



MESA®

2023 MESA Statewide Curriculum & Resources

Overview and Training

Tuesday, June 20, 2023
Wednesday, June 21, 2023





MESA®

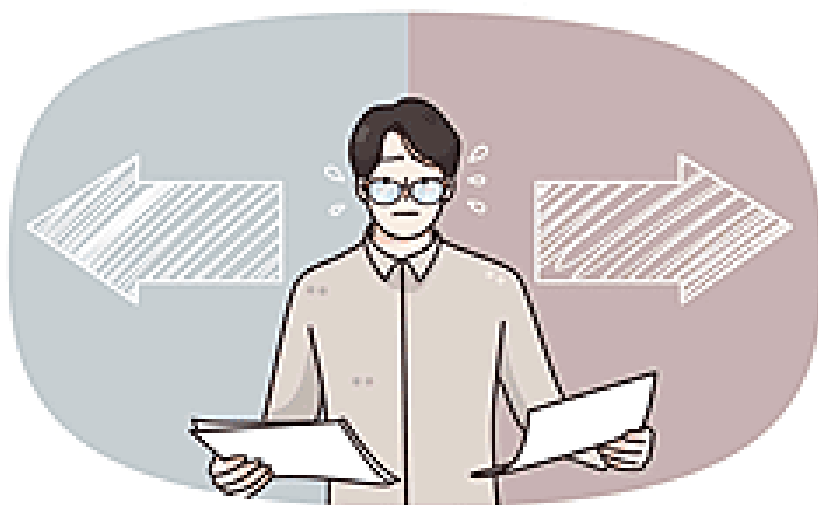
2023 MESA Statewide Curriculum & Resources Overview and Training

Carlos Gonzalez

Associate Director, Programming & Special Initiatives, MESA
Director, UCR MESA Programs

carlos.gonzalez@ucop.edu





A Jack of ALL
Trades is a
Master of None,
but often times
BETTER THAN
a Master of One



Introductions (in groups of 4)

- Name
- MESA Center
- Where/What you teach
- MESA years
- Why you're here...
- Favorite Binge Channel/Show (Netflix, HBO, Disney, etc)

Take 5 minutes...



In this training we hope to:

- Overview of our MESA Curriculum and Resources (MARS) and NEDC Curriculum, both on Canvas**
- Understanding and using our classroom curriculum with your students**
- “Putting it all together:” crafting how you will use our curriculum resources**
- Create meaningful networking and interactions (among MESA Advisors)**

Increase your understanding of MESA in your classroom and beyond...

Agenda?



DAY ONE

9 AM	Breakfast & Arrival
10 AM – 12 PM	Training Session 1
12 – 12:30 PM	Lunch
12:30 – 2:30 PM	Training Session 2
2:45 – 4:30 PM	Training Session 3
4:30 PM	End-by-time



DAY TWO

8:30 AM	Breakfast & Arrival
9 – 10 AM	Virtual Session 1
10 AM – 12 PM	“Real” Breakouts
12 – 1:00 PM	Working Lunch
	Virtual Session 2
1:00 – 1:30 PM	Virtual Session
	Close
1:45 – 2:30 PM	Final Session
2:30 PM	End-by-time

There will be breaks in between sessions...





MESA Advisor Resource Site



You have arrived to the MESA Advisor Resource Site (MARS). You made it to the end of the year!!!

<https://cole2.uconline.edu/courses/1410210>

What this training is not...



We will not teach you how to teach... rather, demonstrate curriculum structure and context through practical examples for lessons and activities...

What this training is not...



This is not a review of rules, process and tips/advice... the September trainings are for that

What this training is not...

Ingredients, Yangzhou Fried Rice:	Process for Yangzhou Fried Rice:
<ul style="list-style-type: none">• Jasmine Rice, 450g• Eggs, Two• Dried Shitake Mushrooms, three to four• Dried Scallops, five to six• Jinhua Ham, 30g• Chicken Breast, 50g• Pork Loin, 50g• Peeled Shrimp, 70g• Peas, 30g• Bamboo Shoots, 40g• Green Onions, ~4 springs	<p>To Prepare the Rice:</p> <p>(If using leftover rice) Leave the rice spread out overnight. Spread out over a plate and put in the fridge at least overnight.</p> <p>(If Making Rice) Cook rice. Rinse the rice thoroughly, leave it to drain, then make your rice at a ratio of 1.2 parts Jasmine rice to one part water (375g water for this recipe). Spread over a plate and use when cool.</p> <p>To Make Yangzhou Fried Rice:</p> <ol style="list-style-type: none">1. Soak the dried mushrooms and scallops. 2 hours if using hot boiled water and 8 hours if using room temp water. Reserve the soaking liquid.2. Dice the chicken, pork loin, bamboo shoots, and Jinhua ham. Finely dice the mushrooms and slice the green onion. Slice shrimp into 2-3 pieces. Cut scallops into four to six pieces.3. Marinate the shrimp for 15 minutes. With ¼ tsp salt and ¼ tsp cornstarch.4. Marinate the diced pork and chicken for 15 minutes. With ¼ tsp salt, ¼ tsp sugar, ¼ tsp cornstarch.5. Make the seasoning liquid. 3 tbsp of the mushroom/scallop soaking liquid, 1 tsp stock concentrate, 1 tsp liaojiu/Shaoxing, 1 tsp sugar, ¼ tsp salt and a sprinkle of MSG.6. Longyau. Get the wok piping hot, shut off the heat, add in the oil (or lard), and give it a swirl to get a nice non-stick surface.7. Fry the shrimp, then take them out and set them aside. Medium-high heat for ~1 minute.8. Add in the pork and chicken. Medium high heat still. Fry for ~1 minute.9. Add dried mushrooms and scallops to the pork and chicken. Fry for ~30 seconds.10. Add the Jinhua ham to the mix. Fry for ~30 seconds.11. Add the peas and bamboo shoots to the mix. For ~1 minute.12. Add the seasoning liquid, turn the heat to high.13. Once it's boiling, take everything out. Be sure to get every last drop of liquid.14. Rinse the wok, then longyau.15. Whisk the two eggs thoroughly.16. Add the whisked egg and fry for ~2 minutes. Or until curds begin to form.17. Add in the rice. Fry by pressing down on the rice to break it up and also scraping upwards to prevent sticking. Fry roughly 3-5 minutes until loose.18. Once rice is loose, add in the mixture made in steps 8-13. The liquid should evaporate away, fry ~1 minute.19. Add in the shrimp and green onion. Mix, shut off the heat, serve.

