

Construction Curriculum Developed for Continuation Schools

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This paper will discuss a curriculum, an introduction to construction fundamentals, that was built for continuation schools. A continuation school is a school for at-risk youth in which it provides programs of empowering, inspiration and outlet. Five modules were created that focus on different sections of the construction industry. These modules consist of Site Safety, Introduction to Basic Math, Introduction to Power Tools, Introduction to Construction Drawings, and Basic Employable Skills. Each module will consist of a ten-question quiz and presentation. Two homework assignments were also created. One homework assignment for site safety which requires students to identify if the provided image looks safe or not and to explain why. The second homework assignment for the employable skills module which requires students to create a well-organized resume. Through these modules students will have the ability to learn from different sections of the construction industry and apply the learning objectives. Students will be provided a perspective of the construction industry and be inspired to pursue a career/future within this sector. Even if the students do not decide to go into the construction industry, they will still have basic construction skills and professionalism.

Key Words: Continuation schools, curriculum, construction education, introduction to construction, project-based

Introduction

This senior project consists of creating an introduction to construction fundamentals and basics course for continuation schools. For those reading who may not know, a continuation school is an alternative high school diploma program. According to the California Department of Education, “students who are sixteen years of age or older, have not graduated from high school, are still required to attend school, and who are at risk of not graduating” (Continuation Education, n.d). Typically, these schools are for high school dropouts, endangered students, students behind in credits, students who need a flexible schedule due to work, and juvenile students. A continuation school is a school for at-risk youth in which it provides programs of empowering, inspiration and outlet. At these schools, they typically provide classes that teach them skills, craft trades, and job training. According to California Department of Education, students take courses that are required for graduation along with guidance and career counseling (Continuation Education, n.d). Students range from sixteen years of age or older and are guided by counselors, guest speakers, and instructors to make good choices. Continuation schools provide students with opportunities to repair the past, find new career paths, and find new purpose in hopes of becoming responsible citizens. These schools try to provide the necessary tools in enhancing life skills through leadership, productivity, and accountability.

Through the curriculum, the author hopes to inspire these students. He wishes these students will recognize that they can become professionals in the construction industry. He will provide real life scenarios, hands on experience (if possible), and new aspirations.

Inspiration

The way this inspiration came to life is that the main objective for the author's senior project was to make it project-based and develop something for his hometown Salinas, CA. This idea became more centralized after he discussed with industry leaders in his community on what he could possibly do for his project. It was suggested to help teach a construction class at Rancho Cielo, a continuation school in Salinas, CA. Growing up he knew people who were sent to continuation schools, so this truly grabbed his attention. He, also, knew Rancho Cielo was helping change lives. He immediately contacted the school, signed release forms, and explored their facilities. He found high interest on how the class was being taught. The construction class was very hands on and allowed the students to build an engineered structured home. The instructor later suggested that he could help teach the students on how to perform trades like mechanical, electrical, plumbing, and finishes on the home they were building. This would fit with his objective of making his senior project hands-on, project-based, and inspiring the youth in his community. Unfortunately, this route wasn't able to be done due to Covid-19, so he had to find a new approach.

The author began having discussions with his Subject Matter Expert (SME) and the construction teacher at Rancho Cielo about other options. After some reflection and consideration, he realized that he could build a curriculum for continuation schools. Not specifically focused for Rancho Cielo, but for all continuation schools. He knew that he could create a curriculum based on what he has learned from his professors at his university and life experiences. He also knew that the curriculum would have to focus on basics and serve as an introduction to construction. After further discussion with his Subject Matter Expert, Dr. Thomas Kommer, he knew which direction to take. Building a curriculum for continuation schools would fit with the author's main objective; which were to enter a project-based senior project that would inspire youth. These students might be inspired to enter the construction industry through trade schools or attend college and obtain a construction management degree. Regardless of what route they take, he wants to help with the process by creating a positive impact in their lives.

