

An Interactive Animated Flash Module to Teach Animation Principles to Community College Digital Media Students

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Abstract: This instructional design project tested the value of a Flash animated, interactive module in teaching animation principles in the Leeward Community College Digital Media Department, University of Hawaii. Studies have indicated that modern learners are less focused over long periods of time and are accustomed to multiple streams of simultaneous information. This instructional design project created an animated interactive Flash module to teach the animation principles of *Arcs*, *Timing* and *Squash and Stretch*. The module was accompanied by a pretest, embedded test and posttest to analyze the effectiveness of this content delivery alternative. Small group testing was conducted on 15 current students of the Leeward Community College Digital Media Department. Evidence from small group testing of the module indicates students benefited from the module in learning Animation Principles. More than seventy percent of the participants saw an improved score on the post-test. Results from this analysis are guiding the instructors of the Digital Media Department in a decision to create more modules such as this one, and simultaneously integrate such modules with the online education that is being expanded by the college.

Introduction

Digital Media (DMED) 140 The Principles of Animation is a required course for all Digital Media students at Leeward Community College (LCC) that wish to graduate the program with a degree. The core concepts of DMED 140 are the Seven Principles of Animation. These seven principles are the following: (1) *Arcs*, (2) *Timing*, (3) *Squash and Stretch*, (4) *Reversal of Curves*, (5) *Successive Breaking of Joints*, (6) *Secondary Motion*, (7) *Overlapping Action*. These concepts are difficult to learn. The goal of the module is to instruct students of the Leeward community College Digital Media Department in three Principles of Animation; *Arcs*, *Timing* and *Squash and Stretch*. The target population for this module is the community college student of Leeward Community College's Digital Media Department. The learners range in age from 18 years to 72 years old. They are men and women of a diverse ethnic background. Most of the students

come from the Leeward part of Oahu. This project is tailored to the unique capabilities of the Adobe Flash software.

Literature Review

Many of the LCC students have short attention spans. The students' ability to focus on abstract concepts for an extended period of time is limited. One study suggests that due to the high pace of modern society many people suffer from a pseudo Attention Deficit Hyperactive Disorder (ADHD) (Geist, & Gibson 2000).

Research indicates that students with enhanced spatial skills benefit from graphics and animation as a method of relating key concepts (ChanLin 2000). Barkley (2005) states in the case of ADHD adolescents "...increasing the novelty and interest level of the tasks through the use of increased stimulation..." (p236) can enhance attention improving student performance. It is also observed that many traditional practices in education can lead to large problems and therefore a new mindset in educational design is needed (Lebow n/d). Animation helped bring instruction to life "grabbing the attention" of the learner in one classroom study (Schaffhauser 2008). Animation was used in a Virginia high school chemistry class to teach state standards on chemical compounds and their corresponding formulas.

The intent of this module was to present animation principles through the use of interactive flash technology. Several online animation education sites that were analyzed used a web page approach with simple text and images to present content (awn.com, makemovies.com, karmatoons.com). The construction of this module went beyond the simple uses of web pages and text, and worked with buttons, embedded videos, audio components and animation.

Methodology

Animation is engaging and eye-catching. The popularity of animation has been seen in the plethora of animated cartoon, films and video games that continue to be produced each year. Animation instruction, however, can be dry and unappealing. Much class time is devoted to the dissemination of principles that in order to be utilized by students in their digital media projects, must be comprehended. Today's learners are increasingly challenged in lecture situations, having been accustomed to the multiple streams of information that surround them in the many media of modern society.

On the one hand lies the problem of learners that require more and varied stimulation to maintain focus, and on the other hand exists the dry content of the animation principles unit that is a part of the Digital Media Program at Leeward Community College. This module was developed as an innovative solution to this problem.

This project tested a prototype module in the community college setting to help determine if animation and multimedia approaches are effective in delivering course content. Modern learners need to be engaged in ways that are current to their time. The

purpose of this project was to determine if an animated interactive Flash Module could be used to teach animation principles to community college Digital Media students.

Target Audience

The economic background of most learners is low to middle income. The computer literacy of the students encompasses a wide spectrum of competency from novice to multiple years of experience. As a group, they are busy with commitments to family and jobs leaving little time for study outside of class. Several of the students have learning disabilities or other health problems that challenge their note-taking and class participation. Table 1 provides a further breakdown of Learner Characteristics. Please note the wide spectrum in age and ability of the target population.

