

## **Program Review and Assessment Committee Grant Proposal**

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Project Title: Assessing Sophomore Level Student Technical Expertise Through Digital  
Portfolio Reviews

Project Dates: August 2009 – May 2010

## **Abstract**

This project will be to create a rubric that will be used to assess the technical expertise demonstrated by sophomore level students in the Computer Graphics Technology (CGT) program at IUPUI. This rubric will specifically be used to assess the work displayed in a digital portfolio review pilot course consisting of students who have successfully completed the pre-professional portion of the CGT program in one of 3 design tracks in CGT: 1) Manufacturing Graphics Communication (MGC); 2) Interactive Multimedia Developer (IMD); 3) Technical Animation and Spatial Graphics (ASG). Sophomore students participating in the project (estimated to be 32) will be those who are preparing their personal portfolios for formal review in the Fall 2009 and Spring 2010 semesters. This project will conclude no later than May 31, 2010. This pilot program will provide data on each participant's overall technical expertise and level of preparation to enter the professional component of the CGT program where they will take 300 and 400-level courses in one of the three tracks detailed above. It is intended that this portfolio review will be used as a gate keeping experience which will be one of 3 indicators used to gage a student's level of preparation for upper division work in computer graphics: 1) Overall GPA; 2) Major program GPA; 3) Portfolio review for technical competency. The data collected from this project will also be used to help pinpoint technical areas in the curriculum that need improvement.

## **Purpose of the Project**

This project seeks to find a means to better assess student technical expertise levels through a pilot program designed to bring content area specialists (CASs) from the School of Engineering and Technology together to evaluate individual work samples generated by students and assembled into a digital portfolio. With the support of a PRAC grant, the project directors will be able to create and execute a rubric which will be used to more accurately identify the level of technical competency of each student who participates in this project.

Being able to assess the level of technical expertise through a portfolio review will support the project coordinators and classroom teachers alike in their efforts to improve the delivery of this topic in courses. However, the portfolio alone is not meant to provide sufficient evidence of a student's level of technical expertise or competency in terms of computer graphics applications, but will be one method helpful in determining each participants' ability to use the knowledge they have gained in their foundational graphics course in applications necessary to move forward to examine higher level visual communication theories and assignments. Other evidence will be collected through information gleaned from lectures and presentations delivered in the pilot course, course assignments, tests and quizzes, and oral presentations made by each student to ensure that multiple sources of data are used to determine that the technical level of expertise demonstrated in the portfolio is founded upon the student's knowledge base.

As part of the pilot course, students will be specifically instructed in 4 critical areas of professional portfolio development:

1. Understanding the Role of the Digital Portfolio
2. How to Assemble a Digital Portfolio
3. Using the Digital Portfolio in the Workplace
4. Peer Assessment Techniques for Digital Imaging

Students participating in this pilot program will find the project divided into two distinct parts. The first part will be conducted during the Fall 2009 semester when they will attend seminars on a weekly basis to receive lectures and demonstrations, and participate in assignments focused on the rules and practices used to create a professional digital portfolio. During this semester, students will individually and in teams, conduct peer evaluations where critiques of digital portfolios which are posted on the internet will be heard.

During the Spring 2010 semester, students will work on the collection, correction, and assembly of their own digital portfolio. Critique sessions will be held throughout that semester where students will be required to present their work in progress to their peers and justify their selection of pieces, quantity of samples selected, category identification, and presentation format. At the end of this semester, each student will be required to make a formal presentation of their finished portfolio as if they were presenting their work in a formal job interview.

### **Intended Outcomes of the Project**

This project anticipates that the following outcomes will be achieved:

1. The creation of a portfolio review rubric by which the sample images contained within a digital portfolio, and the entirety of the portfolio, may be measured
2. Provide a road map for the development of a formal portfolio review process
3. Provide data by which a student's technical competency may be measured thus providing an indication of their level of preparedness to enter the professional portion of the CGT program
4. Provide a rubric that can be used by other computer graphics programs for conducting similar portfolio reviews

### Portfolio Format and Contents

It is intended that each portfolio submitted for review will meet the following criteria:

1. The portfolio should be organized in a digital format
2. The portfolio should be assembled as an interactive document, and not merely be a linear electronic document
3. The portfolio should be designed to represent the body of work completed to date by the student in the pre-professional program and provide representative samples of the diverse subjects studied across the curriculum. The portfolio is meant to be the vehicle that will

demonstrate what the student has learned in terms of the foundational principles of design, color theory, 3D modeling, raster and vector imaging, and visual communication standards.

4. The portfolio will be laid out in a manner that will clearly demonstrate the student's ability to:
  - a. Understand the technical aspects of the computer graphics problems they have solved
  - b. Create a visually engaging work that meets accepted design principles
  - c. Self-assess their work in order to improve the functionality and appeal of their portfolio based on technical principles
  - d. Provide reflective notes explaining the terminal objective of each piece as well as the technology used to create it

### Rubric and Portfolio Development

Due to the wide diversity and styles of portfolios, care must be taken in the development and execution of a rubric in this project. In an effort to meet this challenge, our rubric will take into consideration several points of view already used in general and technical education. As noted in this regard:

Portfolios relate directly to what students are learning, but there are many problems in evaluating their contents. These center on: (1) time involved in scoring; (2) lack of validity statistics; (3) relative absence of reliability data in comparison with standardized tests; (4) vagueness in reporting portfolio results; and (5) the necessity of different criteria for different products. (Ediger, 2000)

