Seeing is Believing:

Video Mock-Ups to Evaluate and Demonstrate Multimedia Designs

By Peter J. Fadde

Designers of interactive instructional multimedia programs often need to demonstrate proof of concept for a program that does not yet exist. Whether an in-house design team is seeking priority funding for their multimedia project, a free-lance designer is seeking development partners, or a team of graduate students is presenting their final project, a video mock-up has the twin benefits of demonstrating design features and depicting user interaction with the program. Once the client – a course instructor, decision maker, or potential investor –can see the designer's vision enacted, then the presentation can progress to discussion of the program's features and benefits. A video mock-up is a *design story,* described by Patrick Parrish in a recent *TechTrends* article as "imagining the journey of a learner's experience in engaging with a finished design" (2006, p. 74). A design story allows designers to show their design vision to others and to observe features and benefits of the program as a learner would experience it. The design story concept has similarities to the *use case* technique developed for software and systems engineering to capture functional requirements. Use case scenarios depict in narrative form how the system should interact with users to achieve specific functions (Bittner & Spence, 2003). Design stories add elements of setting, character, and plot.

A videotaped design story is considered to be a *mock-up* because it is a non-functional representation of a product design, in contrast a minimally functional prototype version of a product (Lantz, 1986). Video mock-ups of multimedia program designs are not limited by the immediate authoring capabilities of the design team. Multimedia features that are difficult or expensive to author can be depicted in a video mock-up before committing resources to full development.

As Parrish suggests, design stories are valuable in both the formative evaluation (FE) and demonstration phases of multimedia product development. Video mock-ups used in the FE stage allow designers and subject matter experts to see the design features of the multimedia program in use. Production quality for FE purposes can be fairly rough. *PowerPoint* representations of interface screens are adequate and design team members can act as the learners, shoot the video with a consumer-quality camcorder, and edit the video using a simple video-editing program like Microsoft's *Windows Movie Maker* or Apple's *iMovie*.

A video mock-up made for demonstration purposes is intended to "sell" the program design and will be at the higher end of production quality, sometimes calling for the involvement of a skilled video producer. The designer's primary responsibilities are to write a design story that acts as the video script and oversee the video producer's efforts. Representative learners should be used as actors, interface screens should be responsive, and video editing should be seamless, which can be accomplished with a video-editing program like Apple's *Final Cut Pro* or Adobe's *Premier*. At its best, a demonstration-quality video mock-up can create the illusion of a fully functional product.

After choosing an appropriate level of production quality for a video mock-up, the

design team needs to decide which aspects of the multimedia design and learner interactions are central to the instructional success of the program. The writer of the design story/script must then work these key program features and interactions into a fictional "story" of a representative learner's session using the multimedia program.

This article illustrates these decisions by profiling two video mock-ups, one produced for formative evaluation purposes and the second for demonstration purposes. In both examples, the instructional multimedia program that is the subject of the video is first described in enough detail to explain the key design features and learner interactions. As described by Parrish, the value of the design story is to reveal – to the designers as well as to evaluators and clients – the essential learner interactions that define the deep structure of the instructional program.

***DVD Reader:* A Video Mock-up for Formative Evaluation**

DVD Reader was designed by students in an instructional multimedia class with the assignment of using the DVD-video specification for instructional purposes. The DVD-video specification enables the extra features that commercial DVD movie releases routinely include: menu-selection of added video segments such as director's comments and production out-takes, selection of different chapters or sections within the production, language translations, and sub-titling options.

Producers of DVD-video games like *SceneIt?* have stretched the interactive capabilities of the DVD-video specification (Fritz, 2003) and designers of educational media are beginning to explore using this technology to develop interactive educational DVDs (SYS-CON Media, 2006) that can be used on any DVD player, providing computer-free interactivity. DVD-video reaches an installed-base of DVD players that is larger than the installed-base of computers. Enjoying the fastest technology adoption ever, nearly 90% of U.S. homes now have at least one DVD player (Kipnis, 2005). Engaging learning media on a DVD/TV rather than on a computer may also have motivational advantages (Fadde, 2006).

The challenge presented by DVD-video is that the interactivity built into the DVD-video specification is much more limited than web-based or CD-ROM authoring environments. The programming of interactivity in DVD-video is detailed, clumsy, and time consuming, as the capabilities of the format are being extended well beyond its original purpose. For that reason, the student design team was not expected to author a functional DVD-video program but rather to focus on *designing around* the capabilities and limitations of the DVD-video format.

