Compositing 3D computer graphics into a 2D computer graphics software environment

By

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Dr. Miriam Larson
I. Executive Summary

In this online course, entitled “Compositing 3D computer graphics into a 2D computer graphics software environment,” the learner will be exposed to the techniques and principles of 3D compositing utilizing Photoshop™ CS3/CS4 software. The target learner will be comprised of professional graphic designers and current graphic design students. Through compositing terminology, lectures, group discussions and hands-on examples, the learner will come to a knowledge of 3D compositing techniques and principles. This knowledge will be applied in an academic or professional setting.

II. Introduction

3D computer graphics are being incorporated into the graphic designer’s software toolkit in various forms. Adobe (HYPERLINK “http://www.adobe.com”) recently released Photoshop Extended (CS3 and CS4), which incorporates 3D features aimed at graphic design (and also animation) professionals. Adobe Illustrator has featured tools for making 3D objects for the past couple of versions. While the big 3D software companies, such as Maxon (HYPERLINK “http://www.maxon.net”) and Autodesk (HYPERLINK “http://www.autodesk.com”) mainly gear their software toward the animation, film/TV and the architecture industries, they are increasingly spotlighting and showcasing how their software can be incorporated into the world of print and graphic design. Recent comments on the blog, “You the Designer” about a posting of 3D artwork, shows interest of graphic designers in 3D graphics is increasing (HYPERLINK “http://www.youthedesigner.com/2008/02/29/25-tasty-3d-graphic-design-treats/”). Many graphic artist jobs that are emerging (especially in advertising, architecture and government contracting) require not only knowledge of the standard graphic design packages but also web design software knowledge and 3D graphics software knowledge.

The instructional designer has determined the needs of the target learners through past experience and informal interviews and conversations with graphic design students and professionals. The instructional designer will be able to confirm the students needs and verify or dispute their assumptions about their prior knowledge of compositing 3D graphics into 2D graphics projects through the means mentioned earlier. These assumptions about their needs is that some graphic design students and graphic design professionals incorporate 3D graphics into 2D graphic design projects but that a lot avoid 3D graphics due to the perceived complexity of 3D software packages. The cost also comes into play as 3D software packages are usually much more expensive than graphic design software.

Students who participate in this course will gain an appreciation for and a knowledge of compositing 3D computer graphics into a 2D computer graphics environment. The course will be delivered in an online format for flexibility and portability in reaching busy graphic design professionals and students.
III. Learner Analysis

As a lot of the learners will be busy students or professionals, an online class is likely the most feasible and flexible option. This could be facilitated or self-paced to allow students to work on their own time. A lot of the students and professionals will have access to computers with fairly fast Internet connections either at school or at work. The exception may be those who practice graphic design in their home and may have slower Internet connections. The amount of graphics, audio and video would have to be constrained to account for learners that may be accessing the Internet from a slower connection.

Prior Knowledge- The learners will be computer savvy and familiar with popular 2D graphic design packages from companies like Adobe and Corel. They will also have at least a base comprehension of graphic design principles.

Motivation- Control, choice and challenge will be important aspects of internal motivation. They could have choice in the mode of instruction, whether the online course will be delivered as a self-paced course or facilitated with an instructor. To alleviate the complications that may arise from learning 3D software, which techniques vary by software package, the learners will have access to prebuilt 3D objects to import into a 2D graphic design program like Photoshop.

Physical Characteristics- With respect to the learners’ physical traits, they are most likely comfortable sitting at a computer for long stretches due to the nature of their work. Therefore, instruction through the computer might be a viable option for many participants. They also have well developed fine motor skills and hand/eye coordination.

Cognitive Characteristics- Being a graphic designer means having to bounce back and forth between multiple software packages and applications throughout the day. Multi-tasking is common, as administrative duties such as email and talking with co-workers are interspersed with graphic design duties on the computer. The learners will have a high degree of spatial intelligence.

IV. Performance and Learning Context Analysis

The performance context for many of the learners for this instruction will be back in their respective places of employment. For current full-time students, the performance context is their future employment and/or graduate school. The learning context for this instruction will be online where the learner will access the instruction in a synchronous or asynchronous manner from their own computer. The learning context will compliment and support the performance context of graphic design professionals and students by working around their busy schedule and utilizing their technical skills.

