The Impact of Streaming Video Tutorials on Undergraduate Students' Performance in Introductory Graphic Communications Management Class

by

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Abstract

The purpose of this study was to measure the effectiveness of streaming video tutorials on undergraduate students in an introductory Graphic Communications Management (GCM) course. Streaming video tutorials on screen-printing were produced to help instruct two GCM classes of 40 total students during the spring 2011 semester.

The methodology of this research focused on the population of the study, all of whom were part of the millennial generation. The literature review focused on who the millennials are, what they do, how they learn and how streaming videos are used effectively in education. A series of ten screen-printing video tutorials was created and put online on the university's server. Students could view the videos via their laptops 24/7, to assist them in accomplishing a screen-printed T-shirt assignment. The study was trying to see if streaming video tutorials enhanced instruction, made students more

competent, increased learner control, and resulted in the students having less anxiety accomplishing the assignment.

A survey was taken at the end of the semester by 30 of the 40 students. The results of the survey indicated the screen preparation videos were most watched, the videos were easy to understand, the students watched and re-watched the videos, the students were only occasionally anxious about the process, the written instruction was useful, and the students would like to see more video tutorials in other lab classes. This research may be an indication of the effectiveness of using streaming video for laboratory instruction which may become a new instructional method for the future.

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Chapter I: Introduction

In 2010, 80% of 18 to 33-year-olds watched streaming videos online on a regular basis (Zickuhr, 2010). Reaching this population, dubbed the millennials, and creating student-centered classrooms can be a challenge for educators. Millennials have grown up with a greater array of choices and they believe abundance is their right. Millennials are experiential learners, seldom read directions and love to multitask (Sweeney, 2006). Because of this sea of change, educators need to use more student-centered teaching methods and less traditional methods. This study was designed to benefit educators by creating a more student-centered learning environment.

The use of video in instruction is not new. In 1910, educational films were first adopted for classroom use in Rochester, New York (Saettler, 1990). These films gave instructors a new tool for enhancing instruction with visual media. Even Thomas Edison, one of the inventors of motion picture technology, stated, "Books will be obsolete in schools, scholars will soon be instructed through the eye" (Saettler, 1990, p. 98). As film progressed quickly from slide projectors, filmstrips and 16mm film, to videos and DVD, each was used in various formats to show processes, demonstrate procedures, or view historical events.

Today, the presence of streaming digital video is permeating every aspect of life in the 21st century. Digital video offers a variety of formats, providing important new teaching and learning opportunities (Berk, 2009). Millions of digital videos are viewed every day on the Internet. It has become a cultural phenomenon. "The availability of video on websites, such as YouTube, offers learning and engagement that may never have existed before" (Bell & Bull, 2010, location 302). More than 35 hours of video is uploaded to YouTube every minute (*Frequently asked questions*, 2011). Digital video has now become more expansive using

multiple softwares. Instructors, writers and students can now use various multimedia to incorporate graphics, photo and narration to create digital stories (Sylvester & Greenidge, 2009).

How Does This Relate to Teaching Millennials?

Watching a movie or television show, or even downloading a video on YouTube can create emotions. The viewer might get excited, laugh, feel love, be relaxed, or even learn by watching (Berk, 2009). Bull and Bell (2010) state, in their recent book on *Teaching with Digital Video*, that instructors need to create videos that produce positive effects for students. These effects engage the student in learning to help them understand concepts. At the University of Virginia, professors are creating their own digital video lectures and uploading them to YouTube. Students who watch the videos say it gives them an extra resource to understand the class (Young, 2008).

Learning is a process and people learn from experiences, observation and hands-on applications (Kolb, 1984). Millennials prefer learning by working in groups and doing. Teachers can use technology to change the interaction and information processing to improve the educational experience.

Streaming Video for Authentic Learning

Streaming video is content that is compressed and sent over the Internet. It is widely used to transmit video clips and movies from the Web to desktop computers. Streaming video can be played almost immediately when it is downloaded on your computer (*Streaming video,* 2011). With technology today, vast numbers of digital video can be accessed on the Internet: movies, instructional videos, and events. Instructors are creating their own video projects, using video editing software and more affordable digital cameras. The opportunities offered by video are tremendous. Girod, Bell and Mishra (2007) in their study on "Using Digital Video to Re-

Think Teaching Practices," state that "creating a digital video enables instructors to present moving pictures to the lesson at hand" (p. 24).

Using video for instruction is not new but studying the effects of streaming video as an instructional tool is. In 2003, University of Wisconsin-Stout graduate student Keif Oss did a research study on "Creating an Autonomous Laboratory Environment Utilizing Laptop Support." The Oss study used a streaming video tutorial to demonstrate if it was effective as a study aid for authentic learning in the photography lab at the University of Wisconsin-Stout (Oss, 2004). This was a relatively new study given that in 2002 the University of Wisconsin-Stout had become the first university in the UW System to require its incoming freshmen to own laptops (Kempert, 2002).

Another study that used streaming video tutorials for complex laboratory techniques was done by Kristen Billiar, Ph.D., Department of Biomedical Engineering, Worcester Polytechnic Institute. The study used 20 Web-based streaming video tutorials to create a self-guided learning resource to perform uniaxial and torisonal tests on biological tissue using a screw-driven testing instrument (Billiar, 2006).

Authentic Learning at the University of Wisconsin-Stout

In the Graphic Communications Management (GCM) courses at the University of Wisconsin-Stout, collaborative learning is done in groups on authentic tasks, where students develop, design, and produce projects in school labs. Lab-based learning is similar to project-based learning: It is a model that organizes learning around projects. Part of the GCM's introductory courses is a section on the screen-printing industry. During the semester the students are introduced to the screen-printing industry through reading and lecture. Eventually, the instructor gives a live demonstration on screen-printing a T-shirt. The students, then, are

expected to follow written instructions to do the same activity. Two of the challenges of the screen-printing assignment are being able to repeat the steps in the proper sequence and to properly operate the graphic arts equipment. Not following the steps correctly can result in an inferior product or project and cause equipment issues. Another challenge is that new adjunct instructors may make mistakes in their demonstrations because they are not as experienced in that environment as their seasoned colleagues.

This study's researcher was one of those new adjunct instructors for the GCM department. At the end of his first semester he asked students for ways to improve his teaching methods. He also created a brief survey instrument to solicit how he could improve. Using a simple three-question format, taken from a business book written by Jack Canfield (2005), he determined areas that he could improve as an instructor. Listed below are the questions.

1. On a scale of 1 to 10, how would you rate the quality of this class this past semester?
2. On a scale of 1 to 10, how would you rate me as a teacher?
3. What would make it a 10?

From students' informal comments, as well as their survey responses, came the statement of the problem being researched.

Statement of the Problem

The methodology currently being used in teaching screen-printing – namely lecture and lab work – is not meeting the millennial students' needs. This conclusion was drawn from the aforementioned informal comments and survey obtained from the students, and can be summarized as follows: The instructor needs to spend more time on demonstration; the written instructions are hard to follow; and more time should be spent in the screen-printing lab. In

discussing these concerns with GCM staff, it was agreed that an online instructional video used as a pre-lab assignment for the screen-printing process might (1) help the students to better understand the process and (2) create a friendlier environment for the learning process.

Research Instrument

To measure the effect of streaming video on student learning in the GCM class, a series of video tutorials was developed and made available to students during the spring semester of 2011. A survey questionnaire also was developed and posted online to be taken after the screen-printing assignment was completed. This questionnaire was designed to answer five research questions.

Research Questions

1. After viewing the lesson via streaming video, will it enhance instruction in the GCM lab?
2. Will students feel more competent completing lab activities?
3. Will students have increased learner control because they can access, start, stop, and search the video?
4. Will students have less anxiety when performing the screen-printing process?
5. After viewing the video, will the written instructions be more useful in completing the lab exercise?