DVD Reader was designed to provide struggling young readers with an opportunity to practice and improve their reading in home situations in which an adult was not available or able (e.g., non-English speaking) to read with them. Based on interviews with a family literacy expert, the design team used the instructional strategy of modeled reading (Ekwall & Shanker, 1993), incorporating multiple reading activity modules. For the *DVD Reader* program an adult male voice was recorded reading each page of the illustrated children's book *Meanwhile, Back at the Ranch* (Hakes-Noble, 1987). Learners used a menu to select various reading activity modules.

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First Module: Modeled Reading. The learner listened to the book reader, then read the same page out loud before using the DVD remote control to advance to the next page, a strategy patterned after read-along audio-cassettes.

Second Module: Timed Reading. As in the first module, the learner listened to the book reader and then read the same passage out loud. The difference was that the program automatically advanced to the next page after a set amount of time. If the learner had not completed reading the page, he or she would be interrupted by the book reader starting the next page. The program allowed the learner to use the DVD remote control to repeat a page.

Third Module: Compare Reading. The learner recorded his or her voice while reading, using a custom-made DVD remote control with a built-in digital audio recorder. The learner would replay his or her own voice and compare it with the book reader. The design of this listen-record-listen-compare module was experimental and clearly called for a *proof of concept* mock-up. The timed-reading module, while less experimental, also needed to be "seen" by the design team as well as by the subject matter expert (SME). How would a learner react to

Figure 1. Learner inserting DVD Reader into home DVD player.

"A video mock-up that works as a mini-drama allows designers to display the full vision of a multimedia program."

the DVD book reader interrupting his or her reading? While the question might ultimately be addressed in use-testing of a product prototype, the production of a video mock-up would allow the design to be observed in the formative evaluation stage.

Figure 2. Learner reading a DVD Reader page aloud.

The *DVD Reader* Design Story. The design team story/script depicted the "journey of a learner's experience" in engaging with the *DVD Reader*. The story has the learner using *DVD Reader* on her home DVD player and television. She gets comfortably into the *DVD Reader* program, suggesting that she has used it before. Using the menu, she goes directly to the timed reading module. On the first book page she does not finish reading before the book reader starts the next page. She shows some frustration but immediately replays the first page and this time she reads fast enough to finish before the next page appears.

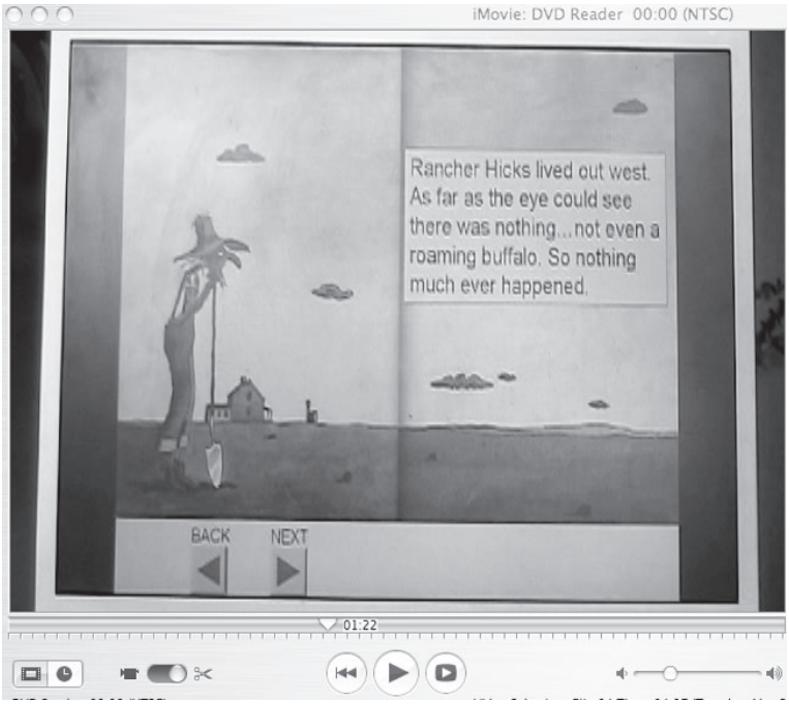

Figure 3. Close up shot of a PowerPoint slide depicting a DVD Reader screen displaying a page of the book Meanwhile, Back at the Ranch *(courtesy Trinka Hakes-Nobel, author; Tony Ross, illustrator; and Puffin Books).*

As she continues using *DVD Reader* she is cued to try the listen-read-record-listen-compare feature. The learner is a bit self-conscious listening to her own voice, but she continues with the activity. She is not stressed, but is clearly concentrating intently on her out-loud reading. The *DVD Reader* design lets the learner control page-by-page when to engage the listen-read-record-listen-compare feature. She uses the feature on a few pages and eventually finishes the module. She takes *DVD Reader* out of the DVD player and goes on with routine home activities.