For the Shrimp Marinade:

- Salt, ¼ tsp
- Cornstarch, ¼ tsp

For the Pork and Chicken Marinade:

- Salt, ¼ tsp
- Sugar, ¼ tsp
- Cornstarch, ¼

For the Seasoning Liquid:

- Reserved Mushroom/Scallop Liquid, 3 tbsp
- Stock concentrate, 1 tsp
- Liaojiu, 1 tsp
- Sugar, 1 tsp
- Salt, ¼ tsp



You will not leave here with a step-by-step recipe for MESA perfection...

**Remember that
a MESA teacher
is caring, and
always goes
above and
beyond...**



Important Advisor Mindsets...



Students can think...

Students can achieve...

Students can problem solve...

Students can always surprise you...

Students have value, worth and **agency**... you are the Advisor and Manager, not the player/builder...



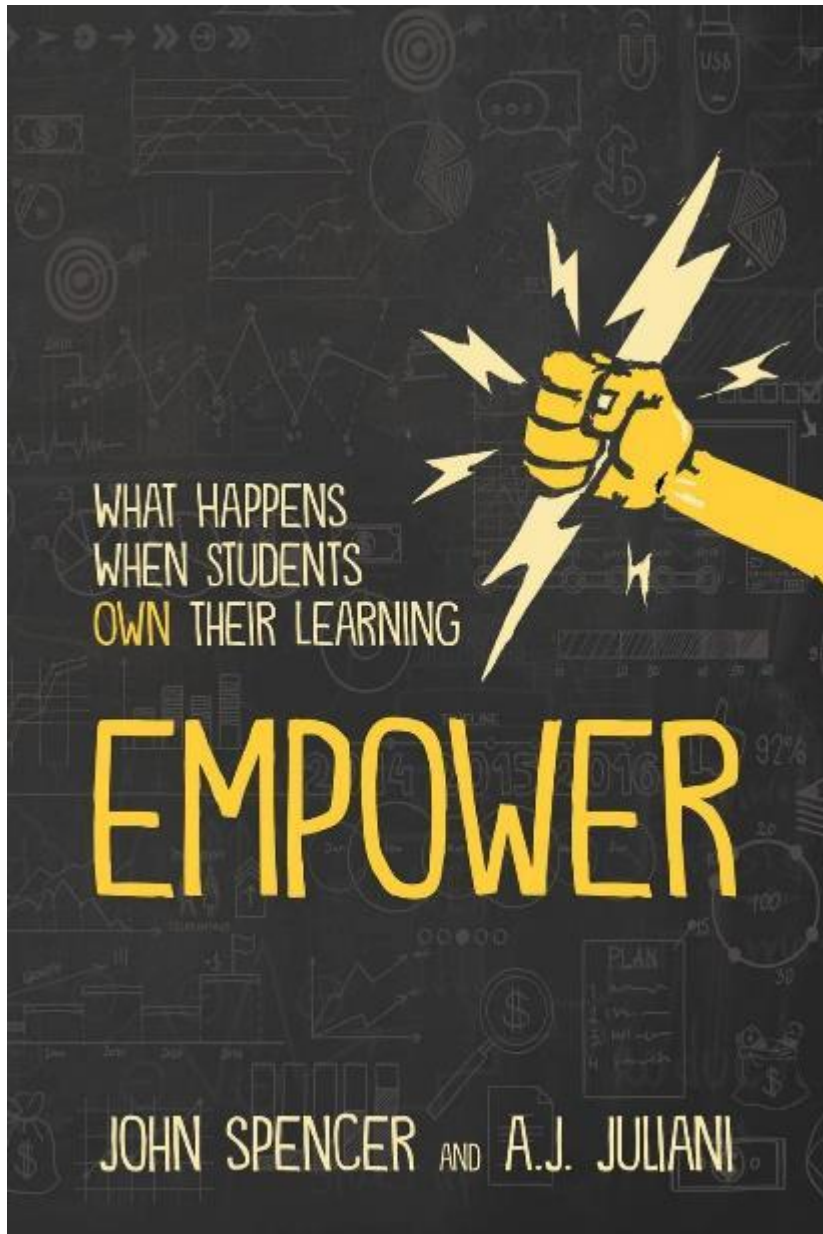
"IMAGINATION DOES NOT BECOME
GREAT UNTIL HUMAN BEINGS,
GIVEN THE COURAGE AND
STRENGTH, USE IT TO CREATE."