Process

Prior to starting, the author identified a book that covered the topics he was passionate about. The book is "Core Curriculum: Introductory Craft Skills Fifth Edition" by NCCER. This book helped him select the five modules he wanted to focus on and what topics to discuss in each lecture. The five modules selected were Basic Safety, Introduction to Construction Math, Introduction to Power Tools, Introduction to Construction Drawings, and Basic Employment Skills. Each module ranged from 40-100 pages. The author decided to take the top topics he found in the book and incorporate them into the lecture. Along with including book details, he also wanted to include personal experiences. This was of particular concern since he did not want to overwhelm the students with an over-abundance of information. However, he also wanted to make sure he hit every important main detail. After each lecture he included a summary slide in which he reviewed the prior points discussed in their respected module. Along with book details, the author included bullet points reflecting his personal insight.

At the completion of each lecture, he created a ten-question quiz focused on the material discussed in the lecture. The quizzes consisted of true or false questions and multiple-choice questions. The focus of the quizzes was not to test the students on whether they had read every detail in the book but focused on the comprehension of the main learning objectives. He did this same process for all 5 modules.

After a rough draft of the curriculum was developed, the author communicated with Dr. Kommer, on what revisions should be made to make sure expectations were being met. From there, he was able to produce the curriculum he had hoped to achieve. A curriculum that would teach students of new opportunities, while gaining a better understanding of what they can achieve/accomplish with a construction background.

Limitations

Prior to starting this project-based senior project the author did not appreciate the limitations that he would eventually face. As the quarter started for spring 2020, the university transitioned to virtual classes and held meetings online due to Covid-19. As stay-at-home shelter was put into effect it resulted in him having to move back home with his parents. He remained optimistic that he could be as productive and have linear success with the current pandemic effecting the planet. Unfortunately, at first he had a tough time transitioning to telecommunicating at an abrupt moment. Before the pandemic he was accustomed to visiting his professors physically during office hours or to even ask them a couple questions after class. For him, it was more feasible and practical. For some reason, he found it uncomfortable and challenging to only have the option to communicate with his SME either via email or zoom. Fortunately, as the quarter went on, he adapted to the new environment and balanced his workload through these unprecedented times.

Another limitation he found, or more so risk, is not meeting a continuation school's requirements of what the curriculum should pertain. He identified this risk early in the production stage as he made sure to provide adequate and valuable information in the modules. Another risk he identified is that the curriculum could be too difficult/easy or not extensive. In order to mitigate this risk, he made sure to discuss with his SME what he could include, what he was missing, and what he can improve.

Deliverables

The deliverables for this project that the student created were 5 modules. Each module consisted of one quiz with 10-questions and one lecture discussing the main points and his personal insight of each respected module. He had originally planned to create a homework assignment for each module but decided to only create two homework assignments. One homework assignment for site safety which requires students to identify if the provided image looks safe or not and to explain why. The second homework assignment for the employable skills module which requires students to create a well-organized resume. This assignment would help create the foundation of future resumes, and all they would have to do is update it. Through this he hopes to provide students with a curriculum that is not too overwhelming but more so effective to their education.


Photos of Project

Module 1: Site Safety

This module discusses the importance of safety in construction and the consequences that occur from unsafe environments. The slides cover who is responsible for safety, where injuries occur the most, how to mitigate risk, and what proper equipment to use.


WHY IS SAFETY IMPORTANT?

- Allows employee to be productive
- Responsibility of employer
- Obligation to your family, coworkers, and yourself
- Safety reduces turnover costs
- Lower incident/accident rates
- Good for business







HOW TO IDENTIFY AND CONTROL HAZARDS

- If it doesn't look safe, it probably isn't safe
- Use proper equipment
- OSHA creates standards and regulations set by the Federal Gov.
 - CAL OSHA is State Regulated and provides more detailed codes
- 4 main leading hazards in construction
 - Fall hazards
 - Struck-by
 - Electrocution
 - Caught in-between



