Flash Learning Games Wow Students and Instructors:
Moving Toward An Academic Gaming Portal
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ABSTRACT

This paper describes and discusses the rationale, background, design, and implementation of Flash learning games. The paper explains why Macromedia Flash has been selected as the authoring tool in the development of highly interactive learning games for online learning. The background evolutionary process of developing the learning games points out why it has been a daunting task to create compelling learning games that impact learning. Designing learning game objects that allow other educators to customize game content is the core of this paper. The author envisions this academic gaming project will evolve into an academic gaming portal, developed in conjunction with other major institutional partners.

Keywords: Learning games, Interactivity, Academic gaming, Gaming portal, Game manager, Flash games.

1. INTRODUCTION

Creating web-based interactive and compelling content (that does not pose any bandwidth problem) to enhance student's motivation and retention of course materials has been a formidable challenge to educators and trainers. This paper will describe, discuss, and show how several highly motivating and interactive Flash learning games created by the author have "wowed" many educators and students. What excites many educators and trainers about these Flash learning games is that they now can create compelling web-based learning games through a web-based question manager without spending any time in developing the games. With this provision, educators who desire high technology integrated learning platform can concentrate their time in developing content rather than spending their time "messing" with technology.

2. RATIONALE & BACKGROUND

The author has been involved in developing interactive web-based learning applications for higher education for the past seven years. For many years, "interactivity" was the missing link in technology in education. Technology had full control while users had virtually none. The onslaught of video and computer games had convinced some educators that what mesmerized children and teens was the high level of interactivity in video and computer games. As these children and teens have a high degree of control and involvement, they become "lost" in the world of "fantasy" and "virtual" playing. If only some degree of this "virtual" playing can be integrated into learning, educators may have a new opportunity of making learning more "palatable" for students. The author embarked on a zealous pursuit of a "perfect" software that would help create a compelling academic gaming environment.

Discovering Toolbook

After a long search for a "perfect" authoring tool, the author found in Toolbook Instructor a versatile and compelling scripting software. Toolbook Instructor (versions 4 to 8) gave the author the opportunity of creating almost anything from scratch. The scripting power of Toolbook Instructor allowed the creation of highly interactive learning applications for web deployment. In fact, the demonstration of interactive web-based learning applications for a course in research methodology helped land the author a dream job in instructional technology at a public university. Although the interactive learning applications created in Toolbook were very compelling for learning, the author was wishing that such opportunities are afforded to educators from everywhere. Educators wished they could create similar powerful interactive learning applications. There was a deep longing that some creative scripting in Toolbook could meet the need.

Discovering The Need

But the need was not really there until the author was sought out to help teach two graduate courses in instructional design and technology at another public university. Interactive web-based technologies were modeled in both courses. Although graduate students in both courses were encouraged to use whatever software they were comfortable with in their class projects, every one of them insisted on emulating the technology used in delivering both graduate courses. It was an excellent

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example of modeling the use of technology for graduate students. However, many of these students could not afford to own the expensive Toolbook software. After their evaluation software expired, some bought the student version at a very affordable price. But they realized that it would not go far as their schools could not support the expensive software platform. Moreover, many students were not "trained" to program interactive learning applications. It presented the author with a great need to create some reusable learning objects for educators from K-12 and higher education.

Discovering The "Barrier"

Although a host of interactive learning objects were created for educators to customize content, the author quickly realized there was a problem. Toolbook was strictly a PC software. It would not play in the Mac environment. Moreover, the plug-in for web deployment was not working seamlessly on the Internet. And there was a bandwidth problem as the native Toolbook files were fairly large. Despite the power of Toolbook, most of the graduate students did not continue with any Toolbook development, not even using any of the Toolbook reusable learning objects created by the author. Later, the author went on to develop some reusable gaming objects using Toolbook. The author created a series of gaming objects. They were very compelling but few educators wanted to use them for online learning because of platform limitation and technical difficulties.

