TEACHING WITH TECHNOLOGY

# INSTRUCTIONAL DESIGN

*A primer on the Latest in the Field of Instructional design*

## What is Instructional Design?

As a teacher you are already a practicing instructional designer. You develop curricula, plan your lessons, develop assessment and evaluate how you can improve your teaching from semester to semester, all of which are part of the ID process. As a discrete discipline instructional design differs from what you do only in that it is an organized field of knowledge that specifically refers to the intentional use of various technologies and takes advantage of specific theories of instruction and the mind. By introducing you to some of the theory and practice of instructional design we hope you can find some tools to enhance your practice as a teacher, especially as it relates to the implementation of technology.

Knowledge of instructional design is particularly important as you evaluate new technologies for teaching and learning, especially when you decide that you would like to develop your own multimedia materials or work with the asynchronous technologies of on-line learning. Instructional design can help you be a more effective teacher on-line or off and help you understand certain problems that you will encounter when using any medium as an instructional tool.

Modern instructional design dates back to the latter part of the 19th century and the early part of the 20th century when psychology began to separate from philosophy as a discipline and take on the characteristics of an independent science. One of these pioneers in psychology, B.F. Skinner, determined that instruction could be more effective if it were based on scientific principles. He proposed that it could be designed and tested for effectiveness in meeting learning objectives.

The ideas put forth by Skinner and others have changed over the years, especially as more effective theories of the mind have come forth, but there are certain core practices of instructional design that have remained fairly consistent. The process can generally be broken down into four parts:

1) Determine your goals for the instruction

2) Develop a strategy to meet these goals

3) Evaluate how well your strategy worked

4) Based on your evaluation, improve your design.

If you notice the instructional design process is circular. You use evaluation to go back and reassess your goals and strategies. In an ideal environment you are always improving your design.

## What are Goals?

In any given discipline there are things that one needs to learn as one goes from a novice to an expert. As an expert you know what is important to understanding how to solve a given problem, understand a topic or demonstrate proficiency in your area of expertise. As an instructor you can identify what you expect a student to know at the end of a given course. These are the basis for your goals. Instructional design starts with identifying these goals for a given unit of instruction.

Identifying goals is something only you, as a disciplinary expert, can do. What do you expect students to know about your field of expertise? What knowledge and skill do you think is important for them to know if they are to be well educated in your discipline? What knowledge do you hold to be required of an expert? Instructional design starts with you articulating this at the very start of the process.

In your design process placing your expectations at the start of the process is very important because it determines everything else that comes afterwards. While we might use similar techniques across disciplines and courses they only make sense if we know our goals in advance. No technology or medium is inherently capable of being a tool for instruction any more than a hammer is capable of hitting a nail by itself.

A key part of any design strategy is to think about specific knowledge, skills and performances you expect students to know and to put them in explicit terms that are detailed and specific. Some of us can express larger goals quite well, but we often have a hard time identifying the specific things that we expect a student to accomplish. You have to be as detailed as possible.

A good tool to help you identify your goals is a rubric. It is a simple means to chart your expectations, and as you will see it will prove to be useful throughout the design process. It is not just a design tool, but also identifies what you need to include in the assessment process.

Students tend to perform better when they know what is expected of them and have an idea of what the standard are, but you will also teach better once you've clearly articulated for yourself what exactly you'd like to see at the end of your semester. Rubrics also have a powerful role to play in your academic discipline as they can be shared with your colleagues to see if you have similar goals and

expectations for the students in your discipline. Rubrics are a central part of helping your students understand by design, but they are also helpful in creating an academic culture of shared expectations.

## What are Strategies?

Strategies for instructional design generally involve a choice of techniques, media and organization grounded in a theory of instruction. Many strategies familiar to you might be those grounded in a theory called Behaviorism, but current instructional design practice generally looks to the theories such as Constructivism as a basis for design. It places the emphasis on active learning by the student and calls for authentic and performance-based assessment.

Constructivism starts with a very basic idea. We construct our own knowledge in an active and engaged manner throughout our lives and each person has a personal role in the process of their own learning in a social context. With this emphasis on the individual learner in society Constructivism recognizes that everyone has a different approach to the world. It encourages us as designers to use a number of different perspectives and techniques to present knowledge and to embrace problems and complexity. It is also concerned with questions such as the transferability of knowledge and the need to put learning in a context where students take an active role in their own education. For you as a designer it means re-evaluating current strategies for instruction, such as how you present information, place it in context and take into account what the learners see from their multiple perspectives. For more information on the theories that make up Constructivism and that will support your strategies you can look at our theories page.

Strategies themselves can be fairly diverse. In many discussions on instructional design strategies are centered on questions of technology or media use, but keep in mind that the definition you use for this can be very broad.

Some strategies can be relatively conventional and self-limiting. For example, you might have determined that for a course in the sciences, such as physics, a specific lesson on the principles of Newton's Laws require a digital video or an interactive graphical display to make them more understandable. You might not want to do much more than that and maintain a lecture format for most of your instruction. Conversely, you might want to do a more dramatic change, taking Newton's Laws and situating them in an actual setting where students have to work on a group project that puts the scientific principles into a realistic setting, such as simulating how the laws are applied by scientists and engineers in the real world and situating the learning in an authentic context. You could, for example, create a situation where students have to explore how the use of seatbelts for automobile safety is of itself an application of Newton's conception of inertia using a simulation of automobile design. In the humanities you could explore history as an actual historian would use primary sources and the like by introducing digital representations in various media that simulate what an actual historian using primary sources would do. Your strategy can be as broad or as precise as you want it to be, but you should start with a theory of instruction. The criteria are how it improves your meeting your goals. To do this you need a method to evaluate your design.

