

Discussing the Impact on Student Learning Experiences in a Renovated Technical Drawing (AutoCAD) Course Using an Online Delivery Format

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Abstract

This work in progress paper aims to compare the student learning experiences before and after an innovative online platform was initiated. Computer-aided design (CAD) was the test case in this research paper. To ensure that the online platform provides the students with the same quality classes as the traditional classroom, the course has to be structured to meet the quality standards. Quality matters at the University of Florida is the resource used to ensure that best practices in learning are being implemented.

The elements of accelerated UF+QM Rubric matters Rubric were used to provide the students with an effective learning experience. The various elements used were factors that focus on 1) Preparing for success 2) Guiding students and their learning path; 3) Teaching effectively online.

The online platform used to deliver the course has been Canvas. The course shell was modified from the previous semester (Summer 2020) to meet the elements of the UF+QM Rubric. Creating an effective online platform (Fall 2020) takes a lot of planning and innovative organization.

This work in progress will focus on the element of making teaching effectively online and measure the impact of this reformed creative platform on student engagement and student learning. The element was selected as new events led to Universities transitioning to online learning.

Apart from meeting the standards of the UF+QM Rubric, the course shell was organized in an innovative fashion to provide explicit directions, learning paths, and weekly directions to students. The objective of this paper is to compare the impact on the learning outcomes of the course before this transition and after this transition. The impact of this switch on student learning will be gauged by evaluating the overall performance of the course.

Introduction

In the dawn of March 2020, the world came to a start of a new normal, continuing in many Universities. During the spring of 2020, the classes started as regular in-person classes, but soon during the mid-semester, things changed and brought about a sudden transfer to remote learning. With the start of the pandemic in the United States of America (USA) country, to guarantee the safety of students and the faculty, The University of Florida (UF) transitioned to online learning. With a half-semester of experience in online education, faculty entered teaching Summer classes remotely. Through distance learning has been around for a while, the agenda of this paper is to compare the Summer 2020 online class to the Fall 2020 class after innovating the online platform based on the learning incurred in the past

semester and a half experience in remote teaching. AutoCAD was the course that the faculty decided to innovate to apply for the research purpose of this paper. The instructor applied this innovation to the design class to ensure that students got a better quality of information.

Online teaching:

In this transition moving from a traditional classroom setting to a complete e-learning approach lets the faculty and the students use various technical tools that were not in use in a standard conventional setting.

Online learning provides students various benefits like working from the convenience of their home, flexibility and time management, and easier collaboration with the faculty through online meetings.[1, 2] The online platform used to deliver the course has been Canvas. Canvas has been in use at the University of Florida (UF) for a few years now.

AutoCAD

The design software used in this research paper is AutoCAD (Computer-aided design), It's software that engineers, architects predominantly use, and professionals mainly working in the construction industry who create 2D and 3D drawings.[3]

UF +Quality Matters:

The Quality Matters (QM) which is universally used to evaluate the quality of the course and its design and delivery. The QM program provides a set of rubrics and a course peer review process that works in collaboration to assist faculty in improving the quality of online and hybrid courses. [4, 5]

The world renown Quality Matters Rubric provides research-driven direction for the design of online courses. UF+QM has been created by UF's Quality Assurance Committee which adopted the QM rubric and merged it with the existing UF standards.[6]

UF's Quality Assurance Committee has embraced the Quality Matters rubric and blended it with the UF standards to provide an assessment tool for the faculty to provide students with a high-quality course. The elements of UF+QM Rubric matters Rubric was used to improve the online design and delivery of the class, and this helped provide the students with a practical learning experience.[7]

Methodology:

In this research paper, the two-course shells of AutoCAD compared with each other and how they impacted student performance overall.

Summer 2020 Course shell:

The Summer course shell, though available online, had basic information like the course syllabus, weekly schedule, slides, assignments, and emailing platform. Figure 1 and figure 2 display the materials provided to the students under the files tab.

