

Using Talking Characters to Improve Online Learning

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ABSTRACT

The introduction of modern technology such as PDAs, laptops, and wireless LANs is a well documented advance for the classroom compared to using chalkboards. This paper describes the implementation of a method of delivering education content using video applications so as to improve student learning. Although measuring improvements to student learning is a difficult task, we believe the use of video talking characters along with the latest technology gadgets fosters learning for younger generations. This paper documents one approach to providing young students with education materials along this track. The use of PDAs by students along with laptops connected by wireless LANS offers a unique opportunity to reach and get the attention of many students. By approaching student learning from a technology standpoint, using devices that they already use in their personal lives such as PDAs and cell phones, student interest in math and sciences can be improved.

Keywords: Animated Character, Online learning.

1. INTRODUCTION

As part of a grant from the Miami-Dade County School System, Miami, Florida, USA called Math Matters Every Day (M²ED), a research project developed teaching materials for math students. These materials could be in any form but primary course delivery means were via PowerPoint slides. As part of this grant, it was decided to also provide supplementary materials in the form of the Apple video iPod files so as to appeal to younger students. This approach turned out to be fairly successful. Later we determined that the video files also worked with iTunes and worked successfully with the iPhone. Due to the expense, at this point, not many

students are expected to have iPhones although this will change in the future. We also developed a website using Microsoft FrontPage which permitted distribution of the teaching materials along with Adobe Flash delivery via the browser.

2. RELATED WORKS AND BACKGROUND

This paper looks at integrating talking animated characters into electronic delivery to enhance learning. The use of these characters has important implications for online learning. The implications of using talking characters are detailed in Guschwan [1] which describes how animated characters improve communication by adding social intelligence which makes the web “less lonely” and technology “easier to use”. These talking characters take on the role of “teammate” thus enhancing positive learning activities.

Guschwan describes the work of Professor Byron Reeves of the Stanford Center for the Study of Language and Information (www-csli.stanford.edu). Specifically, Prof. Reeves’s study [2] describes ten benefits of character interfaces. The Center for the Study of Language and Information (CLSI) is described as an independent research center sponsored by Stanford University, Xerox PARC, and SRI International. The site describes the purpose of CLSI as providing research in the emerging areas of information, computing, and cognition.

Reeves’ study describes how the human brain has not actually adapted to electronic media in the modern era. It still expects social interaction as it was programmed by evolution for thousands of years. The brain is satisfied with this needed social interaction by relating to an animated talking character even though it knows this character is not

actually real. These characters stimulate human responses needed to facilitate learning.

The article indicates that character casting is important since some people dislike certain characters and like others. Therefore the choice of the character can either enhance or degrade online learning. Prof. Reeves indicates that only pretesting with users can determine which characters are the best to use.

Large, Beheshti, Breuleux, and Renaud [3] studied the effects of using animation on grade 6 students. The study looked at the effects on comprehension and recall. The study used Compton's Multimedia Encyclopedia containing images and animation which was semantically connected to the text.

Leung and Komura [4] describe a web-based handwriting education system which uses an animated virtual teacher. The article points out that the animated teacher takes up much less bandwidth compared to a real video of a teacher.

Verhallen, Bus, and de Jong [5] document a study on kindergarten children for multimedia stories. The study indicates that multimedia improves understanding of the stories. It also helped to expand vocabulary and syntax skills.

The literature search revealed relatively few articles researching the incorporation of animated characters into videos for learning purposes. The work performed by Prof. Reeves was ground breaking and stimulated much thinking in this area. Other research such as by Verhallen, Bus, and de Jong reinforces the thinking that animated characters help to improve learning.

3. METHOD

The project developed the required teacher plans based on math objectives. These plans were then created as PowerPoint presentations for the teachers. The plans were then supplemented with files for the students in the form of Adobe Flash and video iPod files. A screen recording type program called Camtasia was selected for use in the project. The program is capable of building Flash files. With the purchase of Apple Quicktime Pro, the Camtasia program can build the Apple video iPod files.

The Camtasia product was selected based on its relatively low cost and smooth integration of its user interface. Other products were considered such as Articulate which seemed very useful. The cartoon character generation software was selected as Media Semantics Character Builder. It was also relatively low cost to buy, was easy to use, and offered a lot of flexibility from a file generation standpoint. The NeoSpeech speech packs were selected to provide voices for the characters. Other voice components are available such as Loquendo and Cepstral which can be selected based on user preferences of the most natural speech.