Table 1.Learner Characteristics

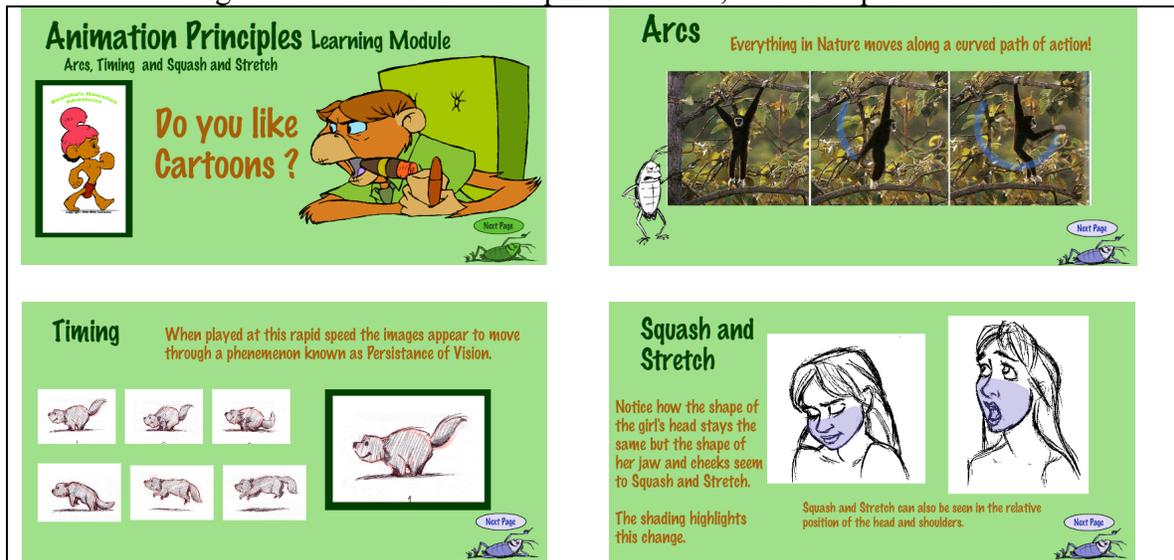
Cognitive characteristics	Psychomotor characteristics
<ul style="list-style-type: none"> • Basic knowledge of computers • Some learners with short attention spans • Some learners with mild psychological challenges • Many learners earning two year associate degrees 	<ul style="list-style-type: none"> • 18 to 72 years of age • Most learners fully functioning • Some learners physically challenged • Male and Female learners • Some learners with chronic health conditions
Affective characteristics	Social characteristics
<ul style="list-style-type: none"> • Some learners motivated toward career in animation • Some learners unmotivated: taking animation course to fulfill requirement • Some learners casually interested in subject 	<ul style="list-style-type: none"> • Some learners with no family members on island • Some learners living with parents • Some learners have children • Most learners in lower and middle economic classification • Most learners residents of Leeward Oahu

Module Development

The module involved viewing video clips, and listening to audio commentary, leading to an embedded test where learners made choices using buttons and interactivity in Flash. (Figure 1.) Immediate feedback was provided as to the correct/incorrect nature of the learner input. The module ended with a review section of the content. It was appropriate to choose the Flash movie format for several reasons. The module was teaching animation principles; therefore it was appropriate that sample movies and animations

play during the content portions of the module. Flash supported the use of movie clips as well as the on-board creation of animations including the uses of audio and text. It was appropriate for the audience of learners because they have an intrinsic motivation to work with computers. They are learners that have voluntarily involved themselves in the pursuit of acquiring computer skill sets.

Figure 1. Flash Module Graphic Interface; Four Sample Frames



Previous uses of interactive media to illustrate Animation Principles were incomplete and limited in their use of interactivity. This module used a unique combination of animation clips, video clips, audio elements, text and interactivity that to date had not been observed in animation education modules.

To create the module three main software tools were used; Adobe PhotoShop, Adobe Flash CS4 and QuickTime Pro. A digital video camera was used to record video reference. A scanner was used to input drawn resources, and microphone to record audio and sound effects. A current Macintosh Computer was used to create, assemble and output the module.

To participate in the module learners used the Macintosh computers in the Digital Media Lab at Leeward Community College. These computers were equipped with the current version of the Adobe Flash Player.

Instructional Strategy

The module was divided into 5 sections. The first section was the introduction. In this section the learners were be presented with examples, side-by-side, of good and bad animation. This section served as a hook to grab the attention of the learners, and also as a way to outline what would be covered. Learners then proceeded into each of the three content areas. The first section introduced them to the animation principle of Arcs. Once

they were comfortable with that information they answered two embedded questions about arcs on a paper-based quiz. Next they proceeded to the second content section on the animation principle of Timing. Once again when they were comfortable they answered two embedded questions on the paper-based quiz. They finally proceeded to the third content section explaining the animation principle of Squash and Stretch. After completing the embedded questions at the end of the final content section, the learners proceeded to the fifth stage, which reviewed the main points of the three content sections. Each user controlled the pace of instruction through the advance button in the module.