Homework Assignment

Olando Yepier: Continuation School Curriculum : Module 1

	<div style="border: 1px solid black; padding: 5px;"> <p>Is this safe? Yes_ No _ Explain:</p> </div>
	<div style="border: 1px solid black; padding: 5px;"> <p>Is this safe? Yes_ No _ Explain:</p> </div>
	<div style="border: 1px solid black; padding: 5px;"> <p>Is this safe? Yes_ No _ Explain:</p> </div>
	<div style="border: 1px solid black; padding: 5px;"> <p>Is this safe? Yes_ No _ Explain:</p> </div>

Quiz 1

Instructions: Please read the following 10 questions carefully and circle the correct answer. Answer to the best of your ability and seek the instructor if any questions. No cheating.

- The person primarily responsible for your safety is _____.
 - Your foreman
 - Your instructor
 - Your employer
 - Yourself
- Which is NOT one of the main four leading hazards in construction?
 - Fall hazards
 - Struck-by
 - Fire hazards
 - Caught in/between
 - Electrocution
- Which organizations creates regulations and codes for the construction industry?
 - OSHA
 - FBI
 - Supreme court
 - Construction company
- Which hazard has the most injuries/deaths in the construction industry?
 - Electrocution
 - Sickness
 - Fall hazard
 - Fire hazard
- How many amps of electrical current can kill you?
 - One amp
 - Two amps
 - 10 amps
 - 100 amps
- What does PPE stand for?
 - Protective proof equipment
 - Planned personal equipment
 - Personal protective equipment
- How often should you inspect equipment?
 - Never
 - Only once
 - Sometimes
 - All the time
- What should you do if you are in a situation that doesn't feel safe?
 - Continue working
 - Make the situation worse
 - Communicate with supervisor that you feel unsafe and want proper training
 - Stay quiet because you're afraid you might be fired
- True or False: Safety is important on a construction project.
 - True
 - False

- True
 - False
10. What should you do to prevent electrical hazard?
- Inspect equipment constantly
 - Nothing, continue working
 - Use GFCI circuit breaker
 - A and C

Module 2: Intro to Construction Math

Module 2 discusses the importance of math in construction. It highlights how to solve decimal problems, fraction problems, whole number problems, conversion problems, and basic geometry.

WHY IS MATH IMPORTANT IN CONSTRUCTION?

- In the construction trades, workers must use math day in and day out.
- Plumbers use math to calculate pipe length, read plans, and lay out fixtures.
- Carpenters use math to lay out floor systems and frame walls and ceilings.
- Algebra, geometry, and even trigonometry are constantly used in construction.
- Workers need to be able to understand and calculate:
 - Whole numbers
 - Fractions
 - Decimals
 - etc.

HOW TO ADD DECIMALS?

- Decimals are based entirely on the number 10.
- When rounding:
 - Underline the place to which you are rounding
 - Look at the digit one place to its right:
 - If the digit to the right is 5 or more, you will round up by adding 1 to the underlined digit.
 - If the digit is 4 or less, leave the underlined digit the same.
 - For example, if you are rounding to the nearest tenth and the # is 64.47 the rounded # will be 64.5. If the # is 64.43 the rounded # will be 64.4.
- When adding decimals the most important part is to remember where the decimal is
 - In the example, 4.76 and 0.834 will be added together. Note that these two numbers have a different number of digits to the right of the decimal. Line up the problem as shown here, adding a 0 if needed to help keep the numbers lined up.
 - Look at the figure at the bottom right for a visual example

Quiz 2

Instructions: Please read the following 10 questions carefully and circle the correct answer. Answer to the best of your ability and seek the instructor if any questions. No cheating.

- A worker has been asked to deliver 15 scaffolds to each of 26 different sites. The worker will deliver a total of _____.
 - 120
 - 390
 - 375
 - 390
- 13.9% = _____ in decimal form.
 - 0.009
 - 0.013
 - 0.139
 - 1.39
- What number is the arrow on figure 1 pointing to?