Description of the Performance Context
Physical Characteristics - Graphic design professionals will have access to computer workstations capable of handling computer graphics but their computers may lack the full hardware requirements for 3D graphics. The biggest factors are sufficient memory, a capable graphics card and a fast processor. While there are a variety of 3D packages, they can be cost prohibitive. A free, open source option is the 3D software program Blender. For the scope of this instruction though, prebuilt 3D objects importable into a program like Photoshop Extended (CS3 or later) will need to be accessible so that no 3D software needs to be purchased or learned. The learners will also be shown online resources to access additional 3D models after the instruction has ended.

Support - Following the instruction, an online resource will be available to learners as they go back into their native learning environments. This online resource will help them to retain the knowledge they gained in the instruction environment and also to show others the benefits of incorporating 3D graphics into graphic design.

Social Aspects - Graphic design professionals can work alone or in groups depending on the size of the organization. Students also can work alone or in groups depending on the project requirements. There may be some resistance from older peers who are used to a certain toolset but the nature of graphic design is that the technology is always changing. The instruction will offer some sort of group collaboration to help the learners to work with others on projects and to learn to solve problems they may encounter in their native learning environment. Through an online tool, such as Wimba, students will work in small groups to discuss compositing examples and also to give feedback to course peers regarding in-class work.

Relevance of Skills and Knowledge - Graphic design professionals and students can utilize 3D graphics in visualizations of concepts, ideas and products that don’t currently exist. They would be able to more accurately portray these visualizations to clients through the use of 3D graphics.

Description of the Learning Context

Physical Characteristics - The instruction can cover theory and show passive examples and also give instruction for self-paced hands-on activities. A recap of the previous lesson can also be accessed for retention. The students and professionals may not have 3D software on their own computers so the asynchronous activities should incorporate prebuilt 3D objects that can be imported into Photoshop.

Personnel or Time Constraints - As graphic design professionals and students are probably working or busy during the daytime, evenings and/ or weekends and online synchronous/ asynchronous learning may work best.

Compatibility with Learner Needs - The online instruction will be more convenient due to the learner being able to access the content from any internet enabled computer on their own time, at their own pace and in a familiar and comfortable environment.
V. Content Analysis

The method used for content analysis was the Instructional Analysis from the text, “Real World Instructional Design,” that examined the “conceptual building blocks of a skill.” (Cennamo & Kalk, 2005, p. 44) The learning outcomes outlined were based on Gagne’s (1965) hierarchy, which includes outcomes such as verbal, intellectual and motor skills. Each goal was grouped into one of these learning outcome categories and then given a priority to determine the sequence of instruction.

The analysis was also based on the Learning Hierarchy Analysis from “Task Analysis Methods for Instructional Design”. This analysis method, also by Gagne, states that “a set of prerequisite skills...” [must exist] “for any higher order intellectual skill.” (Jonassen, Tessmer & Hannum, 1999, p.77) The instructional goals will try to build on the understanding of previous concepts and knowledge to grasp higher level skills. These goals also incorporate the learner “as a very active participant in the learning process.” (Ertmer, Newby, 1993, p.58) The flow chart of the analysis can be viewed in Appendix A at the end of this document.