— DR. MARIA MONTESSORI

The
POST OAK
SCHOOL

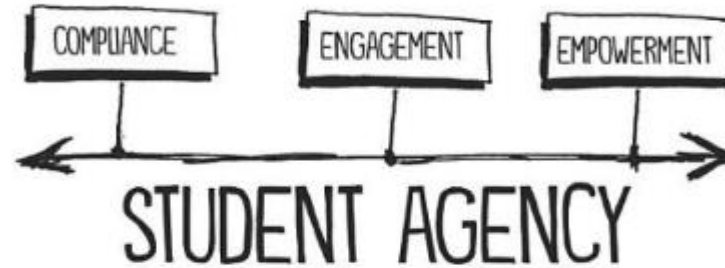


**How much trust and freedom are
you willing to give?**



FOREWORD

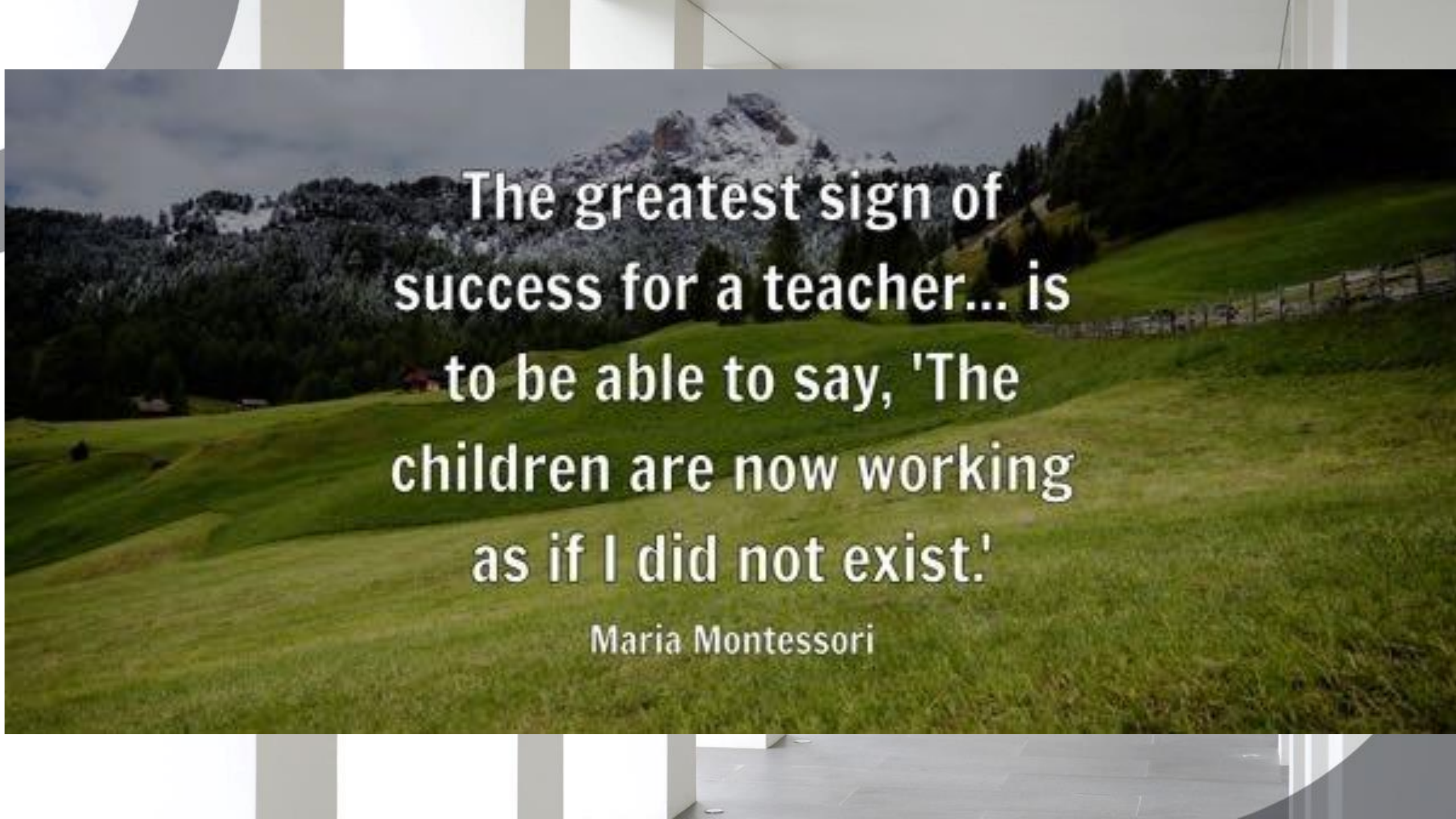
These ideas are not separate but, in some ways, can be seen as a continuum.



Let's go back to the word *compliance*. Has that really ever been the end goal of schools? Maybe as a system overall, but I think the best educators have always tried to empower their students. They know that if you are truly good at your job as an educator, eventually the students will not need you.

That is why "lifelong learning" has been a goal in education forever. If our students are truly compliant when they walk out of schools, they will always need someone else's rules to follow. To develop the "leaders of tomorrow," we need to develop them as leaders today.

Focusing on empowering students is seen by some as "fluffy;" students just show up to school to do whatever they want. This is not my belief at all.



The greatest sign of
success for a teacher... is
to be able to say, 'The
children are now working
as if I did not exist.'