Purpose of the Study

The purpose of the study was to measure the effect of streaming video tutorials in the GCM class and to expand on the knowledge obtained by Keif Oss in his study using streaming video in the GCM photography lab in 2004. In the Oss study, one streaming video tutorial was created to demonstrate how to develop roll film in the photo lab. It was supplemented with a

flowchart and instruction sheet. The Oss study was to show if students used the videos or the other documents to enhance learning.

For the current 2011 study, using streaming videos in the screen-printing lab, a series of ten videos were produced to show how to screen-print. This study measured the effect of the videos used and how they were used, the written instruction, the students' competence and the students' feeling of anxiety in an authentic project.

Definition of Terms

Authentic learning: Structure of learning around genuine tasks to produce a product.

Competence: The ability to perform the screen-printing task with an above average score.

D2L: An online course management tool that is used by professors and students for grading, class assignments, tests, discussion boards, etc. (*What is D2L?*, 2011).

Graphic Communications Management (GCM): A graphic arts program at the University of Wisconsin-Stout that prepares students for careers in the graphics, printing, graphic arts management, imaging, and associated industries (Graphic Communications Management, 2011).

High quality: Videos that are clear, easy to understand, easy to download, and have good video reproduction.

Just-in-time access: The ability to access the video 24 hours a day, seven days a week.

Lab: A place to develop hands-on experiences and skills in the creation and reproduction of graphic products and services (*Hands-on laboratory*, 2011).

Learner control: The ability to rewind, stop, start, and re-watch videos.

Length of video: The duration of a video if played nonstop.

Streaming video: Video that streams from one computer network to another computer. The video can be played and viewed after the data is received but is not stored on the computer that receives it (*Streaming Video*, 2011)

YouTube: "A very popular video-sharing website that allows anyone to upload short videos for private or public viewing. YouTube provides a venue for sharing videos among friends and family, as well as a showcase for new and experienced videographers" (*Frequently asked questions*, 2011).

Chapter II: Review of Literature

Introduction

The purpose of this study was to determine the impact of streaming video tutorials on undergraduate students' performance in the GCM screen-printing lab at the University of Wisconsin-Stout. The methodology that was being used in teaching screen-printing was not meeting the needs of the students, the majority of whom are part of the millennial generation. The research objectives were to see if after viewing instructional videos students were more competent completing the assignment; did they have more learner control of the process because of the interactivity with the video; and were the written instructions more useful after viewing the videos.

Who Are the Millennials and What Are Their Characteristics?

The millennial generation refers to those 18 to 33-year-olds who were born between 1977 and 1992 and who have been brought up in a time of instant access (Nicholas, 2008). Their everyday lives involve tweeting, facebooking and social networking. Also called Generation Me, millennials love to multitask, many have reading issues and prefer to work in groups (Sweeny, 2006). The millennials use the Internet and 80% watch online videos. In a Pew Internet study, 74% of millennials surveyed believe that technology makes their life easier (Keeter & Taylor, 2010). Millennials are the first in history to be always connected. In another survey done by Pew Internet, respondents reported that they sent or received 20 texts in a 24-hour period. Millennials believe that technology is positive, allowing them to be closer to people, making their lives easier and using time more efficiently (Keeter & Taylor, 2010). Howe and Strauss (2003) describe seven core traits of millennials: special, sheltered, confident, conventional, pressured to achieve, and team-oriented.

Preferred Learning Methods of the Millennial Generation

Millennials appear to have a high consumption attitude toward life and education. Crone and Mackay point out, in Motivating Today's College Students (2007), that students view education as just another purchase in their life rather than a learning experience that could help in the future. This generation spends most of its time on fun stuff and does just enough to pass courses.

Millennial students represent a generation of learners that depend on technology to get information. According to Trice and Wilmes (2011), the success of millennials relies on the teacher's ability to enhance learning, knowledge, and skills. Too often, instructors fail in their teaching practices and just lecture, isolating themselves from the students. The millennial generation is accustomed to group activities. Crone and Mackay point out that students will run for president of the student class; however, they do not want to assume the leadership by themselves, so they network and work in social groups to share the role (2007).

A large number of millennials have reading issues due to attention deficit disorder, differing learning styles and difficulties understanding the language (Trice & Wilmes, 2011). In a recent study of undergraduates, Trice and Wilmes found that students preferred written information given to them on what they called a graphic organizer, a visual chart, graph or diagram, where they could access certain facts. Although students preferred this, they performed better on what Trice and Wilmes called a jigsaw. This is where students are put in various groups and they move from group to group to learn and share information through reading, writing, listening, and speaking to the group (2011).

When millennials need to find information, 98% use Google first and Wikipedia second (Nicholas, 2008). Nicholas also found that almost 87% learned from video clips related to class

material, 91% liked to solve problems in class, and 84% liked frequent quizzes over reading or assignments (2008).

Streaming Video and How It Is Used in Instruction

Streaming video is content that is compressed and sent over the Internet in real time. It is widely used to transmit video clips and movies from the Web to desktop computers. Streaming video can be played shortly after only a small amount is received (*Streaming video*, 2011). With technology today, vast numbers of digital videos can be accessed on the Internet: movies, instructional videos, and events. Instructors are creating their own video projects using video editing software and more affordable digital cameras. The opportunities offered by video are tremendous. Girod, Bell and Mishra, in their study on "Using Digital Video to Re-Think Teaching Practices," state that creating a digital video enables instructors to present moving pictures to the lesson at hand. The ability to slow down and speed up the video allows instructors to highlight elements of the lesson that would otherwise be difficult to learn (2007). The results of this study also showed that teachers were more attentive to detail when creating their videos and considerate of the viewers' prior knowledge of the subject (2007).

The Effects of Streaming Video on Competency

Princeton University Wordnet defines competency as the quality of being adequately or well qualified physically and intellectually (2011). Competencies refer to knowledge and skills that help one achieve a successful task. Competencies are formed through one's knowledge, skills, and abilities, and provide a foundation for understanding how to do a job really well and being able to do it (*Biographic behavioral interview*, 2009).

In 2006, Dupagne, Stacks and Giroux, from the University of Florida, did a study on the "Effects of video streaming technology on public speaking students' communication

apprehension and competence." The purpose of the study was to see if streaming video would help to increase competence at public speaking and reduce stress levels that relate to public speaking (2006). They studied 72 public speaking students in two treatment control classes taught by the same instructor. These students were able to access five videos and analyze their own speaking presentations on streaming video anytime and anywhere. The study was conducted during the fall and spring semesters. The results of the study concluded that the treatment group had a higher grade point average and viewing the speeches helped improve posture, delivery, and content of subsequent speeches. The study also concluded that it did not improved cognitive motivation to help increase students' competence at public speaking, and reduced stress levels, but students felt it was a valuable learning tool (Dupagne, Stacks, & Giroux, 2006).

Another study that demonstrated competency after viewing streaming video tutorials, was conducted by Kristen Billiar, Ph.D., Department of Biomedical Engineering at Worcester Polytechnic Institute. Twenty streaming videos were developed to train undergraduate students to perform uniaxial and torsional tests on biological tissues using a screw-driven material-testing device. Students could view the videos and perform lab activities on a flexible schedule without an instructor's supervision. The results of the study were positive and students completed lab activities to the correct industry standard for mechanical test equipment, with little direct help from the instructor or lab assistant. There was no face-to-face training by an instructor and the students performed the experiments individually. The quiz grades, designed to measure the students' understanding of the experiment, were higher compared to previous years (Billiar, 2006).