The video format for the movies consist of several title slides, an introductory/welcome presentation, a narrated PowerPoint lecture, a break usually consisting of an informative video clip and cartoon, then a hands-on lab using a tablet, followed by a goodbye slide and credits. The materials used were all either copyright free or permission was obtained to use the copyrighted materials. The project observed a strict policy of not using any materials which are of questionable copyright status.

During the course of the project, it was decided that a narrated discussion on the lesson plan was needed. This permitted the use of a tablet for a lab type activity where there is a screen recording of a pen performing an example of the lesson. This tablet example is of varying usefulness but it does provide another method of capturing the student's attention and reemphasizing the materials. Keeping this narration down to ten minutes in length prevented students from losing attention and allowed learning for those who are more visually or graphically oriented.

The Adobe Flash files have a testing capability provided by Camtasia. A test was added to the end of each file for review purposes. The test results could have been linked to a course delivery system such as WebCT using SCORM but were not since the intended audience does not use a course delivery system. The future ability to link the tests to a course delivery system using SCORM provides an important upgrade path. The test is automatically stripped out by Camtasia when building files for the video iPod since the iPod at that time had no interactive capability (whereas Flash is interactive so testing can be performed).

The project attempted to integrate a discussion capability amongst the cartoon characters so as to form a social type learning class. The characters conversed with each other, reviewed the material near the end of the file, and generally tried to provide a friendly learning environment. This capability is available through the Media Semantics Character Builder program. Unfortunately, the conversations were slightly annoying because the characters did not appear natural and were programmed to run too slow. However, this type of scenario has considerable promise in the future and may appeal to certain learning groups if perfected.

Some professionally developed cartoons were added to the clips after the lecture as part of a break. These cartoons are copyrighted and purchased specifically for this project. The cartoons were developed by Randy Glasbergen. Many of them have classroom math themes, and some were in color.

Another part of the break consisted of NASA clips usually oriented toward the moon or mars exploration. These were not copyrighted and some had accompanying narration and music. It is possible that these clips provide some secondary educational benefit as many students may have never seen, for example, a lunar rover driving on the moon before. It is hoped also that these clips provide interest in math and science careers.

The clips usually started with a cartoon character describing key points of the math lecture. The key points appeared on a blackboard in the background and the cartoon lecturer pointed to each bullet on the blackboard. This served to warm the students up for the main lecture.

The main lecture consisted of PowerPoint slides narrated by a cartoon character or a real person in a picture in picture in the lower right corner. At first a real person was used but as the team skills developed the real person was replaced by a cartoon character. The cartoon characters were eventually rotated to a different cartoon character as each slide progressed so as to catch the attention of the student by providing more variety. In some cases animal characters were used to appeal to a younger audience.

The video iPod files generated by Camtasia and Quicktime Pro were loaded into iTunes from the download site then transferred to the video iPod.

Although the intent of the project was not to support the Apple iPhone, the video iPod files in iTunes were transferred to an iPhone and worked fine. The iPhone display was much better than the iPod. One difficulty encountered is when the iPod files were downloaded, the browser attempted to open the file as a QuickTime file. This problem was circumvented by compressing the iPod files as zip files so that after the download the browser ignored it.

The production of the files was relatively easy from a standalone PC but from a slower laptop there can be long delays building the files. It is important to have enough RAM installed on the PC. In some cases Camtasia may not recognize the built-in sound card in the motherboard of a PC. Sometimes Camtasia may be unable to accept the file formats generated by the Character Builder application, in these cases build the Character Builder files as a video gif file so that Camtasia will accept it. It is usually better not to compress the Character Builder files but instead to allow Camtasia to compress all files. Camtasia has a nice feature where it will recommend build settings and this worked fine most of the time. One caveat to remember, Camtasia is primarily oriented as a screen recording type application. So it cannot currently accept Flash files directly from another application. In those cases the solution is to have Camtasia do a screen record to capture the running of a Flash file which can then be built into a Camtasia project build. .

4. RESULTS

Since this project was application based, the results of the project are a web site and various Flash and iPod files. No student learning before and after study was conducted. There is gradual improvement in the quality of the files as production improved. The project proved that it makes sense to build learning materials in a format such as video iPod or iPhone that students may be using already in their personal lives.

At present, the video iPod files are not interactive (they just play the movie similar to Windows Media Player) so the tests are stripped out during the Camtasia build. The Flash files provide interactivity so that students can take tests thereby improving measurement capabilities. This is expected to change in the future permitting the use of interactive iPod type devices (such as the iPod touch) that

report test results through SCORM over wireless links to course delivery systems such as WebCT.

