

# **AC 2007-1082: ISSUES IN ONLINE COURSES FOR COMPUTER GRAPHICS**

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# Issues in Online Courses for Computer Graphics

## Abstract

In this paper, the authors will explore issues in the development of hybrid and online courses for the computer graphics technology field. Course design issues will be explored, as well as course management issues. The authors will use the various online courses which they have developed in the discipline to illustrate design and management concerns. The authors will use their experiences in the development of online courses to illustrate these issues, and also refer to the Quality Matters rubric for assessing quality in online courses. The practical concerns which are inherent in a qualitative field will also be reviewed, since computer graphics technology incorporates design and art standards as well as technological mastery. Issues discussed include considerations and methods for submission of portfolio materials, and how students can perform qualitative assessment of their own and others' work

## Background

Purdue University Calumet (PUC) is a regional campus of Purdue University which is located in the northwest part of the state in Hammond, Indiana, a highly urban area of the state. The campus serves about 9,100 students and is primarily a commuter campus, although it has some residential housing. The student population consists of about half traditional students and about half non-traditional returning students. Both the Computer Graphics Technology program and the Organizational Leadership and Supervision (OLS) program are part of the Manufacturing Engineering Technologies and Supervision (METS) Department on the Calumet Campus.

The Computer Graphics Technology (CGT) program at PUC was begun in 2000, and has grown exponentially in the last six years, as have CGT programs throughout the country.

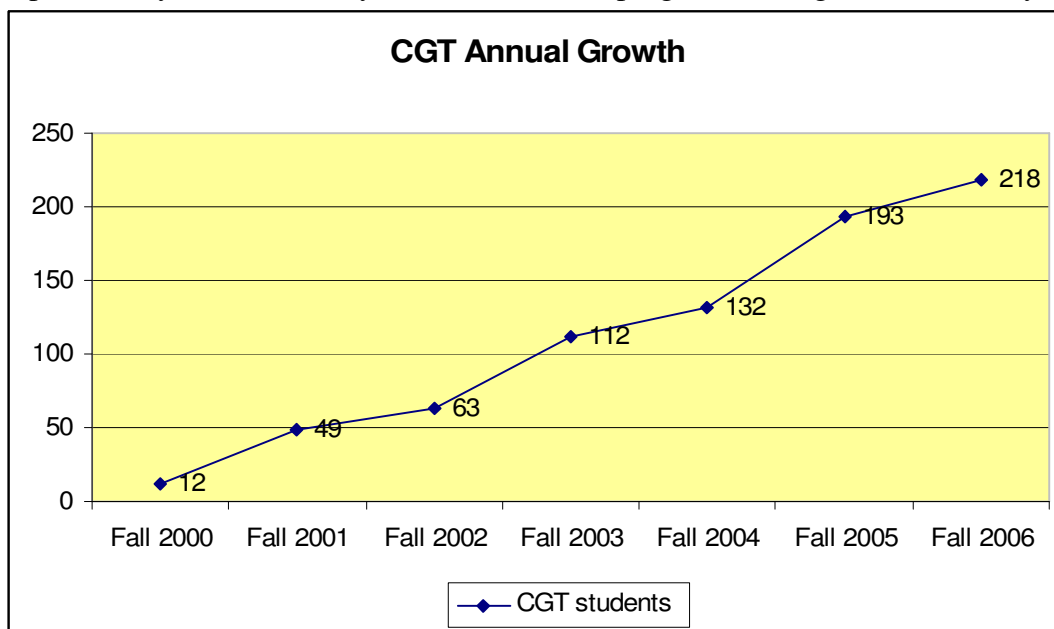


Table 1. CGT Annual Growth at PUC by number of Majors

The majority of students in the CGT program at PUC are traditional college age students. The CGT program offers both Bachelor's and Associate's degrees, with options in multimedia, game and animation, along with certificates in web design and electronic publishing.

Due to the tremendous growth in the CGT program over the last six years, the program has begun to explore the Distance Education (DE) and hybrid course option to address the growing needs for classroom and laboratory space. PUC currently uses WebCT Vista as its course management software. The CGT program has already been using Vista for supplemental support for its traditional classes.

## Discussion

Because of its rapid growth, the CGT program has embraced online and hybrid course development to alleviate some of the resource restrictions caused by this growth. The offering of online courses will assist in the freeing up the classroom space, which is currently at a critical shortage.

For purposes of this paper, the hybrid format is a course format which includes meetings in person in the traditional classroom based setting, and also makes use of web support over the Internet. Hybrid courses are also known as blended learning or blended learning environments. [1] Blended approaches base their pedagogy on maximizing the benefits in face-to-face interaction and online learning; finding a harmonious balance in blending the benefits inherent in face-to-face interaction and inherent advantages in online access to knowledge. [1] Blended learning and hybrid class formats are also discussed in the ECAR Research bulletin *Blended Learning* [2].