Maria Montessori

How much failure will you allow?



and relearn which the things that we have
to do all the time not just as Educators.

<https://youtu.be/VUCyvpJA4wQ>

MESA is about Transformative Experiences



**Have you had/experienced transformative experience through MESA?
Share with a formed group...**



**A transformative MESA experience goes
beyond competitions...**

**A transformative MESA experience changes
you as an educator...**

**A transformative MESA experience makes you
a better teacher...**

**MESA exists to substantially impact our students...
Never forget the power of MESA!!!**



Many of us know what MESA is...



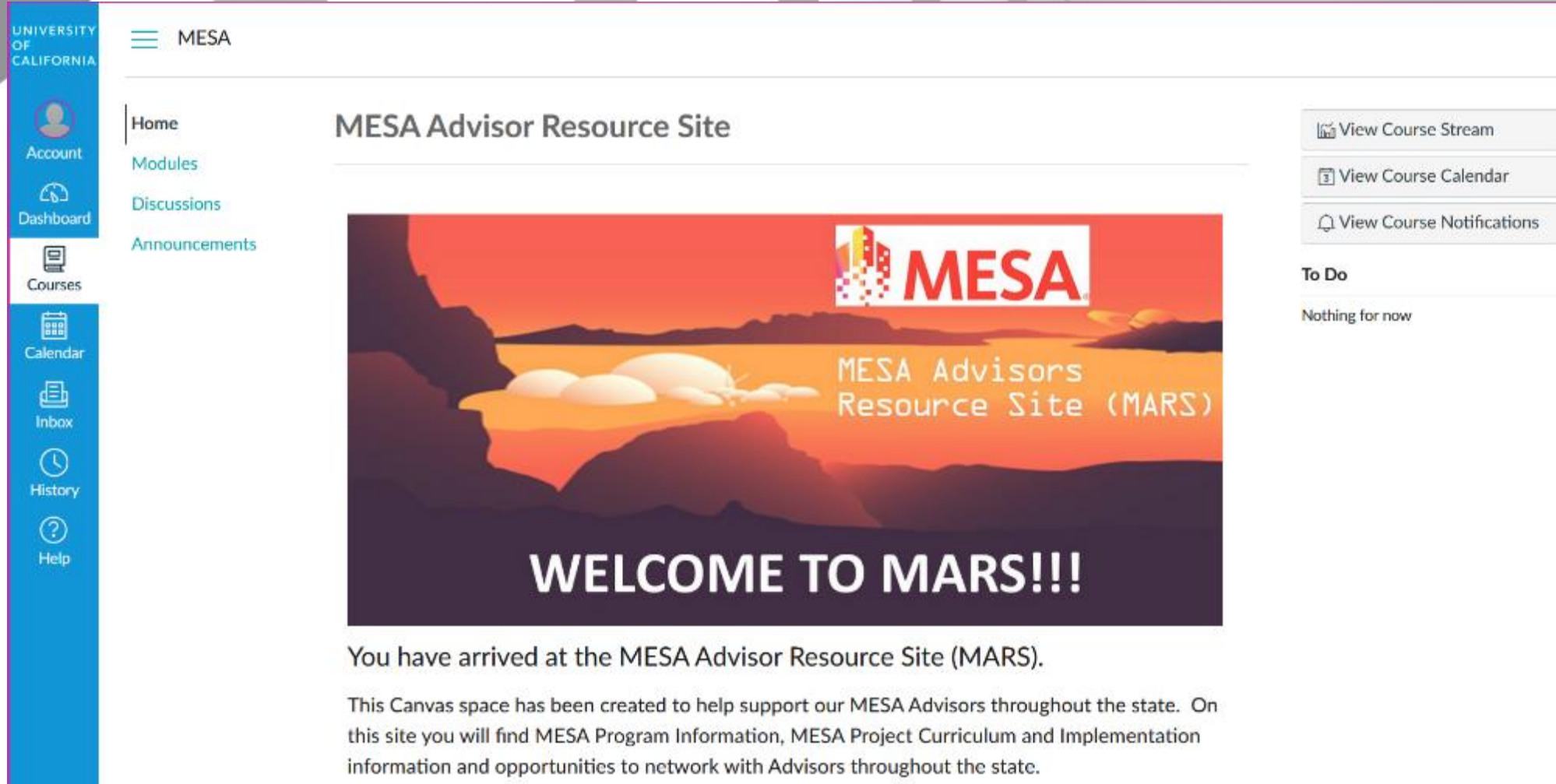
Approach About Us

A grassroots effort that began with 25 students at Oakland Technical High School in 1970 has flourished into an award-winning program that serves almost 25,000 middle school, high school, community college and university level students throughout California each year. MESA's long history with [industry](#) and its vast network of [alumni](#) are key components to success.

[LEARN MORE](#)



...But not all of the resources we offer



The screenshot shows the MESA Advisor Resource Site (MARS) within a Canvas LMS interface. On the left is a blue sidebar with the University of California logo and navigation links: Account, Dashboard, Courses, Calendar, Inbox, History, and Help. The top navigation bar includes a hamburger menu and the text 'MESA'. Below this, a sub-navigation bar lists 'Home', 'Modules', 'Discussions', and 'Announcements'. The main content area is titled 'MESA Advisor Resource Site' and features a large banner with a desert landscape at sunset. The banner includes the MESA logo, the text 'MESA Advisors Resource Site (MARS)', and 'WELCOME TO MARS!!!'. Below the banner, a message states: 'You have arrived at the MESA Advisor Resource Site (MARS). This Canvas space has been created to help support our MESA Advisors throughout the state. On this site you will find MESA Program Information, MESA Project Curriculum and Implementation information and opportunities to network with Advisors throughout the state.' On the right side of the page, there are three buttons: 'View Course Stream', 'View Course Calendar', and 'View Course Notifications', followed by a 'To Do' section showing 'Nothing for now'.