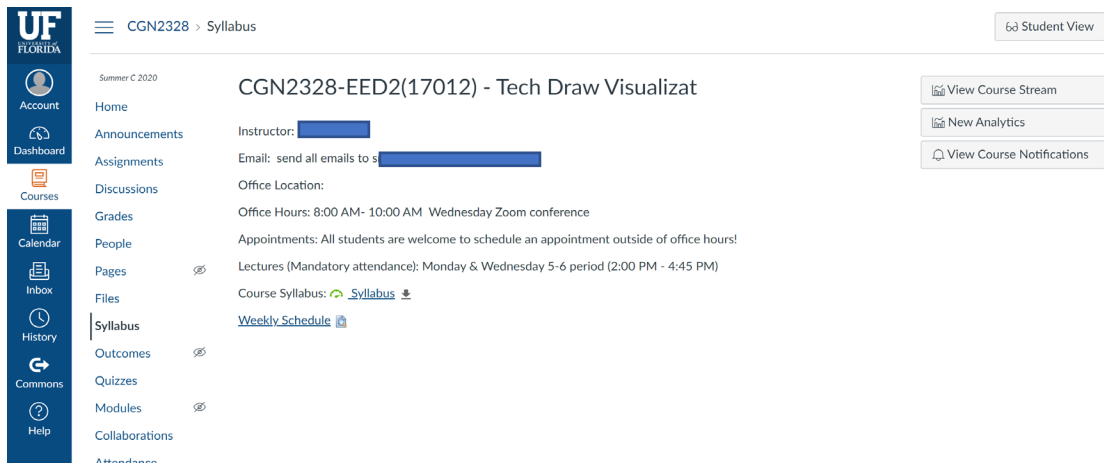


Figure1: Summer 2020 AutoCAD course shell

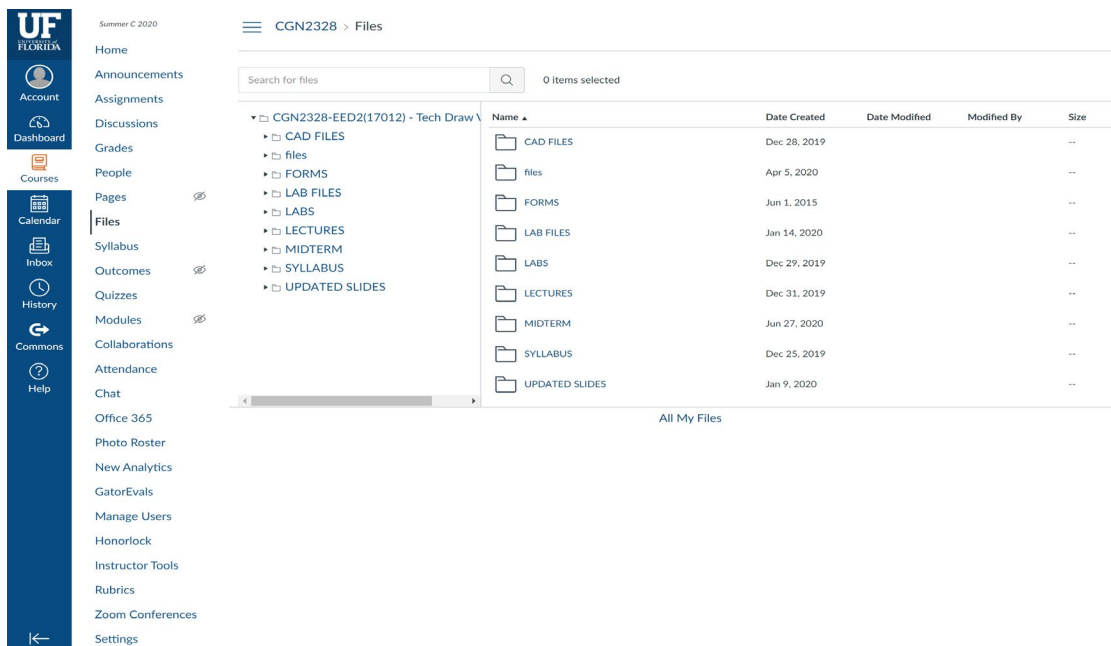


Figure 2: Course shell with files display

The Summer 2020 course shell provided basic guidance for students to attend the online lectures through zoom, had assignment deadlines, and regular office hours for any advice needed by the students. But this was sufficed for Summer 2020, but according to the faculty, this was not enough to provide the students the best transfer of knowledge in an online environment. So, after detailed research on how to improvise the class, the faculty decided to incorporate the accelerated UF+QM Rubric, which is influenced by the well know quality matters Rubric.[7]

The UF+QM Standards have about 11 primary standards. These standards help address the different aspects of the design and delivery of an online course. The Summer 2020 course was modifies to create Fall 2020 course based on the UF+QM rubric to make the online teaching more effective[7]

The focus was on preparing for success, guiding students & learning, and teaching effectively online. Following were the parts of UF+QM rubric that was used for the modification of the AutoCAD course:

- Preparing for success
 - Clear instructions on how to get started
 - Introduction to the purpose and structure of the course
 - A clear plan for the course
 - Clear navigation and accessibility
 - Clear communication on expectation, interaction, and delivery
- Guiding students & their learning
 - Learning objectives for each module
 - Evaluation criteria
 - Instructional materials for the success of the course
- Teaching effectively online
 - Tools used to support the course and students
 - Technical and academic support services
 - Support active learning

The course shell was modified from the previous semester (Summer 2020) to meet the elements of the accelerated UF+QM Rubric as mentioned above.[7]

Fall 2020 Course shell:

Apart from meeting the standards of the UF+QM Rubric, the course shell is organized innovatively to provide explicit directions, learning paths & weekly directions to students.

The Fall course shell had an explicit direction for weekly activities and assignments, had syllabus agreements to engage students. The course shell was aesthetically pleasing in comparison to the Summer 2020 shell. This course shell was organized to benefit the students and avoided any confusion that Summer 2020 brought about. Figure 3 shows how the home page has five sections: welcome, course overview, UF resources, Getting started with AutoCAD, and Modules. Figure 4 displays the information under the welcome image, displaying the communication details and guidance to overall success in the online environment that can apply in all classrooms. Figure 5 shows the weekly modules that students have to access for their weekly learning.



Figure 3: Fall 2020 AutoCAD course shell

UF FLORIDA

Account

Dashboard

Courses

Calendar

Inbox

History

Commons

Help

CGN2328 > Pages > Welcome

63 Student View

Published

View All Pages

Welcome

Welcome to CGN 2328/ Technical Drawing & Visualization

Instructor: [Redacted]

- Phone
- Zoom Office Hours: Wednesday, Period 5-6 (11:45 AM-1:40 PM) (through Zoom Conference)
- Appointments: All students are welcome to schedule an appointment outside of office hours!

Lectures:

- Section EED2 M/W/7-8,(1:55 PM- 3:50 PM)
- Section EED1 T/TH,8-9,(3:00 PM- 4:55 PM)
- Course Syllabus: [HWCOE-Syllabus Autocad fall 2020.docx](#)
- Class Schedule: [AutoCAD weekly schedule Fall 2020.xlsx](#)

Succeeding in an Online Course

Taking a course online can be a lot of fun! Here are some tips that will help you get the most of this course while taking full advantage of the online format:

- Schedule "class times" for yourself. It is important to do the coursework on time each week. Understand the course policies for late work - if it is accepted at all!
- Read ALL of the material contained on this site. There is a lot of helpful information that can save you time and help you meet the objectives of the course
- Print out the Course Schedule located in the Course Syllabus and check things off as you go
- Take full advantage of the online discussion boards. Ask for help or clarification of the material if you need it
- Do not wait to ask questions! Waiting to ask a question might cause you to miss a due date
- Do your work well before the due dates. Sometimes things happen. If your computer goes down when you are trying to submit an assignment, you'll need time to get to another machine

Figure 4: Fall 2020 AutoCAD course shell with guidelines for success

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Account

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Calendar

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History

Commons

Help

Assignments

Grades

People

Pages

Quizzes

Modules

Attendance

Chat

Office 365

Photo Roster

GatorEvals

Honorlock

Quiz Extension

Manage Users

Instructor Tools

Discussions

Collaborations

Outcomes

Rubrics

Settings

MODULE 1 WEEK 1
Introduction to Technical Drawing

MODULE 2 WEEK 2
Introduction to 2D Workspace

MODULE 3 WEEK 3
Drawing & Modify Commands

Figure 5: Fall 2020 AutoCAD course shell with modules display

When the student enters the modules, they have access to all the weekly activity that has been organized for them throughout the course. Figure 6 display the objectives, the lectures, the reading, and the assignments/ assessments to be completed in the coming days.

Figure 6: Fall 2020 AutoCAD course shell weekly activity display

This work in progress focuses on making teaching effectively online and measuring the impact of this reformed creative platform on student engagement and student learning.

The impact of this alteration on student learning is being gauged by evaluating the overall performance of the course, which was the final grade of the course including all the exams and labs. This work in progress paper aims to compare the student learning experiences before and after introducing this innovative online platform.