Figure 1

 - 4.3.8 inches
 - 4.1.4 inches
 - 4.1.2 inches
 - 4.5.8 inches
- Convert the weight of 49 ounces to grams.
 - 1.73 grams
 - 3.06 grams
 - 147.42 grams
 - 1389.15 grams
- Convert 15°F to Celsius.
 - 9.4°C
 - 9.4°C
 - 59°C
 - 59°C
- The sum of the four angles in a rectangle is always 180 degrees.
 - True
 - False
- Two coatings have been applied to a pipe. The first coating is 51.5 nanometers thick, the second coating is 89.7 nanometers thick. How thick is the combined coating?
 - 141.2 nanometers
 - 142.12 nanometers
 - 144.2 nanometers

- 145.02 nanometers
8. $3.8 + 9.16 =$
- 3.4
 - 12.96
 - 7.6
 - 12.96
9. The number matching the words "two thousand, six hundred eighty-nine" is _____.
- 2,206
 - 2,689
 - 6,289
 - 20,689
10. Put the following decimals in order from smallest to largest: 0.402, 0.420, 0.442, 0.442
- 0.420, 0.402, 0.442, 0.442
 - 0.042, 0.402, 0.420, 0.442
 - 0.442, 0.420, 0.402, 0.442
 - 0.042, 0.402, 0.442, 0.420

Module 3: Introduction to Power Tools


Next, there is a discussion on the importance of proper power tool usage. Detail is given on which power tools are most common in the construction industry and how to use each specific tool. A discussion on how to mitigate risk when using a specific power tool is included.

WHAT ARE POWER TOOLS?

- This module introduces three kinds of power tools: electric, pneumatic, and hydraulic.
- Electric tools** – These tools are powered by electricity.
 - They are operated from either an alternating current (AC) source (such as a wall receptacle) or a direct current (DC) source (such as a battery).
- Pneumatic tools** – These tools are powered by air.
 - Electric or gasoline-powered compressors produce the air pressure.
 - Air hammers and pneumatic nailers are examples of pneumatic tools.
- Hydraulic tools** – These tools are powered by fluid pressure.
 - Hand pumps or electric pumps are used to produce the fluid pressure.
 - Pipe benders, jackhammers, are examples of hydraulic tools.

HOW TO USE A POWER DRILL

- Always inspect tool prior to use and make sure everything is properly fastened
- Power tools can be dangerous if you don't use them properly
 - Always wear proper PPE
- To prepare a drill for use, first make sure that the drill is disconnected from its power source.
 - Then turn the chuck counterclockwise until the chuck opening is large enough to fit the bit shank, which is the smooth part of the bit.
 - Keeping the bit centered in the opening, turn the chuck by hand until the jaws grip the bit shank.
 - Make sure the bit is straight in the chuck and not leaning.
- To drill a hole with a power drill, start by making a small indent in the material exactly where the hole needs to be drilled.
 - When drilling make sure it is turning in the correct direction
 - Don't force the drill. Let the bit do the work and apply very subtle pressure



Quiz 3

Orlando Veloz Continuation School Curriculum Module 3
Power Tools Quiz

Instructions: Please read the following 10 questions carefully and circle the correct answer. Answer to the best of your ability and seek the instructor if any questions. No cheating.

1. Considering the following, which is not one of the power tools according to the lecture?
 - a. Electrical tools
 - b. Pneumatic tools
 - c. Hydraulic tools
 - d. All are considered power tools
2. T/F: You should always inspect a tool prior to use.
 - a. True
 - b. False
3. T/F: You should use excessive pressure/force when using a drill.
 - a. True
 - b. False
4. T/F: You should always adjust the depth of the blade to the thickness of the material
 - a. True
 - b. False
5. T/F: It is okay to not use proper PPE when using a tool
 - a. True
 - b. False
6. T/F: It is okay to use a tool without proper training or supervision
 - a. True
 - b. False
7. What are pavement breakers used for?
 - a. To drill into walls
 - b. To make cuts
 - c. For demolition
 - d. To drive steel pins into steel and masonry
8. What are Sawzall and jig saws commonly used for?
 - a. To drill
 - b. To demo
 - c. To make straight and curved cuts
 - d. None of the above
9. Why are nail guns common on some construction jobs?
 - a. They help speed up the installation of materials
 - b. They aren't used on construction jobs
 - c. They are required by OSHA
 - d. None of the above
10. Which of the following is false?
 - a. Follow manufacturer guidelines per each designated tool
 - b. It doesn't matter where you place your fingers when cutting as long as you make the cut