## How Do You Evaluate Your Design?

Any evaluation is based on the idea that if you put in place the right strategy you will see students meet the initial goals you set out at the very start of the process. Often we see evaluation in schools as being of the student, but in instructional design we see student outcomes as being a means to critique our methods as well. For example, if we find that students aren't mastering a certain topic we examine how we can improve our design so they will. Evaluation isn't just about how the student performs; it is also about how good the design is at meeting our goals.

Current evaluation measures use the various ideas that have arisen from Constructivism to look for more authentic ways for students to present what they have learned for you to assess and measure. There is a tendency to downplay such classical Behaviorist assessment strategies such as short answer, multiple choice and true/false tests in favor of portfolios, multimedia presentations and the assignment of authentic tasks in a simulated environment.

Your evaluation of your design can be based on the same tool you use to assess student performance. You are, after all, measuring how successful your design was in achieving your instructional goal of having a student competently understand a given curriculum and be able to demonstrate a given level of expertise.

When you evaluate your students you are doing so within the context of your goals and your strategy. You will be able to identify what needs to be improved by seeing what goals were not met or those that were met inadequately. You will also see where certain misconceptions have been made in the course of their learning process and address that in your design.

## Using Multimedia

Most of us grew up in a world where instruction was generally delivered by a lecture and a textbook. Perhaps a workbook based on behaviorist principles was used as well. When another medium was used it was generally strictly under the control of the instructor, such as a filmstrip or a video. Today, with multimedia technology we can make the classroom a far more interesting place.

With multimedia you can liven up your instruction with student-centered techniques that take full advantage of modern technology. Students can use tools such as digital cameras, scanners, video cameras, audio recorders and presentation tools such as PowerPoint to create portfolios, presentations and websites that can tools for collaboration and authentic assessment.

## Digital Photos

Inexpensive digital cameras have a great deal of value as a tool for education. You can use them to document your classroom activities and events or use as an icebreaker for class introductions and the like. They can also be powerful tools to collect data in visual form. When you look at how visual information is used in so

many diverse disciplines such as anthropology, journalism and engineering you can see how you can develop a means to introduce low-cost digital photography in your class as well. You'll find that digital cameras have many more applications than you've imagined once you start using them.

## Scanners

Scanners allow you to take images or text and put them in digital form so you can manipulate, store and distribute them using a computer. You can scan in text using OCR software that will allow you to save it for use in a word processor and images can be saved for editing in graphics software.

A scanner allows you to use the power of digital technology to share physical artifacts such as images and text that currently are only available in a fixed form such as a book or print. You'll find this is particularly useful in sharing materials with students that might normally not be available to them. Students can use scanners themselves to include various sources in their presentations as well.

## Digital Audio

Audio is one of the things that people tend not to think about when they first use multimedia, but you should consider it as one of the best tools available to you. With simple audio recording equipment you can record a narration for a presentation that you can make available on-line. You can also introduce methodologies such as the oral history to your classes or creative uses such as student performances of poetry and the like. It can also be a useful tool for taking notes in the field and recording debates and interactions that take place in the lab or classroom. Audio can also be a great tool to introduce multiple perspectives and counter-narratives to a given course of investigation.

## Digital Video

Digital video is a technology that allows you to shoot, edit and distribute audiovisual materials. While the digital camcorder is perhaps familiar to you it is not the end point of digital video, just the start. Editing digital video, a task more often than not done on a computer, allows you to take the raw materials that you've shot and gathered by other means and give them meaning through montage and add graphics, sounds and effects. Editing isn't just taking out the materials you don't want; it is also about combining and contrasting audiovisual materials to enhance their effectiveness and meaning.

One of the more exciting aspects of digital video is the flexibility in distribution. While shooting with a digital camcorder is very similar to shooting with an analog one digital video as a means for distribution allows for far more flexibility and broader use than earlier analog methods. Digital video can be put on a server to be distributed via the Internet, burned onto a CD or DVD, used as an element in PowerPoint and can even now be delivered to a cell phone. It can even be delivered live for remote monitoring, such as is the case with a web cam or a teleconference. Digital video can be an excellent tool for nearly every discipline.

## Presentation Tools

Most of us are familiar with presentation tools such as PowerPoint, but we often aren't aware of the full capabilities of this particular tool as well as related tools that can also be quite effective.

PowerPoint can be extended to include image files, graphics, video and audio clips. It can also be made into a stand-alone application that can be distributed for people to use outside of a class or lecture. With Impatica you can put your PowerPoint presentations on the Internet and make them small enough to be shared easily with your students even if they are using a dial-up connection.

Presentation tools are particularly effective if you allow students to use them to build project presentations, portfolios and the like. One of the particularly powerful features of presentation tools is that they can serve as the "envelope" for other digital media.