Therefore, it is essential that the format and content of the rubric must be constructed keeping the outcomes we wish to measure in kind. On this point, we will consider that:

In an educational environment, one or more artifacts are often presented for evaluation (an assessment portfolio) for scoring (often using a rubric), hopefully with feedback provided by

a teacher or peers so that a learner knows how/where to improve. In some cases, a student not only reflects on what they have learned, but also sets goals for future learning (direction). (Barrett, et al 2007)

### **Assessment Methods**

Students in the pilot portfolio review will each create a personal digital portfolio that will use their own computer graphics work as samples as the contents. Throughout the development period, peer review sessions will be held where students will present their work to date and receive feedback from other students in the courses. Based on the rubric developed, each completed portfolio will then receive three reviews by the content area specialists (CASs) in the School of Engineering and Technology at IUPUI as part of the pilot. The CASs will be asked to review and evaluate each assigned portfolio against the rubric. Each CAS evaluator will be instructed on how to use of the rubric prior to the implementation of the rating sessions. Instruction in the use of the rubric will focus on:

1. Terminology used within the rubric
2. Variations that may be expected in the digital content found in each portfolio due to the CGT track the student is focusing upon
3. Expected minimal quality standards i.e. Rules of design, Color theory, Pixilation, Printing errors, etc.

The CSA evaluator will be asked to review only one portfolio at a time and score it as an independent work. Portfolios will not be judged against each other or used as a benchmark to compare one against another in terms of sample pieces selected in regards to number, size, or topic. The complete evaluations of one portfolio must be completed and the evaluator's remarks and impressions recorded, before another portfolio will be released to them for the next review. As each

portfolio will receive a total of 3 evaluations, no evaluator will be permitted to review the record of any other evaluator in regards to any portfolio until all evaluations have been collected. At the conclusion of the portfolio reviews, each evaluator will be asked to complete a survey which will provide information regarding the ease of use of the rubric, the rubric's content, and provide remarks related to any questions they may have had in regards to how the rubric might be improved.

### **Data Analysis to be Employed**

Although all 3 project directors will analyze the data gathered, the PRAC grant will be used to support only two of the project directors as Dr. Bannatyne will provide his services pro bono. Data analysis will be triangulated between information collected from the rubric, the students overall GPA (reflective of all courses taken), and the student's major GPA. This will allow us to graph each participant's score from the rubric, and then chart it against courses completed and major GPA.

By so doing, the visual representation of the data should not only provide an individual result for each student in terms of the learning objectives they have already been exposed to, the quality of their work, and the design principles demonstrated in their portfolio, but also reveal any common trends related to issues of weakness or strength within the CGT curriculum that may require further attention.

Based on the findings that emerge, the rubric could then be revised as deemed appropriate.

### **Evaluation and Dissemination of Results**

In addition to the final PRAC report that will conclude this project, it is our intent to release the results of the data analysis to our colleagues on the DCT Curriculum Committee. In addition, our findings will then be disseminated to all campuses within the IU system where CGT is offered as a major (specifically, South bend, New Albany, Kokomo, and Richmond). In addition, the findings

will be assembled into presentation format and targeted for submission to the leading international professional conferences that deal with educational topics in computer graphics, specifically:

- a. Information Visualization Conference, IV10 (London, England)
- b. Graphicon2010 Conference (Moscow, Russia)
- c. SIGGRAPH Annual Conference 2011 (Vancouver, BC, Canada)

A journal article will also be prepared for submission to leading technology journals which focus on education including, specifically:

- a. The Journal of Technology Studies (JTS)
- b. The Engineering Design Graphics Journal (EDDG)

### **Intended Use of Findings**

The terminal objective of this project will be to establish a workable portfolio review system to determine the level of technical competency of those students who have completed the pre-professional portion of the CGT program. Data collected from the reviews will also become part of the overall program assessment plan to determine effectiveness of the CGT program. The data collected from this project will be used as part of a larger program evaluation system being developed by the Computer Graphics Technology programs tracks.

### **Budget**

1. Stipend for Project Directors:

Dan L. Baldwin	\$1250.00
Kevin C. Marshall	1250.00
Dr. Mark Bannatyne (pro bono)	<u>0</u>
Total	\$2500.00

Stipends will be used to compensate the for Project Directors (Baldwin and Marshall) for time spent administering the training of CAS evaluators to use the rubric, analyzing the portfolio review data received from each evaluator, and charting the data against other supporting information. Dr. Bannatyne is offering his services to this project pro bono.

### **Final Notes**

While Dr. Bannatyne is IRB authorized (effective June 9, 2008), it should be noted that no human subjects will be used in this project. Further, no IRNB authorization has been included with this proposal as it is only required after formal notification has been received by the Project Directors of the acceptance of this project by PRAC for funding.

### **References Cited**

Ediger, M. (2000). Assessment with portfolio and rubric use. (ERIC Document Reproduction Service No.: ED440127).

Barrett, H. C., & Garrett, N. (2007, October). Online personal learning environments: Structuring electronic portfolios for lifelong and life wide learning. Retrieved Feb. 22, 2009 from GoogleDocs at [http://docs.google.com/Doc?id=dd76m5s2\\_39fsmjdk](http://docs.google.com/Doc?id=dd76m5s2_39fsmjdk)