VI. Aligned Learning Outcomes, Instructional Strategies and Assessments

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<thead>
<tr>
<th>Aligned Learning Outcomes</th>
<th>Instructional Strategies</th>
<th>Assessments</th>
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<tbody>
<tr>
<td>1.0- Given a pre-assessment to gauge their ability to visualize objects in 3D virtual space, learners will practice drawing a physical object from four different viewpoints; top, front, side and three-quarters perspective view.</td>
<td>1.0- Individual, hands-on learning to understand workflow and core concepts reinforced by a lecture on the basics of 3D virtual spaces.</td>
<td>1.0- Draw an object from four different viewpoints; top, front, side and three-quarters perspective view.</td>
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<tr>
<td>1.1 (verbal)- Given a list of ten basic compositing terms connected with practical examples, the learner will remember and demonstrate understanding of the basic compositing terminology by correctly identifying techniques or compositing characteristics from those examples.</td>
<td>1.1- Handout, readings and in class demonstration of compositing to connect terminology with real world examples and to reinforce learning.</td>
<td>1.1- You will demonstrate an understanding of the ten basic digital compositing principles by using them correctly in a small group or class discussion after viewing practical examples.</td>
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<td>2.0- Given a presentation on the basics of 3D compositing in a 2D graphics environment, learners will be able to become more aware of and be able to recognize examples of computer graphics that have 3D graphics composited into a 2D computer graphics environment, in such fields as architecture, advertising and product design.</td>
<td>2.0- Brief lecture and class discussion showing examples to reinforce concepts.</td>
<td>2.0- You will conduct an internet search to locate examples of 3D graphics composited into a 2D environment from the fields of architecture, advertising and product design.</td>
</tr>
<tr>
<td>2.1- Given access to the internet and given basic search term suggestions, such as digital compositing, 3D compositing and 3D graphic design, the learner will be able to find three examples of 3D composited graphics in a 2D graphics environment.</td>
<td>2.1- Students will use the internet to find and share examples of compositing to show the class.</td>
<td>2.1- You will have 20 minutes to go on the internet to search for 3 examples of 3D graphics that have been composited into a 2D graphics environment. These examples will then be discussed in a small group setting (online) to reinforce learning and get insights from course peers.</td>
</tr>
<tr>
<td>3.0 (intellectual, discrimination, cognitive)- Given a Photoshop CS3/CS4 file with multiple layers and a 3D object split up into multiple layers, the learner will analyze and dissect each layer by turning on and off each layer.</td>
<td>2.2- Individual, hands-on learning to understand workflow and core concepts using sample 3D objects and a Photoshop file to composite images.</td>
<td>2.2- For the provided sample Photoshop CS3/CS4 file with multiple layers, analyze and dissect the 3D object on multiple layers to analyze, dissect and better understand how a 3D object is composited into a 2D graphic environment.</td>
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<tr>
<td>3.1- Given the sample Photoshop file from the previous lesson, the learner will import an available 3D object into Photoshop to practice the proper positioning, perspective and compositing of that object into the sample file.</td>
<td>3.0- Student sample file work will be posted for others in the class to critique and analyze. This will help reinforce compositing concepts.</td>
<td>3.0- You will take the Photoshop file you worked on in the previous lesson and incorporate a 3D object from the available repository and import that object into Photoshop to practice positioning, perspective and compositing of that 3D object. The Photoshop file’s layers and history will be analyzed for comprehension of concepts.</td>
</tr>
<tr>
<td>4.0 (discrimination)- Given Photoshop software and access to a repository of importable 3D objects, the learner will be able to set up their own composited composition and learn to distinguish cues that aid in more realistic, seamless compositing based on principles of compositing and also principles of graphic design. The final project will also be reflective of a real world project, such as a product advertisement or poster.</td>
<td>4.0- Self guided, subjective, hands-on project with certain requirements followed by a class critique and evaluation.</td>
<td>4.0- You will create a Photoshop file with multiple layers and include at least one composited, 3D object (from a repository of 3D objects) into a photoreal, 2D computer graphic environment using artistic and technical principles learned in the instruction.</td>
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## VII. Media Plan