UNIVERSITY OF CALIFORNIA

MESA

Home Modules Discussions Announcements

MESA Advisor Resource Site

MESA

MESA Advisors Resource Site (MARS)

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View Course Stream

View Course Calendar

View Course Notifications

To Do

Nothing for now

<https://cole2.uonline.edu/courses/1410210>

DON'T
LABEL ME

label
jars
...not
people

Labeling our classroom resources...



Activities

Small investigations and projects meant to cover 1-2 class periods

Units

Often scaffolded series of lessons and activities that cover a month long or more of classroom time. Most based on 5E model and Engineering Process

Courses

Semester or year-long courses that include various units and content, mostly geared to the HS level

Labeling our classroom resources...



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MESA Day Project Units, Other units

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Semester or year-long courses that include various units and content, mostly geared to the HS level

A-G approved courses

TIME FOR A
BREAK



Labeling our classroom resources...



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A-G approved courses

Set the Stage



**Gauge your students' ability, affinity and willingness to
ENGAGE in projects...**

Before we begin...

Return to your groups...

Re-familiarize yourself with your group members...

Select a group name...

The challenge is the following...



<https://youtu.be/XVN-OtYspg>



Operation Volcano Drop (aka. “Circle of Pong”)

What are you doing?:

Devise a way to deliver much needed supplies (ping pong ball) into a paper cup located in the middle of an active lava-filled caldera (6 foot diameter circle)

Do's and Don'ts:

- Every person in the team must be actively involved in the placement of the ball
- The “supplies” must start outside the circle and come to rest inside the cup in the center of the circle
- You may not touch the “supplies” or reach into the circle (you may get burned!)
- No part of anyone's body may extend into the circle
- Only the provided materials may be used

You have 20 min...



Lets test...

Discussion

- Completely open-ended (many solutions)...**
- Can be challenging for students... you'll learn a lot about them if you do this activity**
- You'll begin to see who your leaders are...**
- Stories matter... they are a powerful for engagement and even cultural relevancy...**
- Has many extensions (to other concepts and learnings)**

Discussion/Reflection...



<https://youtu.be/PYeVeTi6iZU>

You can connect these projects in culturally relevant ways!



MESA®

Lunch

Labeling our classroom resources...



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Semester or year long courses that include various units and content, mostly geared to the HS level

A-Approved courses

MESA MODEL OF INSTRUCTION

Identify Problem/Needs:

Engage

- *Set parameter of the focus (guiding questions)
- *Frame the idea - problem statement
- *Create interest and motivate - an example

Research/Explore:

Explore

- *Introductory activities/small scale investigations
- *History of the problem - how technology has evolved
- Inquire, brainstorm - explore different designs
- *Content Instruction - science/math concepts - depth based on grade
- Share ideas - team or class (tie back to Introductory activities)

Develop Possible Solutions

Extend/Elaborate

- Read [Rules](#)/Identify [constraints](#) - including [costs](#)
- Apply Research to develop possible solutions
- *Explain concepts being explored - science/math concepts
- Use prior knowledge to ask questions, and make judgments

Choose Best Solution

Explain (at minimum, in their [log book](#))

- **Provide reasonable conclusions and solution
- Communicate design ([blueprint included](#)) choice based on previous findings/research

Create Prototype:

- Build project based on plans and cost analysis (itemized budget sheet)

Test and Evaluate:

Test

- Compare prototype to specifications
- *Test prototype, where applicable

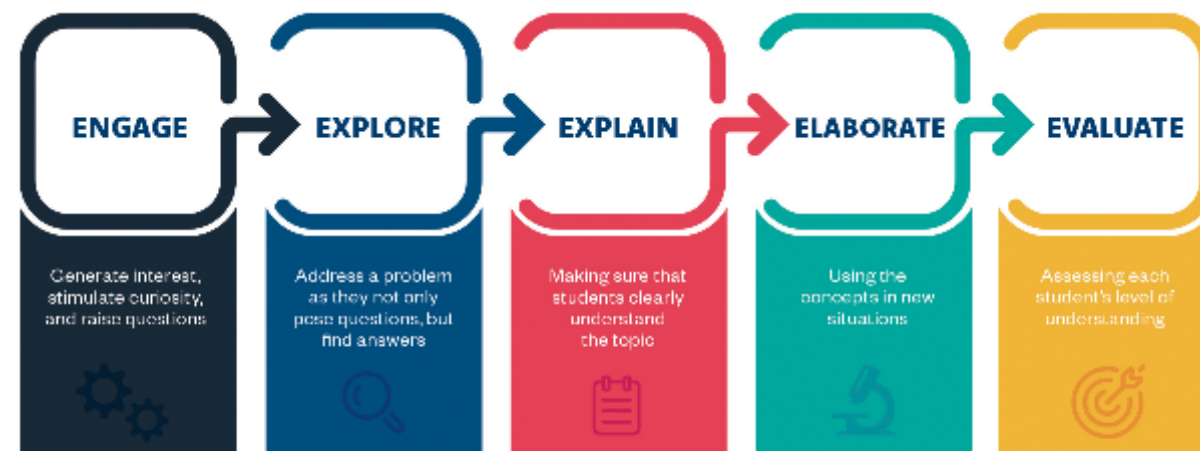
Evaluate

- *Identify strengths and weakness of the design
- Assess knowledge gained from the experience - reflection
- Document and communicate results

Redesign (Make it Better):

- Explain/Extend/Elaborate* based on findings of Test and Evaluate of Prototype.