Discovering Flash

The advent of Flash 5 changed everything. The author realized that Flash was fast becoming the most compelling multimedia animation software for the Internet. Until the Flash 5 was released, not much interactivity could be created in Flash. Although it was the debut of ActionScript, its power for interactivity was exhilarating for the author to develop interactive web-based learning applications and games. The power of Flash animation, scripting versatility, low bandwidth format, universally accepted player, cross-platform deployment, and web multimedia integration make Flash very hard to beat. Moreover, its flexibility to interface with server-side software and scripting makes it even more attractive to web developers. This flexibility has greatly increased the potential of Flash 5 in dominating the world of reusable learning objects.

The author hopes to create a host of Flash adaptive learning objects from which educators can create interactive learning activities or games without having to give up their passion of teaching for time-consuming application development. Of course, the majority of educators would not do that anyway. But they may consider using technology to enhance their classroom teaching if these Flash adaptive learning objects become their technology options.

The use of game and question randomization has created a lot of interest among students who play interactive learning games. The key is to keep students coming back for more games. This will subtly help them learn and relearn some difficult content without feeling the dread. In short, if students play an interactive learning activity or game once or twice and not return for more, it is not a successful interactive learning activity. The instructor may have to require and remind students to play them. As a result, it has not stirred any intrinsic motivation within the students. The remedy lies in highly interactive learning games that will keep students coming back for more.

3. FLASH GAMES RELEASED

Since the Flash Challenge Game Object was released in July of 2001, numerous games have been created for the following disciplines at the University of Minnesota, Crookston: Accounting, Microbiology, Zoology, Animal Science, Speech, Natural Resources, Agronomy, Systems Analysis, Graphics Design, Nutrition, Hospitality Management, Psychology, & Internet. Kilgore College of Texas, Medical College of Wisconsin, and University of Georgia participated in the first phase of the ubiquitous game creation. The web-based game self-creation was the second phase. After the presentation of the Flash learning game objects at the 12th Annual Conference for Distance Teaching and Learning in Madison, Wisconsin, some education institutions asked to be among the first to participate in web-based game creation. They were among the beta-testers during the second phase launched in March 2002. The Medical College of Wisconsin and Milwaukee Public Museum is currently using this game to assess students' learning at their Epidemic! The World of Infectious Diseases website.

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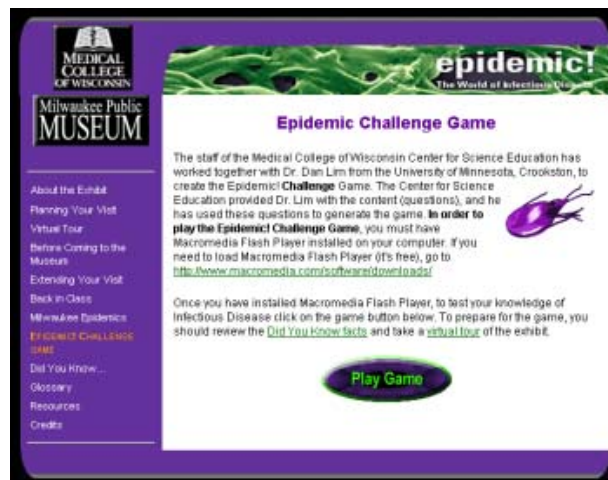
4. DESIGNING FLASH GAMES

The Flash Challenge Game Object is a very compelling learning tool as it keeps learners coming back again and again. It is not uncommon for learners to spend hours playing the game without "feeling" they are studying some "boring", "complex", or "difficult" content. The game requires a total of 80 questions. There are sixteen levels, of which each contains five questions. The game randomly selects one of the five questions within each level. Three lifelines are available to help them with challenging questions. Whether learners win the game or are "kicked out" because of a wrong answer, the new game button will appear allowing them to start a new game. Each new game will have a combination of repeated and new questions. Repeated questions reinforce learning while new questions maintain learners' continued interest in the game. As the correct answer is provided for each wrong answer, learners tend to remember it and answer it when the same question appears again in subsequent games. Below is the feedback from a student in a Spring 2002 class at the University of Minnesota, Crookston:

Student Feedback
"I just wanted to tell you how great your "Challenge" study game is. I played it last night for about two hours not to just study, but because it challenged me and I needed to beat it. I usually study for a multiple choice test by simply trying to memorize the answers of a previous test, or from a study guide provided by the instructor. Except doing it that way (just reading notes and memorizing) gets very boring and I find that I do not study near as much as I need for the upcoming test and I don't get as well of a score as I could if I was interested in the material I was studying. I got 100% on your test today and I am very happy to know that I have found a way of studying that really helps me out. I am very grateful to you for making this game, and think you should implement this sort of, "fun learning" throughout the campus and to all other interested instructors. I guarantee they will like it once they give it a chance." – A student from the ITM3150 Graphics & Interface class (Spring 2002).

Additional Games
Additional Flash Learning Games have been added for ubiquitous game creations for educators. These include Flash Category Game and Flash Clue Game. These two games use the same interface, interactivity, and randomization as the Flash Challenge Game. These additional games will greatly increase the potential of making this gaming initiative a popular and compelling academic gaming portal where hundreds of educators and thousands of students will frequently visit.
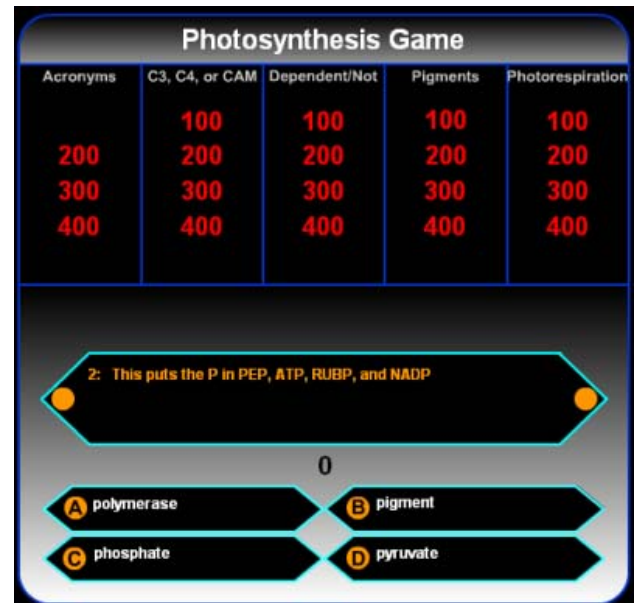
The Flash Category Game above allows students to select a question by category and score. Points are given for each correct answer. However, points will be deducted for any incorrect response. This game object is useful for game content that requires some form of categorization. There is a total of 100 questions of which five questions are used for randomization within each score (20 scores). So, students will get some new and repeated questions for every new game. The Flash Clue Game has five clues to help identify a particular person or thing. Students can limit the number of questions for each play.

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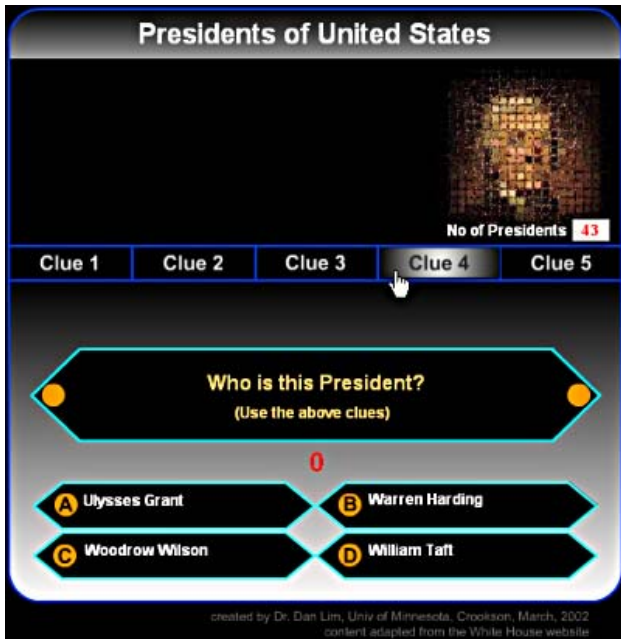
Crookston's Instructional Technology Center Website (http://webhome.crk.umn.edu/~dlim/itc. Flash Games > Game Manager).