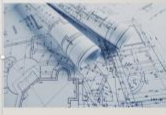
- c. Never change a blade/drill bit/grinder unless equipment is disconnected from its power source
- d. Make sure everything is secured and in good condition prior to use

Module 4: Introduction to Construction Drawings

In this module, the author describes how to read construction drawings. He provides tools and key items to look for when trying to read construction drawings. He also discusses the importance of how project specifications tie into the construction drawings.

WHAT ARE CONSTRUCTION DRAWINGS?

- Construction drawings are architectural or working drawings used to represent a structure or system.
- These were traditionally referred to as blueprints
- The set of construction drawings forms the basis of agreement and understanding that as building will be built as detailed in the drawings.
- Construction drawings usually consist of civil, architectural, structural, mechanical, plumbing, electrical, and fire protection
- Construction drawings, together with the set of specifications (often called specs), detail what is to be built and what materials are to be used.
- The specs define the quality of work to be done and the materials to be used.



EXAMPLE OF A LEGEND ON CONSTRUCTION DRAWING



Quiz 4

Florida Topical Certification School Curriculum, Module 4

Construction Drawings Quiz

Instructions: Please read the following 10 questions carefully and circle the correct answer(s). Answer to the best of your ability and seek the instructor if any questions. No cheating.

1. T/F: Construction drawings are architectural or working drawings used to represent a structure or system.
 - a. True
 - b. False
2. T/F: Mechanical plans usually specify the roof plan and aerial view of the building location.
 - a. True
 - b. False
3. T/F: The scale of a drawing tells the size of the object drawn compared with the actual size of the object represented.
 - a. True
 - b. False
4. What will a mechanical plan usually contain?
 - a. Motors
 - b. Piping systems
 - c. Hvac
 - d. All of the above
5. Where is the title block on construction drawings usually located?
 - a. Bottom left
 - b. Bottom right
 - c. Top right
 - d. Middle of sheet
6. What does the scale: 1/4" = 1'-0" mean?
 - a. This means that every 1/4 inch on the drawing represents 1 foot, 0 inches
 - b. This means that every 1/4 foot on the drawing represents 1 foot, 0 inches
 - c. This means that every 1 inch on the drawing represents 4 foot, 0 inches
 - d. This means that every 1 foot on the drawing represents 4 foot, 0 inches
7. What does "NTS" mean if it was put on a drawing or scale?
 - a. Not trained scale
 - b. Never to scale
 - c. Never tempt silly
 - d. Not to scale
8. What do construction drawings usually consist of?
 - a. Civil
 - b. Architectural
 - c. Structural
 - d. Mechanical
 - e. Plumbing
 - f. Electrical
 - g. Fire protection
9. What do specifications, also referred to as specs, do?
 - a. Define quality of work
 - b. Show construction drawings
 - c. Specify what materials to be used
 - d. All of the above
10. What do you do if the construction drawings and specifications don't match?
 - a. Go with the bigger number
 - b. Submit an RFI to the owner/architect to clarify
 - c. Avoid the conflict by building the project how you think it should be done
 - d. None of the above

Module 5: Basic Employability Skills

The curriculum commences with a discussion on basic employable skills and what the students can do to separate themselves from other candidates. The author addresses leadership skills and how valued these are along with problem solving skills. He also talks about what not to do when interviewing and what to do, once they are hired.

HOW TO USE CRITICAL THINKING AND PROBLEM SOLVING ON THE JOBSITE?