ENGINEERING DESIGN PROCESS





<https://youtu.be/c6XHLe94SJA>

Example of learning through a project unit... **ENGAGE**

What are you doing?:

Design and build a “complicated” device from the available supplies to ring a bell

Do's and Don'ts:

- Only the available supplies may be used.
- Device must have at least two different sequential and dependent actions. The action to initiate the device may count as one of the at least two actions.
- Device must use two different types of energy (e.g. gravity, elastic, etc.)
- Team may not assist in the ringing of the bell in any way (device must move on its own).
- Teams may hold down device OR attach it to the table/desk/etc. if necessary.
- Teams should use as many of the supplies as possible when building the device.





You have 20 minutes (before we test)...

Discussion

- Completely open-ended (many solutions)...**
- The less you define (beyond constraints), the better...
(e.g. don't tell them what an "action" is...)**
- Had constraints (materials, time) to keep things realistic...**
- Students had to work together AND independently throughout...**
- Can/Does lead to the building of an even more complex project
(MESA Machine)**

Leading kids to "discover" a project as opposed to being "given" a project...

A long, minimalist hallway with white columns and a grey floor, leading to a bright opening at the end. The hallway is composed of a series of white rectangular columns that recede into the distance, creating a strong sense of perspective. The floor is made of large, dark grey tiles. At the far end of the hallway, there is a bright, colorful opening that appears to be a doorway or a window, showing a glimpse of a traditional building with a red roof and green foliage. The overall atmosphere is clean, modern, and serene.

BREAK

Labeling our classroom resources...



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MESA Day Project Units, Other Units

Courses

Semester or year-long courses that include various units and content, mostly geared to the HS level

A-G approved courses

A-G approved curriculum (MESA) x UC MESA 1 course.docx - Google x UCOP A-G Course Management x University of California A-G Course Management x

hs articulation.ucop.edu/agcmp#/courses/list

UNIVERSITY OF CALIFORNIA
A-G Course Management Portal

COURSES SEARCH INSTITUTION HELP

Welcome, Carlos Gonzalez
Mathematics, Engineering, Science
Achievement (MESA)

A-G Courses Manager [Return Home](#)

2022-23 A-G Reference List

Search by course title

ALL A B C D E F G 2022-23 2021-22 2020-21 2019-20

All subject areas by course title

Title	Course Details
MESA (Mathematics, Engineering, Science Achievement) G Interdisciplinary	Classroom-based
MESA 2 - Introduction to Computer Science G Interdisciplinary	Classroom-based
MESA 3: DRAFTING AND DESIGN G Interdisciplinary	Classroom-based

PACING GUIDE TANMS/MESA COURSE
PRINCIPLES AND APPLICATION OF ELECTROMAGNETISM

Purpose: In this course students apply principles of science and math, and the engineering design process towards developing two projects related to various disciplines in engineering and concepts of electromagnetism. In this year-long college-preparatory course, students explore designing a magnetic train launcher and an EM-generator. By successfully completing the course students will be prepared to succeed in college level science and engineering.

AUGUST – OCTOBER

UNIT 1

Focus: Fundamental knowledge of electricity and magnetism

GOALS AND OBJECTIVES

1.0 Goal: Introduction to Electricity

Objectives:

- 1.1 Explore the history of electricity and the impact of its early applications.
- 1.2 Introduce the basics of electrostatics. Students should become familiar with the interactions between point charges and/or electric fields.
- 1.3 Introduce the basics of electrodynamics. Students should become familiar with the interactions between currents and/or magnets.
- 1.4 Introduce the basics of circuits. Students should become familiar with Ohm's Law and the difference between series and parallel connections.

Time: 2-3 weeks (720 minutes)

2.0 Goal: Introduction to Magnetism

Objectives:

- 2.1 Explore the history of magnetism and its origin from an atomistic perspective.
- 2.2 Introduce the concept of magnetic fields. Students should become able to visualize the field direction and know the difference between B and H fields.
- 2.3 Show common methods of magnetization and demagnetization.

Time: 1-2 weeks (360 minutes)

3.0 Goal: Electricity and Magnetism Together

Objectives:

- 3.1 Explore the history of electromagnetism and how the two fields were unified into a single theory by Maxwell and his contemporaries.
- 3.2 Expand on concept of magnetic field generation from a moving charge. Students will be introduced to the right hand rule and Lorentz force.

Time: 1 week (280 minutes)

4.0 Goal: Magnetic Induction

Objectives:

- 4.1 Explore the history of the discovery of induction and its applications.

“Putting it all Together”: Modeling Lessons

Using the activity provided, create your own lesson complete with:

Story

Purpose

Do’s and Don’ts

Testing Procedures

What kids will learn

(skills, standards, project preparation, etc.)

Take 30 min and then present to the group!

STRAW TOWERS

Type of Contest: Team

Composition of Team: 1-2 students team

Overview: To build the tallest freestanding tower possible from drinking straws and masking tape.