5. FLASH GAME MANAGER

Two Versions
The current game content creation backend is implemented in two versions: web-based individual question entry manager and a "delimited" format text file batch upload manager. The individual question manager has been beta tested and it is now available for educators to create new game content. There are three educational game manager editions: University of Minnesota Edition, United States Educational Edition, and International Educational Edition.

The Game Manager
Any educator can create a game account within the respective game manager edition. A special code is emailed immediately and must be used to complete the registration process. The special code will be attached to the newly created account's url for game content identification. Currently, each account holder is allowed to create up to three games. The restriction may be waived for some special educational needs. The unique game url will retrieve the specific game content from the server-side database. Specifications for the question and its options are provided to guide question entries. As five questions are required for each level, overflow questions will be automatically assigned to the next level. Questions can be edited or deleted from the database at anytime. All 80 questions need not be entered at one time. The game content entered can be previewed in a flash game format. When all 80 questions are entered, the game can be enabled for public access. The Game Manager is available at University of Minnesota –
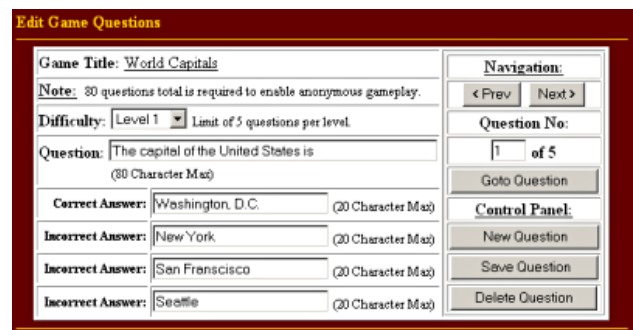
Batch Upload Manager
Another game creation manager using batch upload is in the working. It will be using ColdFusion as backend for uploading all 80 questions at one time. Questions can be pre-entered in a spreadsheet or database format for batch upload. Some testing has been done for this game content upload method. Beta testing for this batch upload manager will be available in the near future.

6. OUTCOMES

UMC Flash Games
Since July 2001, 43 Flash games have been posted at the University of Minnesota, Crookston's ITC website. The games are in the areas of Biology, Microbiology, Zoology, Animal Reproduction, Nutrition, Hospitality Management, Business Management, Accounting, Graphics, Systems Analysis, Corrosion Technology, Soil Science, Natural Resources, Agronomy, Communications, and Composition.

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Survey Findings
According to a web survey conducted in April 2002, almost 40% of students surveyed indicated that they have played the Flash learning games in at least one course during the school year. Out of the 40% who played the games, 92% indicated the Flash learning games were helpful and recommended them to be integrated into other classes too.

7. CONCLUSION

Games that subtly help students learn, especially difficult learning content, are important to both traditional and online learning. The element of fun does help break the monotony of learning mundane content. If Flash learning games presented in this paper are integrated with sound pedagogy into classroom learning, both traditional and online, students can learn better, faster, and with less "pain". The Flash game objects described in this paper are designed to make life a little easier and fun for students and instructors alike. The game manager will definitely help educators focus on developing gaming content for their students. These Flash learning games will become important resources for educators to enhance learning and content retention.

More gaming and other reusable learning objects will be developed in the future. The author hopes to create a mega site (or portal) of academic gaming and learning objects where educators can frequent, use, and create new learning gaming content while students can use them to enhance or make their learning experience more enjoyable.

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