Streaming Digital Video Enhancing Instruction

One of the early versions of streaming digital video was interactive video. Interactive video was the springboard to streaming digital video. Interactive video instruction allowed students to interact via computer with any combination of videotape, disc, film or graphics (Cronin & Kennan, 1992). Interactive video has had significant effects on listening, grammar and learning skills (Herron, York, Corrie, & Cole, 2006). A 10-year review of interactive video instruction found that interactive video improved achievement and performance 53% over traditional instruction (McNeil & Nelson, 1990).

Streaming digital video is an open-source content for online learning, social media, advertising, political agendas and more. Bell and Bull state that to use streaming video in education, it must be meaningful to students. Instructors need to look at digital video and determine if and when it should be adapted for classroom use. Instructional digital videos must engage students' interest to understand the concept, to enhance knowledge and abilities (2010).

A recent application for open-source content online learning is the not-for-profit Khan Academy, which is supported by Google and the Bill & Melinda Gates Foundation. The academy is free and uses self-paced exercises with streaming videos on YouTube (Khan, 2010). There are more than 2,100 videos and the academy is dubbed the most popular educational site in the world with more than 2 million students visiting per month (Urstadt, 2011). Students use self-paced learning; they can start, stop, pause, and repeat exercises on their own time using the streaming videos. The instructor gives the lecture as a homework assignment and in the classroom, students work on their assignments and if they need help they can ask their classmates or the teacher. The classroom is a place for active learning not passive listening to

lectures. This type of upside-down learning — lecture as homework and assignments in class — allows more time for teacher and students to interact and learn from each other (Khan, 2010).

The school district of Los Altos, California, has implemented the Khan Academy in a few of its fifth and seventh grade classes, some of which are for struggling learners. After implementing the Khan Academy, the school district has seen a 70% average improvement on the pre-algebra topics for the struggling learner students (Urstadt, 2011).

Millennial Generation Reading Habits

Almost 50% of Americans 18- to 24 years old do not do any recreational reading. The average recreational reading time for those 15 to 24 years old amounts to between 7–10 minutes per day, which is about 60% less time than the average adult American (National Endowment for the Arts, 2007). Reading classes usually does not continue after elementary school. The millennial generation spends little time reading and when they do read they multitask by listening to music or doing social networking (Sweeney, 2006). College students enjoy using the Internet more than reading for recreation, reading for class, or watching television (Mokhtari, Reichard, & Gardner, 2009).

Streaming Videos for Instruction

A study in Poland on third- and fourth-year chemistry students found that video and interactive video instruction for a chemistry experiment had increased their understanding and performance of the experiment. The study also revealed that it took less time to complete the experiment (Burewicz, & Miranowicz, 2006). Digital video enables instructors to present moving pictures to the lesson at hand. The ability to slow down and speed up the video allows instructors to highlight elements of the lesson that would otherwise be difficult (Girod, Bell, & Mishra, 2007).

Business is also aware of how young adults have a hard time paying attention to anything that does not come onto their smartphone screens. Applications have been developed for teenagers to study for the SAT on their smartphone, with questions, games, photos, and video content (Tedeschi, 2011). Online tutorials, like Lynda.com, offer more than 63,000 streaming tutorials and 1,050 online courses in Web design, photography, graphic design, and animation, all available 24/7 (Kuo, 2010).

Chapter III: Methodology

Introduction

The purpose of this study was to determine the impact of streaming video on undergraduate students' performance in an introductory Graphic Communications Management class. This chapter will discuss the methodology used to obtain the information needed to see if the video had an impact on students. The following narrative will describe the basic research design for this inquiry along with the data sources that were used to address the research questions. It will also describe the instrumentation, data collection procedures, data analysis, and limitations of the study.

Research Design

The research design for this study was descriptive, employing a quantitative approach that used online streaming videos, the D2L online server to view progress, and a survey to gather data to address the research questions. The study focused on the use or nonuse of streaming videos for a screen-printing lab. It solicited feelings about anxiety. It measured competence in the screen-printing process and whether access to video helped or made no difference in the process.

The independent variables were the length of the videos, just-in-time access, and the quality of the production. The dependent variables were the student response to the video and the progress viewing. The control was the undergraduate student population in the study.

Population and Sample

The subjects for this study were undergraduate students enrolled in Graphic Communications Management 141 at the University of Wisconsin-Stout. The study was

conducted during a four-week period for 40 students in two class sections. It started on March 28, 2011 and ended on May 10, 2011.

Instrumentation

The students in GCM 141 were given a follow-up survey after completing the screen-printing assignment. The survey asked the following questions.

1. What is your status as a student at UW-Stout?
2. Have you ever taken screen-printing before?
3. Which series of videos were most helpful?
4. Were the videos clear and easy to understand?
5. After viewing the videos and doing the screen-printing process did you feel anxious about the process?
6. How helpful was it for you to watch and rewatch the videos?
7. After viewing the videos and finishing the screen-printing activity do you feel the written instruction sheets were useful in completing the assignment?
8. What did you like best about the online videos?
9. What did you like least about the videos?
10. Would it be important to see more online videos in other lab classes

Data Collection

The data collected was taken from D2L (aka Desire2Learn or Learn@UW-Stout), the online course management tool that is used by professors and students for online classroom instruction. The D2L server records student use and time spent on activities. In this case, D2L was used for the streaming video viewing. A survey was also administered after the screen-printing activity to assess the feelings of the students. The video was a class assignment, to be

completed prior to the actual demonstration process. Online video access was available 24 hours a day, with no limited access. For example, if students had a lab question they could view the video from their laptops in the laboratory to get the answer.

Data Analysis

The data analysis came from the results of the survey instrument and the D2L online progress viewing. The online survey respondents were voluntary and anonymous.

Questions 1 and 2 of the survey asked the students' grade level and previous knowledge of the screen-printing process. Questions 3-7 regarded the students' feelings and asked if written instructions helped in the screen-printing activity. Questions 8-10 indicated whether the video should be used again in future classes.

Chapter IV: Results

Introduction

The purpose of this study was to determine the impacts of streaming video on undergraduate students in the introductory GCM class at the University of Wisconsin-Stout. Specifically it was to ascertain whether students achieved increased learner control, the usefulness of the written instruction after viewing the videos, competence and whether the feelings of the student were enhanced in the process.

Research Design and Findings

A ten-question survey was created in D2L and taken by the students at the end of the screen-printing assignment. A total of two classes of 20 students each comprised the population of this study.

The survey was voluntarily completed by 30 of the 40 students in the GCM 141 class, yielding a 75% return. The following charts and accompanying discussion were gathered from the survey questions utilized in this study. A summary of findings concludes this section.

Population Breakdown

The first question in the survey asked what level of student respondents were. There were 12 freshmen (40%), 11 sophomores (36.67%), 5 juniors (16.67%), and 2 seniors (6.67).

Table 1

Population Breakdown

Rank of Students	Number in Class
Freshman	12 (40%)
Sophomore	11 (36.67%)
Junior	5 (16.67%)
Senior	2 (6.67%)

As illustrated in Table 1, the response showed the vast majority were underclassman, or a solid majority with more than half of those in their first year of post-secondary education.

Previous Experience

The second survey question asked if respondents had ever done screen-printing before. Nearly three-fourths of respondents — 22 students (73.33%) — had not done any screen-printing, as compared to 8 students (26.67%) that had.

Most Helpful Video Series

The third question in the survey asked which video series was most helpful. There were 13 videos, each one representing a step in the screen-printing process. The entire series of videos was no more than 1.5 hours long. Table 2 shows the various videos, and how the students responded.