Materials (per team):

- Fifty (50) drinking straws (approximate size 7.75" – length x 0.25" diameter)
- One (1) yard of masking tape (36")

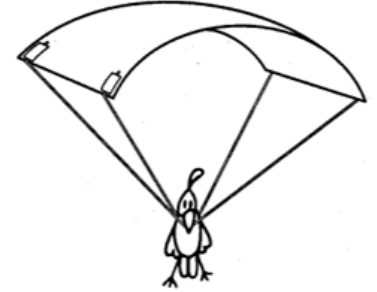
Rules:

1. Each tower must be constructed from the straws and tape supplied by the teacher. No materials or substitutions are allowed.
2. Straws may be bent, fitted inside one another, or taped, but they can't be cut.
3. Each tower must be freestanding (except for tape to the floor) for at least 10 seconds upon arrival of a judge. It must not touch or be attached to or lean against any other surface (e.g. floor, wall, desk, etc...)
4. Contestants have 30-minutes to build their towers. Any modifications made to tower after the allotted 45-minute period will disqualify the tower. Late arriving students may enter the contest at any time after the 45-minute period has begun, however, they must stop when everyone else stops. No extra time will be allotted to late starters.
5. During the contest all students shall have equal access to additional mechanical devices such as chairs, tables bleachers, etc...
6. The judge's decision shall be final related to any apparent safety hazards.

PARACHUTE

Materials:

- Paper
- Plastic wrap
- Lightweight
- String
- Tape
- Ruler
- Scissors
- Small weight (e.g. box containing a couple of marbles, unbreakable toy)



Doing it:

1. Drop a small weight from a high place (e.g. drop it while standing on a chair, or from the top of a stairwell). How quickly does the object fall?
2. Crumple a sheet of paper into a ball. Cut four pieces of sting of equal length. Tape one end of the pieces of sting to the paper ball. Tape the other end of the pieces of sting to the small object. Drop the object from the same height that you dropped it before. How quickly does it fall? Does this design of parachute work? Why or why not?
3. Cut four pieces of sting of equal length. Make a simple parachute by taping one end of a piece of sting to each of the four corners of a sheet of paper. Tape the other end of the strings to the object. Drop the object. How well does your parachute drift to the ground? Why does the parachute make the object fall more slowly?
4. Experiment with different lengths of string. What length of sting makes the best parachute? Why?
5. Use different materials for the canopy. Does paper, plastic, or cloth work best? Why?
6. Try different shapes and sizes for the canopy. Does a larger canopy work better than a smaller one? Why? Does a round or square canopy work better?

Take 30 min and then present to the group!

REFLECTION (end of day one)

Name something LEARNED today...

State a QUESTION(s) you may have after today...

Discuss an ACTION you will take because of today...

This LQA format for group and open discussions can be used ad-naseum in your classroom...



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Overview and Training

Tuesday, June 20, 2023

Wednesday, June 21, 2023






In this training we hope to:

- Overview and description of our MESA Curriculum and Resources (on MARS) and NEDC Curriculum**
- Understanding and using our classroom curriculum with your students**
- “Putting it all together:” crafting how you will use our curriculum resources**
- Create meaningful networking and interactions (among MESA Advisors)**

Increase your understanding of MESA in your classroom and beyond...





MESA USA 2023 Summer Convening Schedule

All times are Pacific Daylight Time (PDT)

Time	Session
9:00-9:30	Welcome and Introduction
9:30-10:00	Keynote Speaker: Dr. Lola Rodriguez Vargas
10:05-11:00	Session 1 - Dive into the modules
11:05-12:00	Session 2 - Continue the dive
12:00-12:15	Break - Get food for working lunch
12:15-1:15	Code.org (working lunch)
1:15-1:30	Closing



This site was created to house MESA curriculum, activities and resources for MESA advisors and staff in the MESA USA network. Feel free to browse content and use what is provided for students and teachers in your state. [Click here](#) to get started.

The site is administered and curated by the MESA USA curriculum committee. For general inquiries and questions [click here](#).

<https://cole2.uonline.edu/courses/2040326>

For our convening day:

- We'll watch the general sessions together...
(9 AM and 12:15 PM, 1:15 PM)**
- You'll also be in actual break-out groups. Your group will be assigned a Module. We'll do two rounds of this. The discussion notes can go in Jamboard (linked below)...**
- We'll have lunch ready by 12 PM...**
- We'll continue with the training after the convening itself ends**



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Time	Session
9:00-9:30	Welcome and Introduction
9:30-10:00	Keynote Speaker: Dr. Lola Rodriguez Vargas

For group discussion, Part 1:

You will engage in actual “break-outs” with each other. For round one, you will look at either MODULE 1, 2 or 3. Answer the following questions:

How would you use this with students?

Is it transferable to other projects?

Are there any gaps in the module coverage?

Is there something a veteran teacher feels a novice teacher needs?

You'll have 25 minutes...

For group discussion, Part 2:

You will engage in actual “break-outs” with each other. For round one, you will look at either MODULE 5, 6 or 7. Answer the following questions:

How would you use this with students?
Is it transferable to other projects?
Are there any gaps in the module coverage? Is there something a veteran teacher feels a novice teacher needs?

You'll have 25 minutes...



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12:00-12:15	Break - Get food for working lunch
12:15-1:15	Code.org (working lunch)
1:15-1:30	Closing

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How do you organize and contextualize all of this?

GENERAL MESA PACING GUIDE

Purpose: Enrich the pre-college math and science environment, and stimulate greater student interest in STEM disciplines.

August - October

Focus: Facilitate the development of a STEM classroom culture and prepare students for MESA Engineering projects.