The blended learning approach has become a more common method of delivering course content. The Computer Graphics field has contributed greatly in the development of these types of courses, especially in the delivery methods employed. The CG field has been offering these types of courses since the inception of internet support. The emphasis of courses has tended to be more towards technical applications, such as OpenGL and other coding languages, due to the high cost of application software required for the multimedia and animation type courses. Traditionally art studio courses offer a type of blended learning, combining traditional class time with studio time. Since Computer Graphics includes the art component, and technology is a tool, blended learning offers the possibility of a studio type learning space. Lab time essentially allows the students to work in a technical studio space.

When creating an online or hybrid course there are number of factors that must be taken into consideration. [4] These factors were researched in *Lessons Learned from the Hybrid Course Project*. This project identified ten elements that need to be considered when developing a hybrid course.

1. There is no standard approach to a hybrid course.
2. Redesigning a traditional course into a hybrid takes time.
3. Start small and keep it simple.

4. Redesign is the key to effective hybrid courses to integrate the face-to-face and online learning.
5. Hybrid courses facilitate interaction among students, and between students and their instructor.
6. Students don't grasp the hybrid concept readily.
7. Time flexibility in hybrid courses is universally popular.
8. Technology was not a significant obstacle.
9. Developing a hybrid course is a collegial process.
10. Both the instructors and the students liked the hybrid course model.

The CGT faculty analyzed the program's current course offerings to determine those courses which would be suited for online or hybrid presentation. In conjunction with the University's initiative to foster the development of quality online education, two courses were determined to be ideal candidates. These two classes are CGT 411 Contemporary Problems in Applied Computer Graphics and CGT 141 Internet Foundations, Technology and Development.

The CGT 141 Foundations class is an introductory Web design tagging and scripting class. The course is ideal for online presentation since it has been offered from the inception of the program, the course content has changed and matured and the software requirements are quite minimal. The course requires a reliable internet connection, a text editor, a simple image editor and a web browser. Many of the other CGT courses in the program require expensive software packages, which makes them less suitable for online presentation.

The development of this online course took on a number of phases. The first phase identified the course learning objectives, which must also be in accordance with the overall CGT program objectives. The course learning objectives needed to be slightly modified to take into account the online nature of the offering. Once the course objectives were established, the course content was thoroughly reviewed for options in online presentation.

The next phase of development involved the type of assessments and measurement criteria, along with the course content presentation. The assessment and measurement criteria were established from the course content that has been developed for traditional classroom delivery. This included:

- Three class projects emphasizing progressively greater degree of competency of course material throughout the semester;
- Two exams, a midterm and final; and
- A series of course exercises to re-enforce course content and to establish the progress of the students' understanding.

Some additional assessment and measurement criteria were developed to accommodate the online nature of the course. These criteria were developed to replace the personal contact with each student which traditionally occurs within the classroom. They will assist the instructor as well as the student in the overall progress and comprehension of the course material. These additional criteria included.

- An extensive series of end of lesson quizzes to evaluate the students' comprehension of the lesson material.

- On-line discussion boards to create interaction among the students within the class and establish personal contact among students and with the instructor.

Once the assessment and measurement criteria were established the course syllabus was developed.

The course was divided into a series of modules which cover specific elements within the overall course design. Each module has specific objectives relating to the content of the module and these module objectives are linked to the overall course objectives. Each module is then divided into three lessons. Within each lesson there are a number of components. Each lesson has a Lecture and Quiz component. Along with these components, when appropriate, there is a Discussion and an Exercise component relating not only to the lesson content but to overall course knowledge.

The Lecture component was developed from the content developed from the existing traditional course content. Initially, this was very straight forward as the existing course content had substantial amounts of introductory and foundation development material. As the course progressed the existing course lectures were more centered on class discussions and example-driven. This required the creation of new course content for this part of the course to accommodate the online delivery. Along with the additional course content, discussion topics were developed to replicate the in-class discussions. The Discussion components are designed to facilitate the interaction of the students among themselves as well as with the instructor. These discussion topics are oriented towards student self evaluation, peer evaluation and critical evaluation of web design. They are also designed to create a sense of community within the online class.

The Quiz component is extensive and is included at the end of each Lesson. The quizzes are designed to evaluate the students understanding of the lecture material as well as the assigned reading material. The quizzes consist of 10 questions centered on the key elements within each lesson, as well as review questions from previous lessons. The quizzes are also used as a mechanism to control the delivery of the modules. A student must complete all the quizzes within a specific module before the next module becomes available. This assures that the material is delivered to the student in the designed and logical progression so there is no random delivery of the course material. The Exercise components address individual elements within the class projects. They provide the student with the blueprints for successfully completing the class projects.