Formative Evaluation Methodology

Site

The module was delivered in the Digital Media Lab, BS-104, at Leeward Community College. Students were seated at Apple computers and ran the flash (.swf) file, which took them through the content. No special permission was required for the use of the facilities because the researcher tested the module in a previously scheduled class. Students of that class who wished to opt out of the module test were presented with alternative class work to account for their class hour during testing.

Test Audience

The module was tested on fifteen current Digital Media students at Leeward Community College. They ranged in age from 18 years to 40 years old. They were men and women of diverse ethnic backgrounds. Most of the students came from the Leeward part of Oahu. The computer literacy of the students encompassed a wide spectrum of competency from novice to multiple years of experience. This sample group was a logical choice since the learners were current Digital Media students.

Evaluation procedures

Feedback on the module was in 2 stages. Content expert feedback was delivered in written form after a one-on-one trial of the module with a senior animator. Dave Pruiksma is a twenty-year veteran of Disney Feature Animation production in Burbank California, as well as a college level instructor.

The second round of feedback came from a paper-based pre-test, embedded and posttests given before, during and after the learners worked through the module. Small group testing had a group of 15 learners from the sample population complete a paper-based pre-test, the Flash module content on the computer, including a paper based embedded test, and finally a paper-based post-test. The facilitator distributed and collected the pre, embedded and post-tests at key points in the testing. Consent letters were signed by participants and collected prior to the testing.

Instruments

The pretest consisted of 16 multiple-choice questions dictated by the learning objectives. It was paper-based and students indicated their responses by circling the answer of their choice from four possible answers. Test questions varied in design along the following approaches; visual analysis, term recognition and deductive reasoning. The posttest was

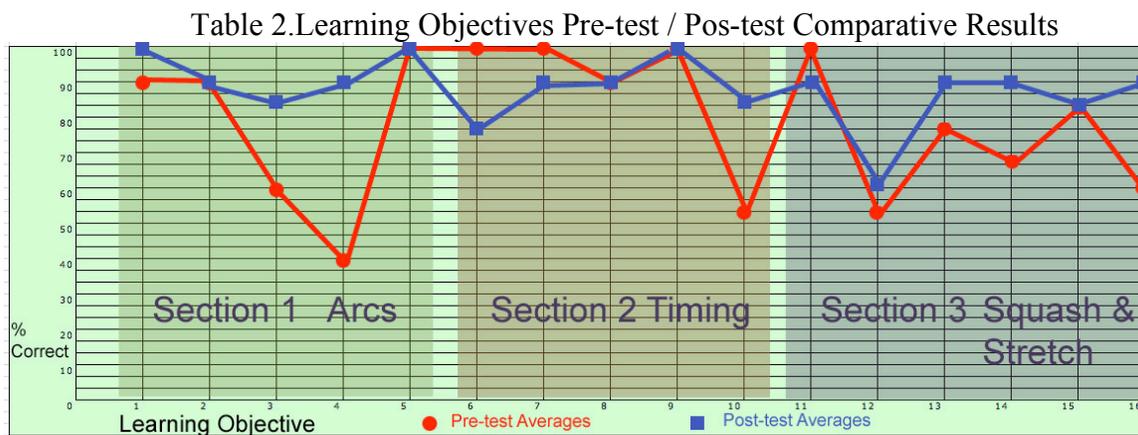
constructed the same way with the same number of comparable questions. The embedded test offered two questions for each of the three major content sections of the module.

Results

An animation content expert in Southern California initially reviewed the module. The main result of this one on one testing revealed some necessary changes in wording in order to enhance the clarity of the instruction. The functionality and overall critique of the content went well with no major changes necessary.

The module was then successfully tested on a small group of participants in two sessions. The first group consisted of 10 learners and the second group of 5. The learners were asked to identify if they had taken the course DMED 140 in the past and 4 learners responded they had. In the process of the data collection it was found that one person had not submitted a post-test, so ultimately the data pool consisted of 14 members. Seventy-one percent (10) improved their score on the post-test as compared to the pre-test. This improvement was 6 percent or greater, with a smaller subsection of 43 percent showing an improvement of 12 percent or greater. Twenty-one percent (3) of the data pool showed no improvement from pre-test to post-test and 7 percent (1) showed a decline in score from pre-test to post-test. As a collective group the learners improved their scores an average of eight percent from pre-test to post-test.