Table 2

Most Helpful Video Series

Video Series	Series that was most helpful	Videos time duration
Labeling screen, presetting screen press, and degreasing screen. (total of 4 videos)	5 (16.67%)	25.83 minutes
Coating, exposing, and applying blockout (total of 3 videos)	14 (46.67%)	28.88 minutes
Printing your screen and dryer setup (total of 4 videos)	9 (30%)	38.56 minutes
Cleaning and reclaiming your screens (total of 2 videos)	2 (6.67%)	16.43 minutes
None of the above	0 (0%)	

Table 2 shows almost half the students felt that the screen coating, exposing and blockout videos were the most helpful. Almost one-third found the printing the screen video to be the most helpful.

Clarity and Understanding of the Videos

The fourth question in the survey asked if the videos were clear and easy to understand. The majority of students felt that the videos were clear or very clear.

Table 3

Clarity and Understanding of Videos

Quality of videos	Response
Very clear	16 (53.33%)
Clear	13 (43.33%)
Somewhat clear	1 (3.33%)
Not clear at all	0 (0%)

Feeling Anxious About the Screen-Printing Process

The fifth question asked students if they felt anxious about their upcoming screen-printing process after viewing the video.

Table 4

Feeling Anxious About the Screen-Printing Process

Feelings of anxiousness	Response
Never	6 (20%)
Occasionally	22 (73.33%)
Regularly	2 (6.67%)
Always	0 (0%)

Table 4 shows students had some levels of anxiety even though they had three methods of instruction: lab demo, written instruction and video tutorials.

Watching and Rewatching the Video

The sixth question asked how helpful it was to watch and rewatch the videos. More than 80% of the students found it helpful or very helpful indicating that having control was preferred by this group of students.

Table 5

Watching and Rewatching the Video

Helpfulness of watching and rewatching	Responses
Very helpful	7 (23.33%)
Helpful	17 (56.67%)
Somewhat helpful	5 (16.67%)
Not helpful at all	1 (3.33%)

Written Instruction Sheets' Helpfulness in Completing the Assignment

The seventh research question asked how helpful the written instructions were in completing the assignment. This question was to determine if written instructions with videos is useful. The vast majority of students — 90% — found it to be useful.

Table 6

What Students Liked Best About the Online Videos

Usefulness of written instruction with video	Number of students
Very useful	3 (10 %)
Useful	17 (56.67%)
Somewhat useful	7 (23.33%)
Not useful at all	3 (10%)
None of the above	0 (0%)

Written instruction complimented the video instruction. Students used both resources to complete the assignment.

What Students Liked Best and Least About the Online Videos

The eighth and ninth research questions were to gain understanding if the videos were a good method of instruction. Students filled in a brief answer on the survey instrument. Most of the answers were no more than one sentence or a few words long.

Feelings that were expressed most about what they liked best were: helpful; clear; easy to see and follow; handy to watch while the process is done; always accessible; learn best from visuals; watch over and over without note taking; and they gave a clear image of what was to be done. Feelings that were expressed most about what they liked least were: could not access them; long; long loading time; boring; pace was slow; dull; and needed to zoom in more.

Students Would Like to See More Online Videos in Classes

The tenth research question asked if the students would like to see more online videos in other lab classes. Table 7 shows that a majority of students would like to see more online videos for lab classes.

Table 7

Students Would Like to See More Online Videos

Online videos in other classes?	Response
Very important	6 (20%)
Important	22 (73.33%)
Unimportant	2 (6.67%)
Very unimportant	0

Students felt it was important to add the online video as another method of instruction.

Chapter V: Summary, Limitations, Conclusions, and Recommendations

Introduction

The purpose of this study was to identify the impact of streaming videos on undergraduates in the Graphic Communications Management screen-printing lab. The methodology currently being used to teach screen-printing was not meeting the millennial students' needs. More specifically, the research was focused on the millennial generation, students born between 1977-1992. The study was designed to answer these five research questions.

1. After viewing the lesson via streaming video, will it enhance instruction in the GCM lab?
2. Will students feel more competent completing lab activities?
3. Will students have increased learner control because they can access, start, stop, and search the video?
4. Will students have less anxiety when performing the screen-printing process?
5. After viewing the video, will the written instructions be more useful in completing the lab exercise?

Streaming videos are a relatively new teaching method. Their use seems logical for the millennial generation, who spends enormous amounts of time on social networking, tweeting, facebooking and texting. This generation enjoys multitasking, reads less, desires consumer control, wants to get what they want when they want it, and believes technology makes their life easier. Through this study it was hoped to better the teaching methods used in the screen-printing part of the GCM 141 class and to create a better student-centered learning environment.

The research design was descriptive and employed an online survey instrument that was given at the end of the screen-printing assignment via D2L. The population was undergraduate students in two University of Wisconsin-Stout GCM classes. A total of 40 students were in the classes and 30 students completed the survey.

The survey featured ten questions designed to help answer the five research questions. The ten survey questions were:

1. What is your status as a student at the University of Wisconsin-Stout?
2. Have you ever had screen-printing before?
3. Which series of videos were most helpful?
4. Were the videos clear and easy to understand?
5. After viewing the videos and doing the screen-printing process did you feel anxious about the process?
6. How helpful was it for you to watch and rewatch the videos?
7. After viewing the videos and finishing the screen-printing activity do you feel the written instruction sheets were useful in completing the assignment?
8. What did you like best about the online videos?
9. What did you like least about the videos?
10. Would it be important to see more online videos in other lab classes?

Findings and Discussion

Survey questions 4-6 were designed to see if streaming video tutorials were a good method of delivering instruction that would help students retain and demonstrate the information. Student response to questions 4-6 showed an overwhelmingly positive response regarding clarity (96% clear or very clear), helpfulness (80% helpful or very helpful) and confidence by virtual of

lack of anxiety (93% feeling no or only occasional anxiety). In addition, after the screen-printing assignment was completed a tally of the class grades was made. The class average grade for 39 of the 40 students was 101.6%. The maximum points for this assignment was 106.6%.

Another item to support the use of streaming videos was question number ten in the survey. This question asked if students would like to see more online videos in other lab classes. The response was again overwhelming, with more than 93% saying it was important or very important for future classes. In a February 2010 Pew Internet report on millennials, it was reported that millennials view technology as making their lives easier. They also use the Internet and believe technology makes their lives more efficient (Keeter & Taylor, 2010). In addition, 80% of millennials watch online video regularly (Zickhur, 2010).

According to Trice and Wilmes, the success of a teacher is to enhance learning, knowledge, and skills (2011). The success of the screen-printing assignment can be measured by outcome and the overwhelmingly positive response to the videos. Online videos appear to have enhanced instruction.

The next question in this study was designed to see if streaming video tutorials were actually better than demonstration and written instruction. In the learning pyramid theory, average learning retention rates are 5% lecture, 10% reading, 20% audio visual and 30% demonstration, 50% discussion group, 75% practice by doing, and 90% teaching others (Lalley & Miller, 2007). Never before now has audiovisual been much more than a PowerPoint slideshow. Streaming video is an interactive media that can be stopped, paused, watched, and rewatched anytime. For survey question 8, regarding what students liked best, one student wrote, “We were able to watch the instructor demonstrate in class, but if we went to the lab by ourselves and forgot how to do something, we could pull up the video to help us.”

In the students' survey, question 6 asked how helpful was it for them to watch and rewatch the videos. More than 80% of the students felt it was somewhat helpful or very helpful. The online instructional videos gave the students unlimited access 24 hours a day, seven days a week. One student's response to what the students liked best was, "I liked the ability to specifically review a process and that it could be watched over and over…" In a study in Poland, the Royal Society of Chemistry conducted an experiment using video, written instruction, and interactive media (Burewicz & Miranowicz, 2004). The students that used video and interactive media made fewer mistakes in the experiment. Salman Khan, Bill Gates' favorite teacher, created the Khan Academy, which is a not-for-profit organization that produces online video tutorials that are stored on YouTube. Khan stated that students don't need to take notes, the videos can be paused and repeated as needed (2010). The Khan Academy has more than 2,000 videos and more than 2 million students. Students learn on their own time with the on-demand videos. With streaming video, textbooks become obsolete and less effective.