The online course ended up having ten modules: an introductory module, eight modules containing course content, and one module dedicated to the review of the course. Once the content of the course was developed, the syllabus was re-written and the course schedule was developed. An extremely important element of an online course is the Course Introduction. The Introduction sets the tone of the class, establishes the rules for participating in the class, the expectations for the class and the avenues for getting help during the course of the class.

CGT 411 Contemporary Problems in Applied Computer Graphics is a course originally designed to help students target their professional area of expertise in the CG field, develop branding and portfolios, and explore employment and entrepreneurial opportunities in their expertise area.

This course also allows them to expand and build portfolio projects in areas where they may be lacking. Due to the nature of this course students spend a lot of “studio time” or experiential learning time on projects. It is important that they go beyond the classroom walls to expand their professional, technical and aesthetic expertise. Many of them participate in group projects where they work for non-profit organizations. The time required to do this does not fall in the weekly-designated classroom time. A significant part of the course involves researching and planning for a one to two semester senior project. Some students choose to work as a group to create their senior project while others contribute to an existing company’s CG needs.

The course has been designed as a hybrid course with five classroom meeting times throughout the semester, for faculty-student discussions as well as presentations of in-progress and final projects. These meeting times aid in the collaborative efforts and are an extension of online discussions. Some students start out researching their senior projects on an individual level and if, through a series of online and in-class discussions, they find that their projects compliment each other, they can achieve a better-prepared group project. The project is better prepared because they were brought together by the project content and expertise. The collaborative relationships are first developed in an online forum through online class discussions, video presentations and critiques where a vblog format is used.

An example of a beginning project includes a series of research assignments about branding. This research results in the student branding their creative and technical knowledge and talents. This self-branding project is then presented to the class for peer review. This simulates a client presentation. This seems like a classroom bound assignment, but actually has online capabilities. In the online presentation format students have the opportunity to film their presentations. This is then loaded into the class as a vblog or podcast for other students to see and critique. The advantage of this over an in-class presentation is the student has the opportunity to view themselves and even re-do their presentation if they feel the need. This creates a platform for self-improvement, self-critiquing and learning beyond the classroom. They have the opportunity to view the other students and learn from their presentations. The student also has the opportunity to re-submit their branding presentation with new input from peers and faculty.

Another aspect of this course is learning how to conduct a successful interview and “sell” their creative and technical talents. This project is completed close to the end of the course when students have had the opportunity to fully develop a successful portfolio and pinpoint potential job opportunities. The objectives of this project are to help students practice interviewing techniques and presentation. In an online discussion forum students discuss what company they are interviewing with, and supply the class with information about the company, its culture and the position requirements. The student then creates a video of their interview presentation to the client. The presentation needs to be targeted to the company position, its culture and the student’s aesthetic and technical strengths. Peers in the course must review the interview presentation and prepare appropriate employer questions. Every student is supplied with 100 most frequently asked interview questions and reading materials on how to participate in a successful interview. During the meeting time on campus, students bring in their portfolios and a series of interviews are conducted peer to peer. This gives the students the opportunity to be interviewed and to be the interviewee. Although the video-interview-presentation does not give them that high-pressure experience, it provides them with a video for self and peer critiquing.

Ideally this creates a platform for learning so that when they do get in that high-pressure situation, they can fall back on the learned experience.

The final project is presented in a poster session where the whole university has the opportunity to see what the student plans to complete for their senior project. In the poster sessions students have the opportunity to set up a multimedia display and exhibit their research and plan. A series of assignments in the online format help the student establish a viable senior project. The multimedia video presentations that were previously used in the online forum usually become a part of the poster presentation session.

### Quality Matters Rubric for development of quality online education

PUC has recently looked to the Quality Matters [QM] project for guidance on developing quality online education. The QM project is a grant-funded project to set standards for high quality online courses and provide for their continuous improvement. The project is based on a peer review model, so that teams of three faculty members review and assess the quality of an online course according to a research-based rubric. The project serves students, faculty, course developers and institutions, all of whom have an interest in high quality online courses. The model for the peer review method and research based standards was developed by Maryland Online, a consortium of nineteen higher education institutions. The QM project reviewed the literature and developed a rubric based on forty elements across eight standards, which have been shown by the research to positively impact student learning. [3]

Under the QM process, when a team of three trained peer reviewers is asked to review an online course according to the research-based rubric developed by QM, they look at forty standards, each of which is assigned with point values of 3, 2, or 1. Fourteen of the standards are “essential”, worth 3 points for a total of 42 possible points. The twelve very important standards are worth 2 points each for a total of 24 possible points, and the fourteen important but not essential standards are worth 1 point each for 14 possible points.