- Having the ability to solve problems using critical thinking skills is a valuable skill in the workplace.
- There will be situations in which timely job completion is at risk because a problem suddenly arises.
- When searching for the solution to a problem, it is easy to fall into a trap that prevents you from making the best possible decision. The following are the most common barriers to effective problem solving:
 - Closed-mindedness, Personality conflicts, General fear of change
- Always keep an open mind and listen to other people's ideas.
- Accept change; change is the only constant in life

WHAT ARE SOME IMPORTANT LEADERSHIP SKILLS?

- Every day, you will interact with members of your work crew and your supervisor: It is important to value everyone's input the same.
- Always show respect for the other members of your team.
 - Although you have a specific job to do, always be willing to help a co-worker.
 - Support your co-workers when they need it and they will support you in return.
- By carrying out your task quickly, correctly, and independently, you are setting an example for others to follow. In doing so, you are demonstrating leadership skills.
- Don't be afraid to lead by example and take initiative.
- Encourage people to feel that their job is important.
- Recognize and praise a job well done.

Homework Assignment

A resume isn't supposed to an essay

Don't feel insecure if you don't ha



Quiz 5

Ofando Yopez Continuation School Curriculum Module 5 Employment Skills Quiz

Instructions: Please read the following 10 questions carefully and circle the correct answer. Answer to the best of your ability and seek the instructor if any questions. No cheating.

1. T/F: The construction industry consists of independent companies of all sizes that specializing in one or more types of work.
a. True
b. False
2. T/F: Having the ability to solve problems using critical thinking skills is a valuable skill in the workplace.
a. True
b. False
3. T/F: It is okay to arrive to work late and unprepared without letting anyone know.
a. True
b. False
4. T/F: It is okay to talk to your friends and family about your job even though you signed a document to keep confidentiality.
a. True
b. False
5. Where can job openings be found?
a. Internet
b. Trade magazines
c. Local newspaper
d. All of the above
6. What are the most common barriers to effective problem solving?
a. Clain-misinformation
b. Personality conflicts
c. General fear of change
d. All of the above
7. What is professionalism?
a. Being the boss of a company
b. approach your work with integrity and a professional manner.
c. Arriving to work on time and prepared
d. B & C
8. Is the way you self present (the way you dress, speak, act, and interact) a vital part of any successful work relationship?
a. Yes
b. No
c. Sometimes
9. What do good leaders do in the work force?
a. Encourage others that their job is important
b. Believe their employees and consistently blames them
c. Recognize and praise a job well done
d. A & C

10. If you finish a task ahead of time, looking for another task that can be finished in the remaining time is referred to as _____.
a. stealing someone else's job
b. being sandy
c. showing off
d. taking initiative

Lessons Learned

The author has come to appreciate how it takes a significant amount of time and effort to create a curriculum/course for students. Throughout the process he gained a deeper respect and understanding for teachers. It is one thing to be knowledgeable about a topic, but it is another challenge to be able to simplify it for students and have the ability to teach them effectively. Throughout the process, he learned that it takes a lot of time and effort to take a main point, be able to simplify it, but still touch on all the critical details. He was humbled instantly that it takes a lot of reading along with critical analysis to achieve this. It was also a challenge for him to create quizzes that would target the learning

objectives at hand. He wanted to make the questions and answers as clear as possible because he knows what it feels like to be a student and not understand what the instructor is trying to interpret.

Throughout building this curriculum, the author has been inspired to, one day, teach. He gained a lot of satisfaction in creating a curriculum for continuation schools and for students who do not have much awareness of the construction industry. Growing up, he too was not aware of the career paths available in the construction industry. He did not know how sophisticated it was until he was exposed to all the other trades. Each trade specializes in their designated area and requires a lot of training and time. He will never discredit what each trade is responsible for because it takes a lot of experience and learning to get to that point. That is why he wants to inspire these students to be aware that each trade is valued, and everyone helps contribute to a project, whether you're a laborer or the project manager.

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