The *DVD Reader* Video Mock-up. Following the script, the design team created *PowerPoint* slides representing only the particular interface screens that would appear during this learner's journey. *PowerPoint* slides of instructional management screens included audio clips of instructions. Slides of screens displaying pages of the book included audio clips of the book reader voice. The 13-year-old student recruited to act as the learner was older and more advanced in reading fluency than the target learners, but she was closer in age to the target learners than any of the design team, and she was directed to read less fluently – qualities that made her selection close enough for the FE purpose of the video mock-up. The video was shot by one of the design team students and the videotaping "set" was the student's home. An establishing wide shot shows the learner and the television in the same video frame (Figure 1). The body of the video mock-up consists of close-up shots of the learner (Figure 2) inter-cut with full-frame shots of the *PowerPoint* slides depicting *DVD Reader* screens (Figure 3). In editing (using *iMovie*), the inter-cutting of *PowerPoint* slides and close-ups of the learner was adequate for viewers to understand that *DVD Reader* was intended to be viewed on a home television.

The design team edited a seven-minute video mock-up of *DVD Reader* and showed it to the SME while describing program features and the context of the design story (e.g., that the learner was not using the program for the first time). The SME accepted the timed-reading design that involved the book reader voice interrupting the learner's reading. However, she objected to the amount of text (a full page) that was read before the learner repeated the reading and recommended that shorter passages be used for the timed reading module. The SME was less than convinced that the listen-read-

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record-listen-compare module was worth the extra complexity for the learner (not to mention the program designers) but rather emphasized the need for extensive testing to ascertain the appropriate length of text and the time allowed in the timed reading module.

It is unlikely that this quality and depth of observation would have emerged from showing storyboards and flowcharts to the SME. A curricular design flaw may be missed in a typical FE process that focuses the designers' attention on aesthetic and navigation elements and the SME's attention on content issues. During beta testing of the product, a teacher might catch an unnecessary or flawed design feature and the design team would be forced to choose between going to market with a known flaw or expending considerable effort and expense to fix it. Perhaps most important, the student design team reported that they understood their own design much better after "seeing" *DVD Reader* being used by a learner.

Video Mock-up for Demonstration

Many college football players, especially at positions such as quarterback and linebacker that require extensive decision-making, do a considerable amount of self-directed study of game video (Fadde, 2004). Some players engage deeply in self-directed video study, but the experience is fairly passive for most. *Interactive Video-Football (IAV-FB)* was designed as a multimedia program combining video and game data (e.g., type of play) to provide interactive quizzing of players, greatly enhancing the focus and intensity of self-directed study. The designer's problem was to demonstrate the *IAV-FB* design for a potential development partner without having to author a functional prototype. The *IAV-FB* design had a critical feature – voice input – that would be demanding to author. The designer felt that constructed-response voice input was superior to multiple-choice input using mouse or keypad. Integrating voice recognition in the *IAV-FB* program was a programming task that the developer did not want to undertake before arranging the support of a development partner.

Along with the challenges involved in authoring a functional prototype of *IAV-FB*, the designer also felt the need to demonstrate that football players would have the desire and the ability to use the program. With manufacturers coming to market with virtual reality and video game products intended for football players (Dempsey, 2006) it was necessary to show that players could be actively engaged by the much lower technology, lower cost interactive video approach. In the case of *IAV-FB*, the production of a demonstration-quality video mock-up was called for.

***IAV-FB* Video Mock-up.** The primary goals for the *IAV-FB* video mock-up were much the same as for the *DVD Reader* video mock-up: to demonstrate yet-to-exist design features and to depict the program being used by a learner.

Figure 4. An IAV-FB interface screen.

The difference was one of scale. The formative evaluation purpose of the *DVD Reader* video mock-up required only a modest level of video production quality – well within the capabilities of many design teams. On the other hand, the *IAV-FB* video mock-up had to be credible to an audience of football coaches and to representatives of companies who manufacture and sell expensive, high-technology video analysis systems. It had to sell the concept.

A video mock-up is not intended to impress clients with video production value. The craft involved in producing a video mock-up is in being able to make it appear to be un-produced. A video mock-up is successful to the extent that viewers believe that they are watching an unedited videotape of a typical learner using the product.

Figure 5. A football player (actor) using IAV-FB on a laptop computer.