The eight general standards are:

- Course Overview and Introduction
- Learning Objectives (Competencies)
- Assessment and Measurement
- Resources and Materials
- Learner Interaction
- Course Technology
- Learner Support (student and technical)
- Accessibility

In order to pass the standard, the course must meet all fourteen of the essential standards and receive a minimum score of 68 out of 80 possible points.

To give an idea of the importance of course design and student interactivity in the QM process, the fourteen essential standards are shown below.

- Navigational instructions make the organization of the course easy to understand

- A statement introduces the student to the course and to the structure of the student learning.
- The learning objectives of the course describe outcomes that are measurable
- The learning objectives address content mastery, critical thinking skills, and core learning skills
- The types of assessments selected measure the stated learning objectives and are consistent with course activities and resources
- The grading policy is transparent and easy to understand.
- Assessment and measurement strategies provide feedback to the student
- The instructional materials support the stated learning objectives and have sufficient breadth and depth for the student to learn the subject.
- Instructional materials are presented in a format appropriate to the online environment, and are easily accessible to and usable by the student
- The learning activities promote the achievement of stated objectives and learning outcomes
- Learning activities foster instructor-student, content-student, and if appropriate to this course, student-student interaction.
- Clear standards are set for instructor response and availability (turn-around time for email, grade posting, etc.)
- The tools and media support the learning objectives of the course and are integrated with texts and lesson assignments.
- The course acknowledges the importance of ADA requirements

#### Art and Technology in the Online CG Course

How does art and technology transmit to online delivery in the Computer Graphics curriculum? The creative aesthetic aspects, visual information and collaborative learning are important aspects in the CG field. Using current technology is an important avenue for online delivery in the CG field. Vblogs, or podcasting, is one of the newest avenues we are experimenting with. These methods are being explored in the online CGT411 course in Contemporary Problems in Applied Computer Graphics with the use of vblogs and podcasting and the use of self and peer critique.

#### Practical issues—limits on submissions, portfolio review

The limits of online delivery of the CGT 411 course are the bandwidth and server space limitations, as well as setting up a vblog on the school server. Podcasting or vblogs by nature are small files, but the campus has to provide the technical support and/or the courseware needs to be able to handle the video file formats. In my experience there is more success in working with QuickTime files across various platforms. Working with computer graphics students has not presented problems for PUC's CGT program as far as their mastery of the technology. One of the assignments is to create a website where students post their progress on a project. Many choose to supply their URL and post their vblogs in their own vblog set up. There is some minimal cost to the students to do this, but many already have accounts and it is easier for them to use them. Conversely, in a degree program where students are not as familiar with the technology, setting up a vblog or merely instructing them on how to create a video podcast and

upload it to the server becomes a project in itself. The software for Mac and Windows platform is available at no or minimal cost. Any book or online resource on vblogs or video podcasting provides the faculty and student with the needed technical knowledge. If the online courseware has a platform to upload videos and a discussion board, then the vblog format is available in a roundabout way.

To help the student visually understand the format one of the authors creates a visual presentation where professional and student examples are used to talk about the process. Some students have also created a podcast on how to create a podcast. The content and capabilities are limitless for the instructor and the student. Visual communication is often lost in the online format and with the use of low-resolution video a more personal touch to an online or hybrid course is possible.

### OLS classes online

The CGT program at PUC requires five to seven Organizational Leadership and Supervision classes for their graduates. Organizational leadership and supervision classes teach students business and entrepreneurship skills. Since most CGT graduates end up working in self-owned or small businesses, and often work in teams or groups, these skills are vital for their professional development.

The OLS program has a different student demographic than the CGT program. Nearly three-quarters of the students in the OLS program are older returning students. Among this student population there is a large demand for flexible and alternative scheduling, such as hybrid and online courses. Approximately 70% of PUC's OLS program is offered online or in hybrid format. This also fits with the CGT students' needs: although they have a more traditional student demographic profile, they are technologically sophisticated and seem comfortable with the online format. Since many of the students at PUC work, whether they are traditional or returning, the online format is appealing to nearly all PUC students. The OLS program also encourages the use of quality standards such as the QM rubric to maintain a high-quality learning experience for students in the online format.

### Conclusion

Development of hybrid and online courses for the computer graphics technology field presents some interesting challenges, but can be a way to meet classroom and student needs for this rapidly growing field. Course design issues and course management issues, such as bandwidth and server space limitations need to be considered. The authors also believe that it is important to maintain the quality of the educational experience for the student, and use of standards such as the Quality Matters rubric for assessing quality in online courses can help meet these considerations.

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