The learning pedagogy was developed based on a project at Harvard School of Education called Balanced Assessment in Mathematics Program. An example PowerPoint slide, shown in Figure 1, provides instructions and background to the teacher on the topic.

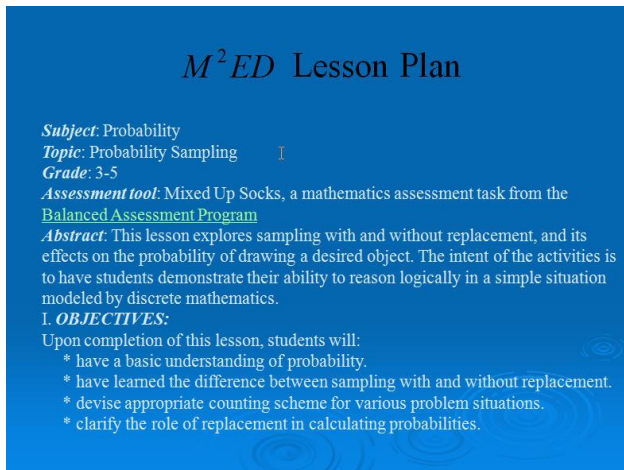


Figure 1 - Lesson Plan for Instructor

The files produced were all video but screenshots are provided for information purposes. Figure 2 shows the introductory screen



Figure 2 - Introduction Video Clip

The lecture consisted of approximately five slides covering one narrow topic on mathematics based on NASA/NCTM. The slide was narrated in a PIP (picture in picture) in the lower right hand side of the screen as shown in Figure 3.

Finding the Classroom Distance from the Sun to the Planets

1. Using a calculator, solve the equation to find the unknown, the Classroom distance from the Sun to planet for each planet. Convert miles to feet: 1 mile = 5280 feet.
2. Complete the data sheet provided.
3. Discuss your results with your teacher and classmates.
4. Solving the equation may be repeated using different Classroom Distance from the Sun to Pluto given by your teacher.



Figure 3 - Main Lecture Video Clip

Single characters (shown in Figure 4) were used briefly to describe and summarize the material and to keep the project rolling so as to capture student attention. These characters spoke very well due to recent advancements in natural language processing.



Figure 4 - Single Character Video Clip

A tablet was used to illustrate math concepts discussed in the lecture. A real instructor narrates and uses a pen to write formulas and insights for an example lab of the theory presented in the lecture (see Figure 5). This tablet presentation is recorded and captured to be placed in the movie. It is not clear how effective this learning approach is but it does provide another format which may reach some students struggling to understand the lecture. The pen can be seen in the lower right corner of the figure.

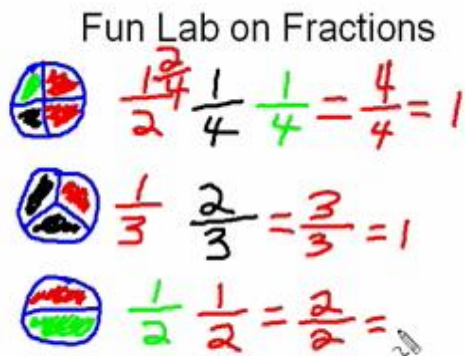


Figure 5 - Use of Tablet Video Clip

The use of a “social learning” scenario where story telling takes place is illustrated in Figure 6. This approach may be effective for teaching to certain groups. Unfortunately, the characters were awkward and jerky and their conversations were not natural. This may be caused by the inexperience of the programmers or the technology is not advanced enough yet. This concept of story telling seems to be a promising area in the future for case type studies.



Figure 6 - Story Telling Scenario Video Clip

5. CONCLUSION

The building of learning materials in the newer formats such as for Flash, iPod, and iPhone is a time consuming task. It really takes a group of people from different backgrounds that can provide education, mathematics, and computer expertise to make the project work. Usually only parts of this expertise come together. There were some problems providing the materials in a suitable format for the

school system to use. It was thought that if we provided industry standard formats such as PowerPoint, Flash, video iPod, iPhone files through an internet web site or through a course delivery system such as WebCT that they would naturally find their way into the classroom. This is not always the case due to technical distribution difficulties through peculiarities in equipment and software. These channels of distribution are important to classroom delivery. Recently, Camtasia offered a new release which produces a single Flash file (instead of multiple different files) which shall greatly ease distribution to environments such as the classroom. Classroom teachers welcome supplementary materials such as this to enhance student learning especially those that include the pedagogy. The advantages of incorporating animated characters in the video learning clips was not measured but it became apparent that the characters stimulated increased student interest in math learning. Plans to measure these improvements are the subject of a future study.

6. REFERENCES

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