<table>
<thead>
<tr>
<th>Instructional Strategies</th>
<th>Media/Technology Selections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0- Individual, hands-on learning to understand workflow and core concepts.</td>
<td>1.0- An instructor/facilitator, through the means of streaming video on the web, will lead a demonstration on drawing objects from different viewpoints and then the learner will utilize paper and pencil to draw an everyday object suggested by the instructor/facilitator.</td>
</tr>
<tr>
<td>1.1- Handout, readings and in class demonstration of compositing to connect terminology with real world examples and to reinforce learning.</td>
<td>1.1- PDF handouts reflecting in-class instruction will reinforce and promote retention after instruction has ended. Screenshots for step by step instruction will also be included.</td>
</tr>
<tr>
<td>2.0- Brief lecture and class discussion showing examples to reinforce concepts.</td>
<td>2.0- An instructor /facilitator will show examples and compositing concepts using a computer, internet and Photoshop software.</td>
</tr>
<tr>
<td>2.1- Students will use the internet to find and share examples of compositing to show the class.</td>
<td>2.1- Using a computer and browser with access to the internet, learners will find examples to show the class.</td>
</tr>
<tr>
<td>2.2- Individual, hands-on learning to understand workflow and core concepts using sample 3D objects and a Photoshop file to composite images.</td>
<td>2.2- A computer with Photoshop Extended (CS3 or later) software will be employed to understand and dissect a compositing file.</td>
</tr>
<tr>
<td>3.0- Student sample file work will be posted for others in the class to critique and analyze. This will help reinforce compositing concepts.</td>
<td>3.0- A CMS/LMS such as Blackboard will be utilized to post sample work done by students and the commenting tool will also be employed during the critiquing process.</td>
</tr>
<tr>
<td>4.0- Self guided, subjective, hands-on project with certain requirements followed by a class critique and evaluation.</td>
<td>4.0- A computer with Photoshop Extended (CS3 or later) software will be employed to complete the final hands-on project. A repository of 3D objects will also be employed. A CMS/LMS such as Blackboard will be utilized to post the final project by students and the commenting tool will also be employed during the critiquing process and final evaluation.</td>
</tr>
</tbody>
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VIII. Project Evaluation Plan

Design Review

Vicky Bridgeforth

Vicky is a coordinator for SWORPS here at the University of Tennessee and works with industry standard multimedia tools like Flash and Dreamweaver. She has a background in graphic design and video production.

SME Content Review

Michelle Brannen

Michelle is the supervisor of The Studio, a multimedia computer lab located within Hodge’s library at the University of Tennessee. She has experience in using industry multimedia and graphic design tools, such as Photoshop. She also has experience in teaching multimedia tools and software.

Plan for Formative Evaluation

As I develop my instruction, the process will be evaluated by testing the lesson with an expert reviewer (SME) and a pilot test group.

Expert Review- A SME will analyze the design document for typos and clarity. They will analyze the outcomes, assessments and activities related to the instruction.

Outcomes:

Do the prerequisites make sense?
Does the instruction build on prior knowledge?
Is the instruction too simple/too challenging?
Does the instruction achieve the intended outcome?

Assessments:

Is the instruction measurable?
Do the student projects reflect the intended outcomes?
Is there adequate feedback given to learners?

Activities:

Is there enough examples to reinforce the content?
Is it organized?
Is the instruction motivating for learning the material?
Are there resources for student learning outside of instruction?
Pilot Test- This online lesson can be evaluated by a test group comprised of graphic design students and graphic design professionals. The lesson can then be evaluated based on the following questions:

Was the instruction free from errors and typos?
Was the instruction clear and logical?
Did the instruction help you to learn material and concepts?
Do you feel more confident you can perform this instruction in your native environment?

Plan for Summative Evaluation

The summative evaluation will be based on the following four levels of Kirkpatrick’s Evaluation model:

Reaction/Response- An online survey, given to students, will be conducted after the completion of the course. This survey will focus on how interested the students were in the course and any suggestions/comments they may have to enhance or improve the course in the future.

Learning- The final project/ critique will be able to informally evaluate the extent to which learners felt they learned the material.

Performance and Transfer- A workplace/school project would be assigned (voluntarily) after the instruction has ended. This will help to evaluate how well the instruction translated into the native environment.

Impact or Results- Interview students and professors during the graphic design student’s final semester to determine how the instruction has impacted their portfolio and marketable skills. Interview graphic design professionals after instruction has ended to see if the skills they learned has had measurable results in the workplace.
References


Appendix

- Instructional Design Flowchart (Appendix A)
- Formative Evaluation Report on the SME and Peer Design Reviews (Appendix B)

Appendix A: Instructional Design Flowchart

Terminal Outcome

1.0- Given a pre-assessment to gauge their ability to visualize objects in 3D virtual space, learners will practice drawing a physical object from four different perspectives: top, front, side and perspective view.