The *IAV-FB* video mock-up is seven minutes long. It contains 70 video edits plus numerous split A/V edits (audio from the previous segment continuing under a new video segment), but a sample of viewers estimated that it contained only three or four edits. It isn't a lack of viewer sophistication that can make video edits invisible but rather an internalized understanding of film/video conventions that makes edits that follow aesthetic rules acceptable – and virtually invisible – to the viewer's eye. If executed well, a dramatic video elicits *suspension of disbelief* by viewers who accept that they are watching the videotape of an actual scene.

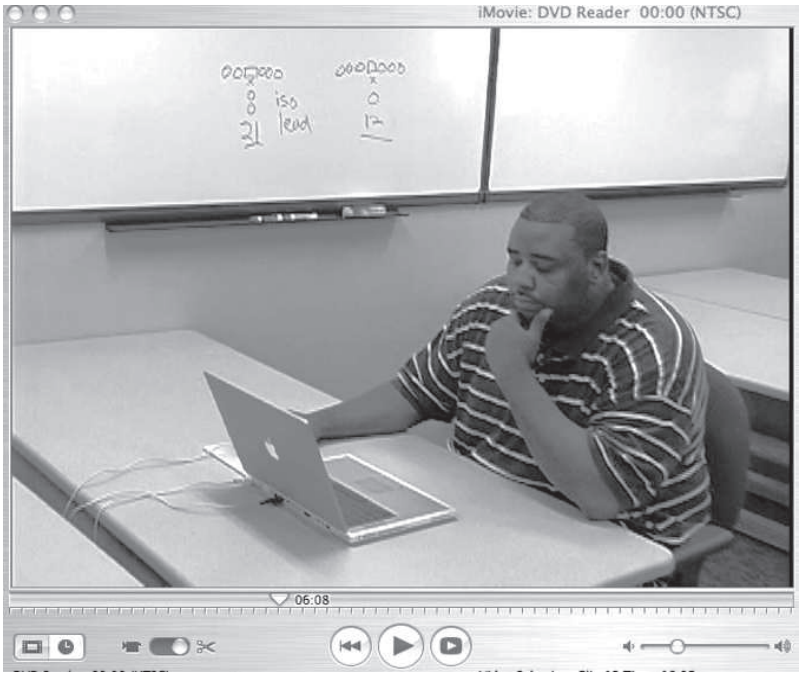

Figure 6. A football player (actor) using IAV-FB on a laptop computer.

The creation of the *IAV-FB* video mock-up consisted of three elements.

First Element: Interface screens. The *IAV-FB* computer interface screens specified in the script (Figure 4) were programmed so that rollovers and menu selections would appear natural, with mouse-click actions linking to new interface screens. In a simpler proof-of-concept mock-up (such as *DVD Reader)* the screens can be represented on a *PowerPoint* slide, but *IAV-FB* was aiming at a higher level of viewer acceptance and so required a more authentic "look and feel" for the interface.

Second Element: Video clips. Although *IAV-FB* is designed to call up any play from hundreds archived in a football video database, the mock-up used 25 plays selected in advance (Figure 5). These plays were edited and played full-screen from the video editing program onto the screen of the laptop computer used in the video mock-up. In this way the video did not have to be converted to computer files that would either be huge or would be highly compressed and lose quality.

Third Element: Learner. The opening shot of the *IAV-FB* video mock-up was framed wide and depicted a player at a laptop computer in a typical football meeting room (Figure 6). Videotaping combined over-the-shoulder angle that included the computer screen (Figure 7) and an up-angle shot that showed the player's face but did not show the computer screen (Figure 8). The interface screens and the football video clips were shot separately as full-frame close-ups of the computer screen.

The completed video mock-up consisted primarily of close-ups of interface screens, video clips of football plays, and close-ups of the player's face as he verbalizes the answers to quiz items. Relying on close-ups benefits the video production in three ways. One is that the screens, especially interface screens with text, are easier for viewers to see. Another benefit is that inter-cutting between the close-ups suggests a continuous flow of screens and actions that were actually shot at different times and edited into sequence. The third benefit is that close-ups are more dramatic.

The *IAV-FB* Design Story. While the videotaping and editing of a demonstration video mock-up like *IAV-FB* will often be turned over to a skilled video producer, writing the design story/script to be acted out is the responsibility of the design team. Like any good drama, the design story should include character elements

Figure 7. Opening shot of a football player interacting with IAV-FB program.

and obstacles to overcome. Although the design story should have a beginning, middle, and end (Parrish, 2006), consider the admonition that "the secret of being a bore is to tell everything" (Voltaire, 1738/2006). A design story should not include all of the program's features and possible learner interactions, just those that the designers identify as critical to the deep structure of the learning experience.