Table 2 indicates the results of the individual learning objectives. Section 1 indicates the module was effective, 3 of 5 objectives showed an improvement with 2 objectives showing no change. Section 2, the section on Animation Timing, shows the module was less effective. Of 5 learning objectives only 1 showed improvement, 2 objectives showed a decrease in performance, and two objectives showed no change. Section 3 shows positive results with 4 of 6 objectives showing improvement, 1 objective showing no change and 1 objective showing a small decrease in performance. Overall 9 of 16 objectives showed improvement, with the weakest section in the module being Section 2.



Finally an instructional design expert reviewed the module. The feedback from this review is being implemented at this time. Many points of concern were regarding the

visual appeal of the module as well as division of information. Comments were also made on the interactive features including the need for a “back” navigation button throughout the module.

Implications and Discussion

The implications of the learning objectives results are important as the module is modified. The section on Arcs (Section 1) was effective along with the section on Squash & Stretch (Section 3). Although Section 3 had one objective that exhibited a decrease in performance, it was only a drop in 7 percent, indicating one person from the sample did worse on the posttest. This single learner is not enough to conclude the section needs changes until further testing is undertaken.

It is clear from the data that Section 2 needs to be modified. One of 5 objectives showed improvement; the other 4 objectives did not. It should be noted that Animation Timing is the most complex section, with concepts that are not readily perceivable in still images and must be observed in real time, using movie clips. In addition one learning objective stresses complex concepts of character performance and it's relationship to timing. This complexity may have been a factor in the weak impact of the module. It is also worth considering if the paper-based test made it difficult to test for timing concepts, since movie clips had to be displayed in still graphics for the assessment items. Timing concepts may require movie clips played in real time to create clear assessment items. This would be possible if the assessment for Section 2 is computer based. Also, add more practice and feedback may improve scores.

The scores on the pre-test were considerably higher than anticipated. The question was posed whether the level of difficulty was too low. This point is under consideration, however the level of difficulty of the question in the pre-test versus the post-test was consistent so the measure of improvement is deemed accurate.

The module was progressed through in the anticipated amount of time with some learners completing all the sections in less time than predicted. The sound of the advance button was audible to the facilitator so the speed of progression through the module was somewhat observable. The module seemed to hold the interest of the learners as observed in the notes of the facilitator.

It is worth noting that in the lecture format this information required approximately ninety minutes of lecture to communicate. The approximate running time of the module with the accompanying testing was thirty minutes. It should be studied more closely to see if all the content in the normal lecture is actually included in the module sections. However the instructor that normally teaches this course verified that simply cueing and loading visual examples takes time in class, whereas in the module the information is ready and efficiently presented in a single Flash movie file.

One of the fourteen learners exhibited a drop in score from the pre-test to post-test. This learner showed decreased improvement in 4 objectives; 2 from Section 2 and 4 from

Section 3. This same learner scored very poorly on the pretest with 8 objectives wrong: the next closest number wrong was half that. This may indicate that this interactive multimedia approach is suitable for most learners, however some learning styles may not be well served by this method of delivery.

The level of complexity this project proposed in the design of its multi-media module was something that had not been done yet in the field of animation education. The project is helping determine the effectiveness of this method of instruction among learners of the community college system. The success of this module is determining it's expanded integration in the animation classes at Leeward Community College. It is also providing useful insight into how modern learners can best be served in the classroom. The usefulness of stand-alone interactive modules like this in asynchronous learning and distance education is readily apparent. Flash modules can be easily used via the Internet or on local computer resources in the absence of network connectivity. As the needs of learners change and technology moves forward, the argument for use of multimedia in the classroom has only increased.

Conclusion

The results of the testing are ultimately positive in favor of continued module development. The larger percentage of learners clearly benefited from the module with five of fourteen learners achieving a perfect score on the posttest thereby accomplishing all of the learning objectives. These results are particularly noteworthy when it is considered that instruction time was reduced by two thirds. This efficiency factor may particularly benefit learners with short attention spans.

The module must be modified to include improved navigation and a reworking of Section 2. With the new modification it would be worthwhile to test section 2 with movie clips integrated in the assessment by making the assessment computer based, as well as, adding more practice and feedback.

The format of the module, Flash Movie format, is attractive as it allows the module to be made available asynchronously through the University of Hawaii's *Laulima* online course development site. The faculty of the LCC Digital Media Department is encouraged enough by these results to continue the use of the module next semester after the revisions are incorporated. The possibility remains to develop the remaining four Animation Principles for delivery in this same media format. In the end the complete Seven Principles of Animation may be delivered in the classroom setting in this interactive way. Ongoing assessment and monitoring will guide future modifications to the module.

It is important to consider that not all learners benefited from this module. Therefore the module must be modified based on the results and tested again with a larger group. It is possible this module should ultimately exist as a supplement to, rather than a replacement of, existing classroom instructional methods. The final goal is for all learning styles to be served best.

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