The next question in the study was designed to find out if less anxiety happened because the students had video tutorials in addition to the other resources. Before this study, the researcher had students confide that the screen-printing process made them anxious and nervous because they might forget a step. In the student survey, question 5 asked if after viewing the videos and doing the screen-printing process did the student feel anxious about the process. More than 70% of the students occasionally felt anxious while 20% never felt anxious about the process. Screen-printing is not a difficult process to learn, but making mistakes and redoing the process can take time. An estimate of the total time to do the screen-printing process would be a 6-hour block. This would allow drying time for the emulsion and block-out procedure. The time allowed could take up to 2-3 lab sessions. Time management in college is crucial to the success

of a student. Students that succeed in college develop planning skills and positive attitudes toward the use of time (Britton & Tesser, 1991).

The next question in the study was designed to see if students read the instructions and if the written instructions added more value to the assignment with the video. Students were asked if after viewing the videos and finishing the screen-printing activity, did they feel the written instruction sheets were useful in completing the assignment. The response was more than 10% felt that they were very useful and more than 55% felt the instructions were useful, while more than 20% felt that they were somewhat useful and 10% felt that they were not useful at all. A number of students also commented in the survey that "the videos were very, very clear and detailed. I hardly looked at the written instructions." Another student wrote, "It was handy for people to bring out there computers and watch while they were doing the project."

Research on millennials shows that millennials love to multitask, are techno-savvy and prefer to learn from video-clips (Nicholas, 2008). Millennials also frequently have reading difficulties, are visual learners and like to work in groups (Trice & Williams 2011). The screen-printing project is a group project and the online video gave visual instruction. The students watched and completed the project in real time.

Limitations

The study was limited to two Graphic Communication classes at the University of Wisconsin-Stout during the 2011 spring semester and is limited to the scope of this class and no generalization intended. There were a total of 40 students and the majority were freshmen and sophomores.

The production of the streaming video tutorials was done by University of Wisconsin-Stout's Multimedia department. Considerable time was taken in the preparation prior to shooting

the videos. Storyboards, scripts and duplicates of the screen-printing process had to be created before the video shoot. To minimize no interruptions from students or staff, the videos were shot during the week of spring break. The entire process took three days. The screen-printing instructor that demonstrated the process in the video was not an actor, so the video production was dry and technical. The video also had to be edited and linked to stream on D2L. Issues getting the video to stream on all computer platforms were problematic in the beginning so some students did not see all the videos produced but could view it on other computers.

Conclusions

The impact of streaming video tutorials on undergraduate student performance in the introductory Graphic Communications Management class was very evident.

1. Streaming videos enhanced instruction: 39 of the 40 students had a 101.6% average score for the screen-printing assignment. More than 93% of students said it was important or very important to have more online videos for future lab classes.
2. Students have increased learner control because they can access, start, stop, and search the video on demand. The survey concluded that more than 80% of the students felt this was helpful or very helpful. The online instructional videos gave the students unlimited access 24 hours a day, seven days a week.
3. Students had less anxiety when performing the screen-printing process. The survey showed that 70% of the students only occasionally felt anxious while 20% never felt anxious about the process.
4. Written instructions were useful to more than half of the students in completing the screen-printing project, yet several students also commented in the survey that “the videos were very, very clear and detailed. I hardly looked at the written instructions.”

Written instructions compliment the teaching method of demonstration, instructional video and written instruction.

Recommendations

Based on the findings, this researcher recommends adding more streaming videos to lab instruction. Streaming video tutorials proved valuable for millennial students that have difficulty reading instructions or taking notes. Streaming videos also can be watched and rewatched in case the student might miss something previously said or done. Other recommendations would be to use newer technology that would create faster downloading videos that work on all platforms. Instructors should also use close-up shots of important items and tell the students a quiz will be on the video so the students pay closer attention. Listed below are extensions of these items:

1. Add more streaming video tutorials in other lab classes. Students surveyed overwhelmingly would like to see more streaming video. Problems with live lab demonstrations can include varied demonstration methods, students' inability to see the process or hear the demonstrator due to their place in the room, and not understanding the written instruction.
2. Create faster, more compact video content for downloading to maintain student interest. One area of complaint about the video was downloading the content and the boring, long presentations. Though the demonstrations were not that long, speeding up the video and highlighting content might hold better interest.
3. Make sure streaming video will work on all computer platforms. Some of the students could not download the video or the download took too long. These students had to view the video from other students' computers or missed the video completely.

4. Show close-ups of what the demonstrator is talking about in the videos. If necessary, disassemble the screen-printing press to show the part that they are pointing at. This might help the viewer recognize it later.
5. Tell the viewer what to look for in the videos and then ask them about it or quiz them so the viewer knows how to view the content.

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Appendix A

Survey Instrument

Thank you for taking the time to participate in this survey. Your results may help improve future educational experiences. By completing this survey you are expressing your consent to participate in this research. You are not required to participate in this research. There are no foreseeable risks related to your participation in this survey. Your responses will be completely confidential and will be summarized as part of this research. Any questions or concerns can be addressed by contacting the researcher or the research advisor as follows. Researcher, Robert E. Burger, 715-235-8781, burger@uwstout.edu. Research advisor, Peter A. Schlosser, Ph.D., 715-232-5616, schlosserp@uwstout.edu. Research administrator, Sue Foxwell, 715-232-1152, foxwells@uwstout.edu.

Thank you so much for participating in this study, Robert E. Burger, candidate for Masters in Career and Technical Education.

1. What is your status as a student at UW-Stout?
   A. Freshman b. Sophomore c. Junior d. Senior?

2. Have you ever had screen printing before?
   Answer true if you have and false if you have not.

3. Which series of videos were most helpful?
   a. Labeling and preset screen press b.Coating, exposing and applying block out
   c. Printing your screen and dryer setup d.Cleaning and Reclaiming your screens
   e.None of the above