2.0- Given a presentation on the basics of 3D compositing in a 2D graphics environment, learners will be able to become more aware of computer graphics that have 3D graphics composited into a 2D computer graphics environment.

3.0 (intellectual, discrimination, cognitive)- Given a Photoshop CS3/CS4 file with multiple layers and a 3D object split up into multiple layers, the learner will analyze and dissect each layer by turning on and off each layer.

4.0 (discrimination)- Given Photoshop software and access to a repository of importable 3D objects, the learner will be able to set up their own composited composition and learn to distinguish cues that aid in more realistic, seamless compositing.

Objectives

1.1 (verbal)- Given a list of ten basic compositing terms connected with practical examples, the learner understand and remember basic compositing terminology.

2.1- Given access to the internet and given basic search term suggestions, such as digital compositing, 3D compositing and 3D graphic design, the learner will be able to find three examples of 3D composited graphics in a 2D graphics environment.

3.1- Given the sample Photoshop file from the previous lesson, the learner will import an available 3D object into Photoshop to practice the proper positioning, perspective and compositing of that object into the sample file.
Appendix B: Formative Evaluation Report on the SME and Peer Design Reviews

Revision Record & Summary for the Peer Design Review

The peer design review process was helpful for me, in that it allowed me to review a working design document from a course peer as well as to be evaluated by a course peer. My reviewer, Vicky Bridgeforth, offered some insights into my design document, many of which I have incorporated into my final design document.

<table>
<thead>
<tr>
<th>Section of Design Document</th>
<th>Comment or Issue Raised by Reviewer</th>
<th>Whether and How Issue was Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction: Statement of Need, Instructional Intent &amp; Theory Base Justification</td>
<td>Wanted to make sure references were valid and legitimate for basis for instruction. This will help with credibility.</td>
<td>Found some other design related websites from graphic design and 3D software companies to strengthen the justification for instruction.</td>
</tr>
<tr>
<td>Performance &amp; Learning Context Analyses</td>
<td>Wanted to see some more quotes in this section to strengthen the material.</td>
<td>Incorporated the Ertmer and Newby article that highlighted the theories of behaviorism, cognitivism and constructivism.</td>
</tr>
<tr>
<td>Overall</td>
<td>Some instructor comments were still inserted into document.</td>
<td>These were still inserted for reference on what I needed to update or clarify. They were removed in the final design document.</td>
</tr>
</tbody>
</table>

Revision Record & Summary for the SME Content Review

The SME, Michelle Brannen, who has experience teaching and planning multimedia workshops, had some great suggestions for the final design document. She was concerned with the interaction among the students and wanted to see some additional ways for collaboration and group work throughout the course. She also wanted a way to incorporate material for students who wanted to later make the transition to a 3D animation course. Her comments were honest and thorough and most suggestions will be incorporated into the final design document.
<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Learner Analysis</td>
<td>Would like to see an overview of 3D tools and introduction to 3D workflow for those who may want to further pursue more 3D related classes.</td>
<td>The lecture on compositing could briefly talk about some of the various 3D software packages but due to time constraints, an introduction to the 3D workflow might not be feasible.</td>
</tr>
<tr>
<td>Performance &amp; Learning Context Analyses</td>
<td>Thought that critiques are a central component of design classes and would like to see more group discussions.</td>
<td>The class will be online in a synchronous or asynchronous environment. Depending on the setup the students could chat in real time during class or out of class through a discussion board.</td>
</tr>
<tr>
<td>Outcome 1.1</td>
<td>How to remember and demonstrate understanding of basic terminology.</td>
<td>Incorporated SME’s suggestion for having outcome 1.1 lead into outcome 2.0.</td>
</tr>
<tr>
<td>Outcome 2.1</td>
<td>Will there be group discussion on examples students find in class or only instructor feedback?</td>
<td>Will incorporate small group discussions into outcome 2.1.</td>
</tr>
<tr>
<td>Outcome 4.0</td>
<td>Last project should not only incorporate compositing principles but graphic design principles as well.</td>
<td>I will incorporate SME’s suggestion to make final project reflective of a real-world project like a product ad, poster, etc...</td>
</tr>
</tbody>
</table>