The *IAV-FB* design story picks up with a football player starting an early, but not initial, session. The program welcomes the player by name and displays the player's previous performance on various video drills. The scenario continues with the player re-doing a drill, after which he takes the test version of the drill, which he passes but only by correctly answering the last four items in a row. He then practices another drill and, when confident, tests on that drill. He starts getting more engaged in the competition that is inherent in the drill-and-practice instructional method (Alessi & Trollip, 2001).

Beyond the goals of depicting *IAV-FB* features in a natural setting, the mini-drama depicted in the video mock-up engages viewers more deeply than a descriptive presentation alone could. The player in the *IAV-FB* mock-up does not have a name and doesn't speak any dialogue. We simply see him using the *IAV-FB* program, overcoming obstacles and ultimately having some successes. Many viewers of the *IAV-FB* mock-up spontaneously comment that they like the player.

The greatest value of a video mock-up is the de-brief session that follows its demonstration. If the designer/presenter has confidence in the credibility of the video mock-up, it can be very effective to wait until after the video has been shown to reveal that it is a mock-up and intended to demonstrate the *design* of a yet-to-exist product. Once the client has seen the product in use, the designer can discuss the benefits of developing ambitious multimedia features such as voice input. After all, we have just seen it work.

Figure 8. A football player interacting with IAV-FB program.

Conclusion

The video mock-ups produced to evaluate the design of *DVD Reader* and to demonstrate the design of *Interactive Video-Football* illustrate the benefits of the approach. Video mock-ups can:

- Depict not-yet-existing products and features.
- Help designers appreciate learner needs and anticipate interface problems.
- Enable subject matter experts to provide feedback on learner interactions as well as instructional content.
- Focus clients on learner benefits as well as product features.
- Engage clients with dramatic story and characters.
- Instigate productive de-brief sessions based on "seeing" the product work.

The stance of this article is that it is valuable to videotape as well as to write design stories of the type described by Parrish (2006). Although it's assumed that the design team will also do more traditional usability testing of product prototypes, it can be eye opening for the design team to imagine both satisfying and unsatisfying stories of learners engaging the product in an authentic environment. For demonstration purposes, a video mock-up that works as a mini-drama allows designers to display the full vision of a multimedia program. The production quality of video mock-ups can vary greatly depending on the design team's goals, skills, and budget. This article was not intended to teach readers how to produce a video mock-up as much as it was to describe the use and benefits of the approach. It takes time and effort, and sometimes money, to produce a video mock-up – although usually much less time, effort, and money than producing a functional prototype. The bottom line is that *show* is always better than *tell*.

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References

Alessi, S. M., & Trollip, S. R. (2001). *Multimedia for learning: Methods and development* (3rd ed.). Boston: Allyn & Bacon.

Bittner, K., & Spence, I. (2003). *Use case modeling*. Boston: Pearson Education.

Dempsey, C. (2006, August 6). CU quarterbacks pass time with video game [Electronic version]. *Denver Post*. Retrieved September 6, 2006, from http://www.denverpost.com/colleges/ci_4144609

Ekwall, E. E., & Shanker, J. L. (1993). *Locating and correcting reading difficulties* (6th ed.). Upper Saddle River, NJ: Prentice-Hall.

Fadde, P. (2004). The mental game: Using instructional technology for mental training. *American Football Monthly*, *10*(5), 28-31.

Fadde, P. (2006, March). *Exploring DVD-video for interactive learning*. Paper presented at 2006 Teaching and Learning with Technology Conference, West Lafayette, IN.

Fritz, M. (2003). *Farm aid: Enhancing DVD for gaming*. Retrieved October 26, 2005, from http://www.emedialive.com/Articles/ReadArticle.aspx?ArticleID=5109

Hakes-Noble, T. (1987). *Meanwhile, back at the ranch*. New York: Puffin Books.

Kipnis, J. (2005). Next-Gen DVD formats concern industry. *Billboard.com*. Retrieved October 26, 2005, from http://lexis-nexis.com

Lantz, K. E. (1986). *The prototyping methodology*. Englewood Cliffs, NJ: Prentice-Hall.

Parrish, P. (2006). Design as storytelling. *TechTrends*, *50*(4), 72-82.

SYS-CON Media (2006). SBG/b EQUAL inks deal with Knowledge Adventure to exclusively distribute a new line of educational DVD games worldwide. Retrieved February 20, 2006, from http://www.sys-con.com/read/176652_p.htm

Voltaire (1738/2006). Sixième discours: sur la nature de l'homme, *Sept Discours en Vers sur l'Homme* (1738). Retrieved September 5, 2006, from http://en.wikiquote.org/wiki/Voltaire