Material comparison between Summer 2020 and Fall 2020 course shell:

Similarities:

- Lecture slides
- Labs (drawn on AutoCAD)
- Forms (Hand drawn Assignments)
- Timeframe for assignments and exams
- Files folder with the materials related to the course

Dissimilarities

- Different Canvas page, with more information provided on Canvas
- Different exams
- Video recording per module

- Well organized course material under files folder on Canvas
- Clear communication guidelines

The accelerated UF+QM standard has been in use to make changes to the Fall 2020 course shell. 11 Factors have been modified in Fall 2020 in comparison to Summer 2020. The following are the top 5.[7]

1. Provide explicit directions

The course shell has been organized to guide the students learning path progressively, to navigate the course effectively and with ease by dividing the course materials in weekly modules.

The navigations on Canvas were gone over in the first couple of classes to makes students familiar. The students of the Fall 2020 where made aware of the changes that have been made to the course shell in comparison to the course shell that was offered to the summer 2020 counterparts.

The home page of Canvas has five main topics:

- Welcome page: Introduced the class and the instructor, the expectations from the class, and contact details
- Course Overview: Provides the summary of the class and course description
- UF Resources and Policies: Details about the resources available within the campus, library information, Software related help
- Getting started with AutoCAD: Introduces the software and the installation procedure with an explanation
- Modules: shows the weekly modules that are discussed weekly in the order provided

The modules are divided based on the topic covered each week

- The module gives them the direction of reading materials and assessments that are due
- The link to the videos are available in the respective modules

Apart from modules, the files are in proper categories for easier understanding

- CAD Files (Set up & installation, plotting, title block etc..)
- Forms
- Lab files
- Lectures- further divided into 2D, 3D & Visualization
- Syllabus- Syllabus & Weekly schedule

- The weekly schedule tells them the topics we cover every class, it also includes the deadlines of assignments

2. Clear Course Communications:

The expectations revolving the communication, online discussions, email responses, and other forms of interactions, along with requirements of learner interactions, are established on the welcome page. The Netiquette Guide for Online Courses was used for course communication guidelines. The following are the three main areas in which the policies are established.

- General communication guidelines
- Email guidelines
- Breakout room guidelines:

3. Relationship between use of course materials and completing the learning activities

The course is divided into modules and topics as shown in the link:

- Each week constitutes a module.
- The topics covered in the modules are on display on the module page
- Lectures/ prerecorded videos available for the students at the start of the week
- During class hours, along with the instructions portion, I also facilitate additional time to answer commonly asked questions and assist with alleviating the difficulty in software use
- The lectures & videos help and guide students to finish the weekly course activity
- The modules also keep students informed about what assessments are due.

4. The relationship between the course activities and the learning objectives

This course helps students gain a working knowledge of 2D and 3D Autocad. They also learn how to draft manually; this drafting process builds their spatial visualization skills.

Course objectives

1. Work with 2D & 3D AutoCAD
2. Basic construction plans reading
3. Use engineers and architects scale and interpret construction documents
4. Be able to compile construction documents

5. Develop and improve spatial visualization skills

The course activities in this course are forms, labs & exams

The Labs will help students to implement what they have learned during lectures and have objectives 1 through 5 met (Course Objectives)

Form:

- Form 1 helps them be able to use engineer's and architect's scales to interpret construction documents
- Form 2 -5 helps them visualize and improve their spatial skills

Labs: The spatial skills learned from forms transfer well into using the AutoCAD software

- Lab 1 will help them with objective 1 & 2
- Lab 2 will help them with objective 1,2,3 & 4
- Lab 3 helps them visualize and improve their spatial skills

Exams:

The exams test the working skills, and the visualization skills learned during the semester

5. Creating an inclusive, supportive classroom with a sense of community

I believe that encouraging and connecting with the students help increase their morale and help them perform well.

- The instructor takes the first 5 minutes to connect with the students, ask them about their week
- The instructor asks them one thing they did for fun and self-care
- The instructor shares something fun or exciting with them
- The instructor added trivia to the zoom call to increase student engagement

The few ways in which the instructor creates a sense of community and encourages the students are:

- The instructor also tells the students not to be afraid to ask for help
- The student questions can benefit others in the class
- There are different ways of creating the same design model. There is no one-way design.

After a brief interaction with students, I start the class with the agenda for the day.