4. Were the videos clear and easy to understand?
   a. Very clear b.Clear c. Somewhat clear d. Not clear at all

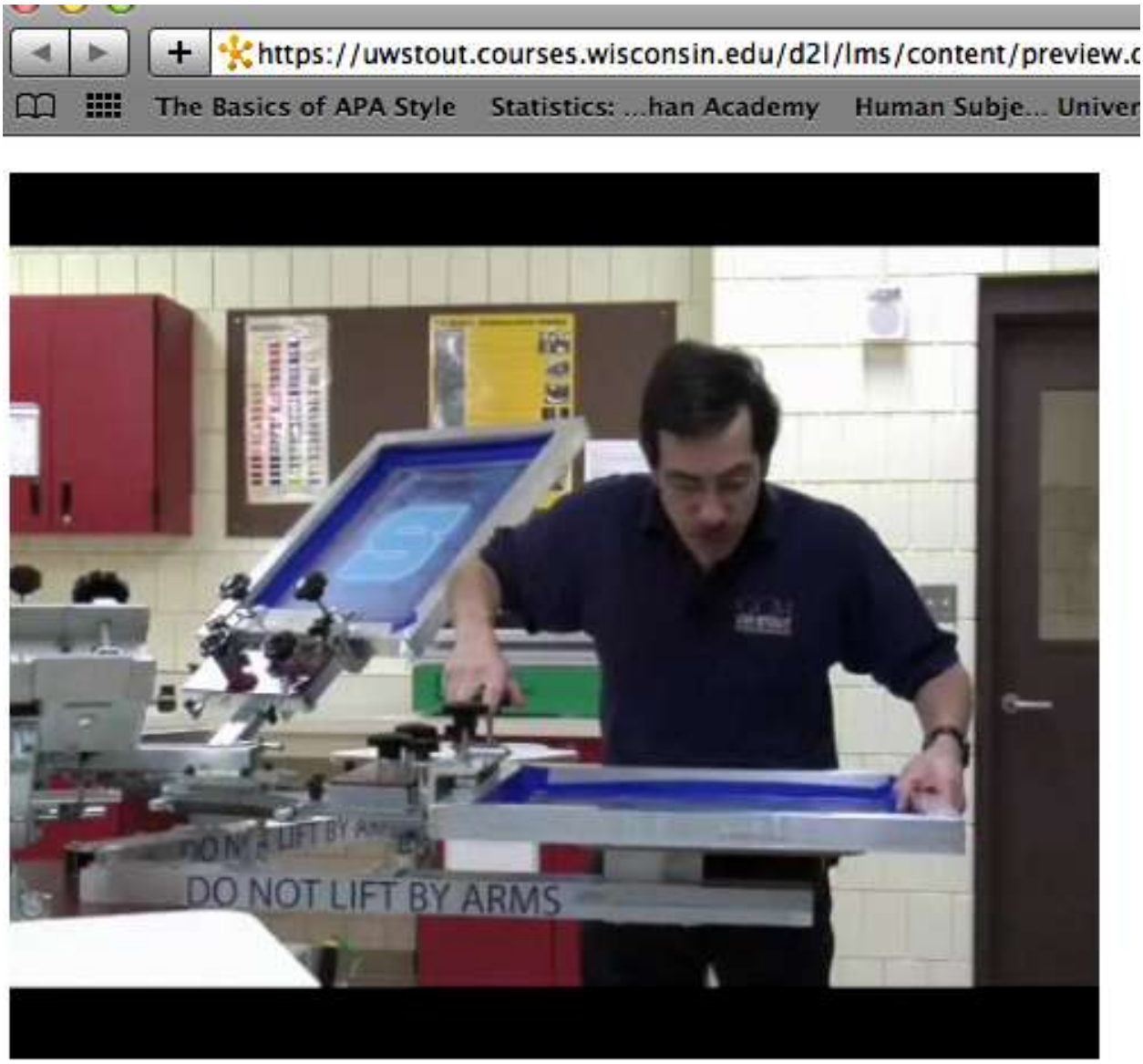
5. After viewing the videos and doing the screen printing process did you feel anxious about the process?
   a. Never b. Occasionally c. Regularly d. Always

6. How helpful was it for you to watch and rewatch the videos?
   a. Very helpful b. Helpful c. Somewhat helpful d. Not helpful at all

7. After viewing the videos and finishing the screen printing activity do you feel the written instruction sheets were useful in completing the assignment?
   a. Very useful b. Useful c. Somewhat useful d. Not useful at all

8. What did you like best about the online videos?
9. What did you like least about the videos?

10. Would it be important to see more online videos in other lab classes?
    a. Very important b. Important c. Unimportant d.Very unimportant



Screen capture of streaming screen-printing video tutorial on D2L

Results of questions 8 and 9 on the student survey

What students liked best

- They were clear and useful to look back on to make sure we were completing the task correctly
- They were easy to refer back to, right to the point that you needed to be at.
- Helpful.
- Explained the process clearly.
- They were clear and showed every step. Easier to follow than the written out instructions.
- We were able to watch Jt demonstrate in class, but if we went to the lab by oursleves and forgot how to do something, we could pull up the video to help us
- it is available whenever we have time to watch it
- Visual directions
- They gave me a clear image of what was to be done. It wasn't confusing at all because you did all of the steps we were supposed to do.
- I like that it was step by step and it mocked the demo we did in class.
- Very clear on the process
- clear and easy to see and hear
- the steps were clear and easy to fallow
- They were very, very clear and detailed. I hardly looked at the written instructions because the videos were so thorough.
- I liked the ability to specifically review a process and that it could be watched over and over whereas a demonstration is done once requiring you to rely on your notes as the student typically completes the process on a different day.
- I learn best from visuals. There are a lot of things you can only learn from seeing.
- They were informative and helpful.
- It was nice to actually see what needs to be done rather than just reading about it. Visualization always is a better way of learning a process.
- Availability, clear, informational
- They were handy for people to bring out there computer's and watch while they were doing the project.
- That I could be prepared
- The directions in the videos were very precise and clear
- They were very clear and informative.
- I liked that I was able to see everything I was going to be doing so I got a good idea of it.
- They were very detailed
- You got to see how it was done.
- I was able to visibly see how things get done instead of just reading about it.
- always accessible
- That we could watch them as we were printing our screens.

- They were always there if I had questions.

What students liked least

- I could not access them on my computer I had to watch with another student
- Being forced to watch them all.
- Tough to follow at times.
- Became kind of lengthy when he was at the press measuring out the lengths of the tables.
- They sometimes took awhile to load.
- na
- At first they didn't play on my computer
- Somewhat longer than I felt they needed to be
- I didn't think that there was anything bad about them.
- They were too long... they seemed to be very drawn out. I think it would be better to explain it and then cut to the next part.
- Very long.
- takes too much time out of class to do, pretty much doubles the time that it takes to complete the activity because you have to watch the whole thing happen then do it all yourself.
- kind of dull
- They got a bit long sometimes, but that's what's going to happen if you want to be detailed (which, like I said, was great).
- Occasionally it was difficult to hear. also, I disliked that time elapses were not identified. For example, I was uncertain how long to leave the screens after having applied block-out. Neither the video nor assignment sheet identified the time.
- Sometimes the pace was a little slow
- I had a few problems loading them, but I eventually just had to wait a while and then I could watch them.
- They were boring
- The only thing was obviously that live demos are a little more useful. The videos were great though
- Maybe zoom in a little more when showing how to align your screens.
- none
- The loading time
- They were a bit redundant from the in-class demos.
- Kind of boring
- They sometimes took too long to load
- The time it took to load them.
- They were long
- nothing stuck out.
- It was hard for me to find time to watch them because they took so long to load.
- I had difficulty opening some of the videos.

Appendix B

Lab instruction sheet: UW-Stout GCM 141 – Graphic Communications Lab Assignment 5

Screen Printing

Objectives

Upon completion of this assignment, the student will be able to:

- Perform the following operations for screen printing:
- Attach and stretch fabric on a screen printing frame
- Use a tensometer to measure the tension of screen printing fabric on a frame.
- Degrease fabric and apply a capillary-direct-film stencil.
- Expose, and washout a capillary-direct-film stencil.
- Blockout and mask a screen printing stencil and frame.
- Align and print multiple-color images on T-shirts using a textile-printing press.
- Explain how to properly cure plastisol ink on textiles, and care for plastisol-printed garments.
- Clean and reclaim screen printing frames and stencils after printing.

Assignment Information

In this assignment students will print designs that have been created in the previous assignment.The designs will be printed in at least two-colors on T-Shirts. Your instructor will specify the color(s) of the shirts. The printing of the shirts will be done in teams of three persons. Each team will select one of the designs made by its group members, or create a new design agreeable to all,and will print that design.

Materials Needed

-Assignment sheet- Posted on Learn@Stout -***LA#5 Assignment Sheet.*** -One set of vellum positive material for your group. One vellum for each color. -Screen printing frames and fabric -Capillary-direct-film stencil material -Blockout and edge masking tape. -Printing supplies and tools: List is posted in the lab. -T-shirts: one per group member is provided. Additional shirts can be purchased or provided by the student(s). -Peer evaluation sheet- Excel spreadsheet posted on Learn@Stout.

