many words on an overhead and make finding their instructional goals a complete mystery to the learner. The bad news is that, without some intervention, these folks will go on to develop more powerful instructional messes using multimedia.

MULTIMEDIA PROJECTS HINTS

Plan for success

I make considerable use of the equation for satisfaction (read as success) in my work. (7) The equation states that

satisfaction is equal to reality divided by expectations (1.0 is used as normal in each area). Expectations can easily be off-target when using the new technologies associated with multimedia. Good projects can be evaluated as failures simply because reviewers have the wrong or inflated expectations. Everyone who will judge the final project, whether management, department chair, peers or students, must be clearly told what to expect (and, sometimes more importantly, what not to expect).

Clearly defining success before starting is the biggest factor in being able to declare victory when the multimedia project is done.

Regrettably, there is no clear agreement about what a good design is in the first place. In a survey conducted by the editor of Data Training, trainers completed the phrase "a good instructional design is like" with such remarks as "like nothing I've seen around here" or "likely to be disapproved by my boss." (8) The disappointing reality is that there is no book of template designs from which the instructor can choose. He or she must rely on the support of people with appropriate skills and a clear vision of the goals of the project.

Emphasize orientation

While taking a graduate psychology course in human memory and learning, I had to make several in-class presentations covering assigned readings. One was titled something like "Prospective vs. Retrospective Memory Strategies in Rats Running a Twelve Arm Radial Maze." Even after making the presentation, I considered this topic "noise." I was wrong.

In the experiment, a group of rats was placed individually in the center of a maze consisting of twelve straight paths from the center with food at the end of each arm. Rats, being by some measure intelligent and resourceful, typically did not repeat

trips down an arm where they had already eaten the food that day. The experiment then varied the time the rats were left in the maze. The results showed that if the rats were allowed to eat from a few arms or most of the arms and then removed for awhile, they seemed to remember where they had already eaten when put back in the maze. Visual and scent clues were controlled for in the setting. However, when the rats were allowed to finishing half the food and then removed, they fared much worse. The researchers speculated that the rats changed memory strategies from remembering where they had been (retrospective) to remembering where they had yet to go (prospective) as one list became shorter than the other.

Several weeks later I set out to update lab PC software on twenty machines. Students came and went on various systems as I worked. When I ran out of time that morning, I looked back into the lab and realized how much I had in common with the rats. I could only remember the few systems I had yet to install (prospective). However, when I started through the lab, I distinctly remembered keeping track of which units I had finished (retrospective). Somewhere along the way, I changed memory strategy.

The point here for multimedia designers is that each learner will attempt to make and continuously update a mental map of the instruction -- even in a straight-line instructional sequence. This mental effort will reduce the ability of the learner to focus on the new material. Therefore, the designer should carefully develop an appropriate method of keeping the learner aware of where they have been and where they are going in the instruction.

KEYS TO SUCCESS

Target and stay focused of the learning goals of the project. Do not use technology "frills" unnecessarily. Gain approval of clearly defined success measures before starting.

Provide obvious, not clever or cute, orientation and control mechanisms throughout the project. Tell the learner how to use the system and what to expect.

Let users have control over the learning without letting them stray from the objectives. Never let the learner get lost (hypertext hotwords of optional informational paths such as definitions are great, hotlinks that bypass instructional materials are perilous). A lost learner is a non-learner.

The orientation plan provided also should serve to present the users with a topic overview before allowing them to look deeply into any sub-topic. Without forming a holistic view of the instructional goal first, the learners will be much less successful when they attempt to construct an individualized knowledge set of the new material.

Clearly defining success before starting is the biggest factor in being able to declare victory when the multimedia project is done. Those doing their first multimedia project would be well-advised to under-commit when defining what they will accomplish. If the project exceeds the promised goals (reality greater than 1.0) while expectations remain comparatively low (1.0), satisfaction levels will be high.

Finally, again especially for those embarking on their first multimedia venture, the best chance of success may be through the purchase of existing software and videodisc packages. However, while the educational value may be good with this path, IS educators will not learn as much as when doing their own project.

An alternative is to buy an existing videodisc and "repurpose" it. Repurposing requires either custom programming or the use of an authoring tool such as IconAuthor, ToolBook or Course Builder. (9) This last approach can provide a good compromise between instructor learning and student performance.

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