- Namely the topics the instructor plans on covering
- After 10 minutes into the commands, the instructor provides students with the opportunity to interact with me and ask me questions
- The instructor also asks them questions to reiterate the topic
- To actively promote student, The instructor gives multiple options for students to explain the command or annotate on my slides or share their screen to work on the command
- Hence promoting technical & social skills

Comparison of data:

In this section, we try to compare the overall class performance for Summer 2020 and Fall 2020. The instructor compared the final grades of the students from both Summer 2020 and Fall 2020. The range of grades and the list of student percentages for Summer and Fall courses is available in Table 1 and Table 2. Table 1 shows the student's grade ranges for Summer 2020, and Table 2 offers the student grade range for Fall 2020.

Table 1: Summer 2020 student grade analysis

Summer C 2020		
Grade range	No of Students (34)	Percentage (%)
90>	15	44.11764706
85-89.99	6	17.64705882
80-84.99	4	11.76470588
<80	9	26.47058824

Table 2: Fall 2020 student grade analysis

Fall 2020		
Grade range	No of Students (69)	Percentage (%)
90>	31	44.92753623
85-89.99	15	21.73913043
80-84.99	8	11.5942029
<80	15	21.73913043

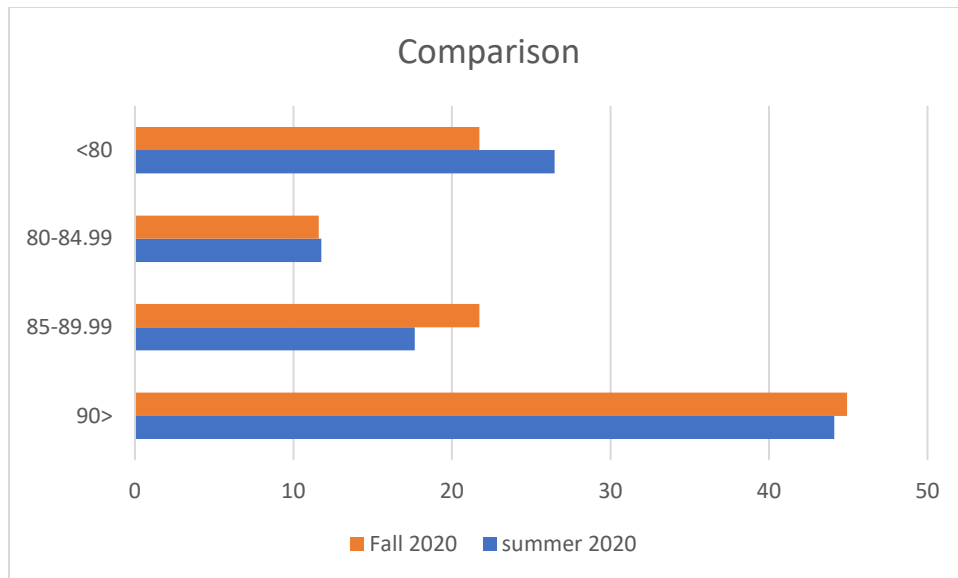


Figure 7: Comparison of the Summer 2020 and Fall 2020 Grades

By comparing the data of the above table, the instructor made few inferences:

- The number of students scoring higher than 90% in the class was about 44.11% in Summer 2020 and 44.92% in Fall 2020, as shown in Figure 7.
- About 29 % of students in Summer 2020 scored higher than 80%, and 32% of students in Fall 2020 scored higher than 80%
- About 26.4 % of students in Summer 2020 scored lesser than 80%, and 21.7% of students in Fall 2020 scored higher than 80%

Instructors perspective on student engagement and outcomes:

- Compared to the Summer 2020 classroom, The Fall online classroom had students engaging in helpful communication in helping their peers out. More cognitive engagement might be due to clear course communication guidelines established at the beginning of the semester
- The first 10 minutes of social chat by the instructor with the students increased emotional engagement, as the students were excited to be present in the class, in the instructors perspective
- There were occasions in which students would answer a question on chat before the instructor could get to it in the Fall 2020 course.

- There were more student interactions through online zoom chats, more social engagement in the Fall 2020 course.

Conclusions:

The instructor assessed the impact of this switch on student learning between two semesters by evaluating the overall performance of the course. Though the above data might be for a smaller number of students, there is still some notable difference in the grade percentages. The student grade performance might not be the only way to measure the impact of quality matters and organization of the course shell. The student engagement and various learning outcomes need to be established and measured to understand the above changes' implications truly.

This work in progress paper will continue to make further changes to the course shell with additional videos and measure student engagement and learning outcomes for this course. This research study will further compare the student learning experiences after making innovation to the online platform every couple of semesters. The instructor will use the student evaluations for the two semesters to understand the student perspective.

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