Assignment Procedure – Additional instructions are in the instruction sheets posted on L@S.

Part I. Preparing the frames and stencils

1. Attend lectures and demonstrations for the assignment.
2. Review the assignment evaluation sheet.
3. Locate the screen printing frames that your instructor assigns to you. Write down the framenumbers that you are assigned.
4. With masking tape, mark all four sides of each frame with your section, group number, andmembers' names. Don't cover up the frame number.
5. Create a sign with the above information, and tape it over your frames in the storage rack:
6. Be sure to **use only the frames assigned to you**. If a group uses the wrong frames, your instructor will have to remove the stencil and give the frame back to the correct group. Yourinstructor will not extend due dates for groups that took the wrong frames.
7. Inspect each frame and fabric on the frame. Show your instructor the frame if the fabric

is torn. He/she can help you decide if the fabric should be repaired or replaced.

8. Clean any blockage of the mesh as shown by your instructor.
9. Remount/restretch the fabric if necessary. Minimum tension for used mesh is 15 newtons per centimeter (n/cm). Stretch new fabric to 20 newtons/cm. On roller frames only, be sure to "soften" the corners of the screen to avoid ripping the fabric as it is tensioned.
10. Mount and mark the location of each screen in the T-Shirt press as explained in the instruction sheet below.
11. Align your "key" film/vellum positive to one platen, and tape it down.
12. Lower each frame to the positive, and trace the register marks onto the mesh with a ballpointpen. Be accurate and precise.
13. Roughen the job side of the screen.
14. Degrease the fabric (lather, rinse, repeat).
15. Apply wetting agent to the screen. Rinse well.
16. Apply the stencil to the job side of the wet screen. Blot excess water, let dry.
17. Attach a film positive to each screen with clear tape.
    a. Lay the positive on the "job side" of the screen so it is wrong reading when looking atthe job side.
    b. Align the positive to the marks you made on the screen in the steps above.
    c. Attach the positive to the screen with clear tape.
18. Expose each frame with its film positive.
19. Wash out the screen with warm water, blot excess water with clean uncoated paper, let dry.
20. Blockout (two thin coats on the inside, one on the job side). Let dry.

Mask the frame edges on the inside of the screen as demonstrated in class

Part II. Printing

1. Pre-heat the infrared curing unit, following the instruction card at the drier.
2. Thoroughly clean all work surfaces and press parts to avoid getting ink on the good shirts.
3. Set up the press as explained in the information sheet posted on L@S.
4. Prepare the inks as demonstrated.
5. Print on a **makeready** T-shirt and cure it. Surface temperature must be 320-340°F.
6. Check the cured shirt for register, ink coverage, and stray ink.
7. Adjust for register if necessary.
8. Block any pinholes or leaks in the stencil or frame.
9. Print and cure makeready T-shirts as needed until the image is clean, sharp, and in register.
10. Print and cure one makeready square for **each** team member **PLUS** one additional make ready square for your instructor.
11. Print and cure the good shirts for your team. Surface temperature of the garment must be 320-340°F for proper cure.

Part III. Cleanup

NO INK IN ANY OF THE SINKS!

<u>At the printing station:</u>

1. Remove the screen frames from the press.
2. Remove as much ink as possible from the frame and squeegees with 3x3 ink scraper cards.
3. Lay the frame on a stack of newsprint and clean **all** of the remaining ink with ink cleaner and a rag. Clean all sides of the frame as well.
4. Clean the squeegee with ink cleaner and a rag.
5. Clean all press surfaces and work areas of ink.
6. Clean the ink cans of **all** ink from the sides, rim and lid, and return them to storage.
7. Put waste papers in the recycle bins. Return useable papers to storage.
8. Return all materials to storage.
9. Turn off the drier according to the instruction card.
10. Obtain cleanup signature **number one** for the printing area. You must obtain a signature,even if another group will follow your team. No signature will result in a loss of points.

Reclaiming the printing screens

1. Clean your printing area and obtain cleanup signature number one.
2. Be sure **all ink is removed** from the screen.
3. Peel off the edge tape.
4. Wear **protective glasses or goggles** for the remaining steps.
5. Wash the blockout from the screen with plain hot water. High pressure is not needed here.
6. In the washout sink, apply stencil remover as demonstrated, and remove the stencils with thehigh-pressure sprayer. Inspect the washed-out screens. Repeat stencil remover if necessary.
7. Clean any ink blockage from the mesh using stain remover and high-pressure spray.
8. Remove all tape, ink, blockout, emulsion, and name labels from the frame.
9. Obtain cleanup signature **number two** for the screen reclamation. No signature will result ina loss of points.
10. Complete your digital copy of the Peer Evaluation Sheet. Enter **your** name **and** your teammembers' names. **Evaluate yourself and your peers using the digital copy of the spreadsheet.** Then print it out and sign it.

Part IV. Submitting assignment for evaluation

1. The due date is on your class schedule.
2. Submit all of your group members' projects in **one** pocket folder. Write your group number and list all team-member names on the outside of the pocket folder:
    a. In the right-side pocket, please include in the following order. Do not submit anything extra that is not listed below:
    - **Three** evaluation sheets, one completed for **each** team member.
    - **Three** peer evaluation sheets one completed by **each** team member. Each team member evaluates **him/herself and each of the team members**. Fill in the ratings **in the digital version**, and then print it out and sign it. If you wish, you may turn in your completed peer evaluation form directly to your instructor. The form is posted on L@S.
    - The film/vellum positives

    b. Left-side pocket in the following order:
    - **Four** make ready squares, trimmed to 8.5 x 11 so they fit in the pocket
    - **One** printed T-Shirt

Secure the entire package with a rubber band or Minnesota "binder."

Information Sheet

Preparing a Multicolor Job for a Wet-on-wet Rotary-type Garment Printer

Introduction

Your success in screen printing with a press or printing jig will come from careful preparation of many steps before you ever pick up a squeegee. When the job becomes more complex, with different substrates and multiple colors, the value of good planning increases tenfold. Carefully follow the detailed steps listed below and you'll have a perfectly-registered image on the first print!

1. **Procedure**
   Part I- Preparing artwork and positives

   Prepare artwork for the "key" color and other colors. The "key" is the image that usually has the most lines and detail. All of the other colors will line up to the "key." Include centerlines and register marks on all positives. This should already be standard practice.

2. Prepare and align all film positives with centerlines and registration marks. See below:

"Key" Positive Other Positive Other Positive

Part II- Preparing the screen frames

3. Stretch and mount fabric on screen frames, one frame for each color.
4. Wipe the printing press and all surrounding areas, tabletops, racks, counters, etc. to be sure there is no wet plastisol or other ink around to ruin your garments.
5. Select a pallet to use for aligning the image. Be sure the pallet is clean and square to the pallet arm. Loosen the bolts under the pallet and twist the pallet if you need to position it. Tighten the bolts gently.
6. Align a garment on the pallet just like you will when you will print. Make sure the shirt is square to the pallet. **DO NOT write on or draw any marks or lines on the pallets!**
7. Lay the a composite proof with register marks on the shirt exactly where you want the image to print. T-shirt designs usually start 2.5 to 3 inches below the collar of the shirt. For best results, the image area should be as near to the center of the pallet as possible. If the image is closer than 2 inches from a side of the pallet, you should re-position the pallet and/or the shirt to move the image nearer to the center of the pallet. Use a T-square to be sure the image is square to the pallet

8. Measure from the top of your image to the front of the pallet (the side towards you).Record that dimension on the proof. Measure from one side of your image to the

side of the pallet. Record that dimension on the proof.