GOALS AND OBJECTIVES

1.0 **Goal: Introduction to MESA**

Objectives:

- 1.1 Use MESA resources to inform/recruit students, i.e. video, PowerPoint presentation, pamphlet/brochures, etc.
- 1.2 Have students complete online application/registration for program
- 1.3 Pass out and collect completed Parental Authorization forms and enroll students by end of November (online database).
- 1.4 Meet with parents during the school's Back to School Night or another convenient time in early Fall to gain parental buy-in.

Time:

2-3 class periods AND one afterschool period

2.0 **Goal: Build a “Sense of Belonging” and Set the Stage for Team/Project Based Learning**

Objectives:

- 2.1 Engage in class and team-building activities
- 2.2 Do “introductory activities/projects” to set the stage for MESA projects
- 2.3 Engage in a non-MESA Day challenge (eg. Egg Drop, Roller Coaster Design Challenge, etc.)

Time:

2-3 weeks (5 -7 Introductory Projects over 1-2 weeks, 1 week for challenge)

3.0 **Goal: Encourage the Development of a “Preparing for College” Mentality**

Objectives:

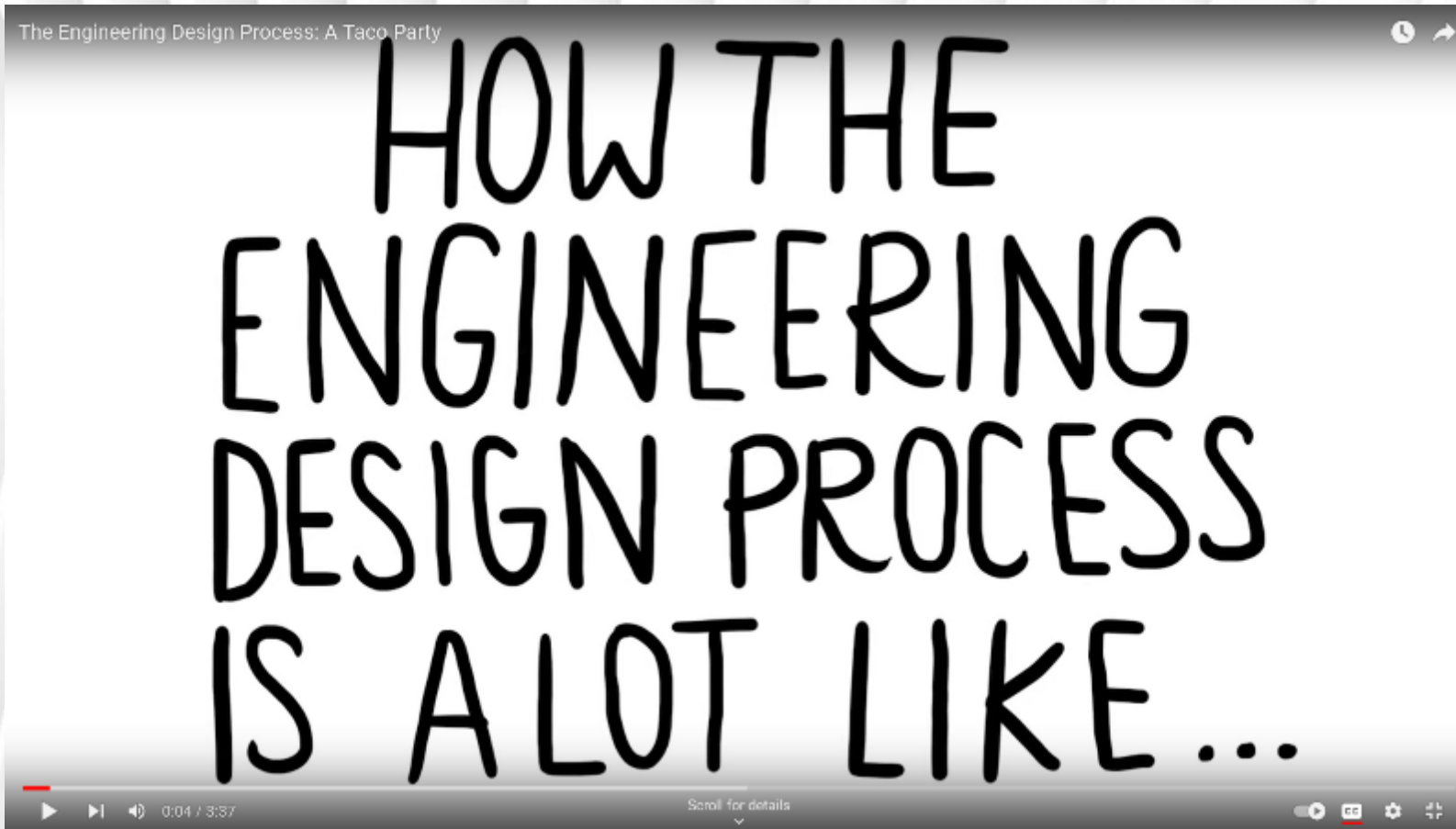
REFLECTION (end of day two)

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Discuss an ACTION you will take because of today...

This LQA format for group and open discussions can be used ad-naseum in your classroom...



https://youtu.be/MAhpfFt_mWM



2023 MESA Statewide Curriculum & Resources

Overview and Training

Carlos Gonzalez

Associate Director, Programming & Special Initiatives, MESA

Director, UCR MESA Programs

carlos.gonzalez@ucop.edu