9. Remove the proof and the shirt from the pallet.
10. Tape the proof directly to the pallet in the same place on the pallet that it was before you removed the shirt. Use a T-square to be sure the image is square to the pallet.
11. Loosen the clamp fine-adjustment locking knobs on each frame holder.
12. Center the horizontal and vertical fine adjustments for each frame holder. Tighten the knobs gently.
13. Draw a three-inch-long centerline on the **bottom** of each frame on the edge of the frame that will go into the frame-holder clamps on the press. Draw the line from the edge of the frame onto the fabric. Don't puncture the fabric!

Clamp edge Job side of frame

Mark each screen frame using a piece of tape on the **top** side of the frame. Put the tape on the clamp edge of the frame. Write the ink color and the frame clamp number on the tape.

1. Using the centerlines that you marked on the job side, mount each frame in the correspondingly-numbered frame-holder clamp on the press. Don't push the frame all the way into the clamp-- keep a 1/2" space between the back of the clamp and the clamp edge of the frame.
2. Tighten the frame-holder clamps.
3. Lower one of the frames onto the pallet.
4. Loosen the bolts under the pallet and slide the pallet forward or backward so the image on your proof is centered under the screen. Observe where the front edge of the pallet-mounting bracket (under the pallet) aligns to the ruler scale on the pallet arm. Record that dimension on the proof.
5. Now, one at a time, lower each frame down onto the pallet over the key positive. Hold the frame down securely. The screen must be in direct contact with the garment.
6. Using a straightedge and ballpoint pen, trace exactly over the register marks and/or centerlines that are visible through the screen fabric. Don't puncture the fabric!
7. After you have marked centerlines and/or register marks on each screen, you are ready to make stencils.
8. Degrease the screen fabric, let dry. Coat or apply the stencil emulsion and let dry.
9. Expose the positives to your numbered screens so the frames will be mounted on thepress in the proper color sequence for your design. Process the stencils.
10. Block out and mask the stencils.

Part III- Printing

1. When the blockout and edge taping are dry after processing the stencils, you are ready to print.

2. **Be certain the press, table, and surrounding areas are still clean.**

3. Position each of the garment pallets so they are all:

a. Returned to the same number (as in Part II) on the scale underneath each pallet.
b. Positioned squarely to the arms of the press.

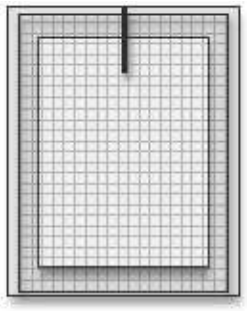
4. Tape the composite proof to pallet #1.
5. Center the frame-holder fine adjustments in the same way as you did in Part II.
6. Remount the screens loosely into their corresponding clamps.
7. Lower and hold down frame #1 onto the proof.
8. Loosen the frame-holding clamp and move the entire frame so it lines up with the image on the proof. Hold the frame down firmly on the platen and tighten the clamp.
9. Repeat the alignment for each of the remaining frames.
10. Check the alignment of each frame once more.
11. Loosen and move the fine adjustments for each frame if needed to get each stencil into perfect alignment with the proof.
12. **Do not remove the composite proof from pallet #1.** You can continue to use the proof on pallet #1 to re-align frames during the run if necessary.
13. Apply a very light and even coat of pallet adhesive to pallet #2. Use the pallet-adhesive spray booth so no adhesive falls to the floor. Clean any adhesive that does hit the floor with ink solvent.
14. Check each stencil one more time for alignment and you're ready to print!
15. Load ink into each frame.
16. Use squeegees that are 1" to 2" wider than the image. Wider squeegees are more difficult to control the amount and evenness of pressure.
17. Print on make-ready T-shirts before your first good shirt. Make all of your adjustments with the make-ready shirts. Use as many make-ready shirts as you like.
18. Load a make-ready shirt onto the pallet.
19. Mark the pallet with masking tape guide marks so you can align every garment in the same place every time. Use the collar, shoulder seams, centerlines, buttons or whatever points on the garment that are convenient to align. **DO NOT write on or draw any marks or lines on the pallets!**
20. Print the shirt.

a. Pull the squeegee towards you
b. Press firmly, but only allow the sharp edge of the blade to touch the screen.
c. Start pulling 1" before the image area and **stop** 1" after the image area. If you drag ink the entire length of the screen, you are just making more cleanup work for yourself.

21. Print all colors in immediate succession, wet on wet. For overprinting heavy ink coverages, you many need to flash cure the first color(s) on the press before over printing. Commercial flash cure units can be used, or even a hand-held hair drier or heat gun may work.
22. Plastisol inks require heat curing. **They do not air dry.** Required curing temperature is340° F. With a proper cure, the ink should not only be dry to the touch, but also should flex and stretch when the garment is pulled. Over curing will cause the ink to crack when stretched. Under-cured inks will not be permanent.
23. Move the frames as needed for exact color register using the fine adjustment controls. Use the composite proof that should be still taped to pallet #1 if needed to realign a color.

1. **Hints for Printing:**

2. Use spray adhesive or a commercial table adhesive to hold the garment in place during printing. If it shifts between colors as you lift off the screens, you've had it!
3. For most types of garments, you will not need any off contact between the screen and the substrate.



4. Several squeegee strokes may be necessary on porous garments (or if you used the wrong mesh) to get good ink penetration and coverage.
5. Remember--**process color inks are transparent.** They will allow the color and texture of the shirt to show through. They will allow colors underneath to show through. They should not be used if you desire overprinted colors to completely cover colors beneath.
6. Lift and lower each screen straight up and down to avoid smearing the image.
7. Raise the screens slowly to avoid pulling and moving the garment between colors.
8. For curing without a commercial drying tunnel, a dry mount press will do in a pinch for one shirt at a time. Lay heat transfer paper (or baker's paper) on top of the wet image in the dry mount press to keep it from sticking to the top platen of the dry mount press. Follow recommended temperature. Peel off the paper from the garment when cured and cooled.

J. Tenorio • 12/09

UW-Stout GCM-141

Name_____ Username _____Team Number_____

Other members: _____ _____

Section __01 __02 __03 __04 __05 Date Submitted _____Date Due_____

Evaluation for Assignment 5 • Screen Printing

Criteria	Points Possible	Points earned Student	Instructor
Videos viewed			
10 videos viewed by deadline	20	_____	_____
Vellum/film positives			
Separations output, all marks, clean	5	_____	_____
Stencil making and screen prep			
Emulsion applied, exposed, washed	5	_____	_____
Blockout and masking	5		
Printing			
Even/solid ink coverage	10	_____	_____
Sharp images no smearing	10	_____	_____
Images in register	10	_____	_____
Copies are consistant	10	_____	_____
One shirt and four makeready sq.s	10	_____	_____
Non-image areas clean, no ink	10	_____	_____
Cleanup signature #1 – printing area			
_____ _____ authorized signature date	10	_____	_____

- *All ink removed from frame & fabric*
- *All ink removed from ink containers and tools*
- *All ink materials returned to storage, nothing left on tables or counters*
- *All ink removed from press and work surfaces*
- *Infrared curing unit correctly shut off*

Cleanup signature #2 – screen reclamation			
_____ _____ authorized signature date	10	_____	_____

- *Fabric is clean and mesh is unblocked*
- *Damage fabric is replaced*
- *Frame has no tape, ink, blockout on rollers*
- *Washout area is clean, dry and orderly*

Assignment submission			
Project evaluation sheet submitted for each person	5	_____	_____
Peer evaluation form- digitally completed	10	_____	_____
Then printed, submitted by each person,			
Self evaluation made on the form			
Member contributed fairly based on peer evaluation scores			
Overall quality and neatness bonus or penalty			
Total	**120**	_____	_____
Additonal colors printed (+10 points for each additional color)		_____	_____
		_____	_____
Total		_____	_____