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Online Instructors' Use of the Cognitive Theory of Multimedia Learning Design Principles: A Mixed Methods Investigation

Thomas Pantazes

West Chester University of Pennsylvania

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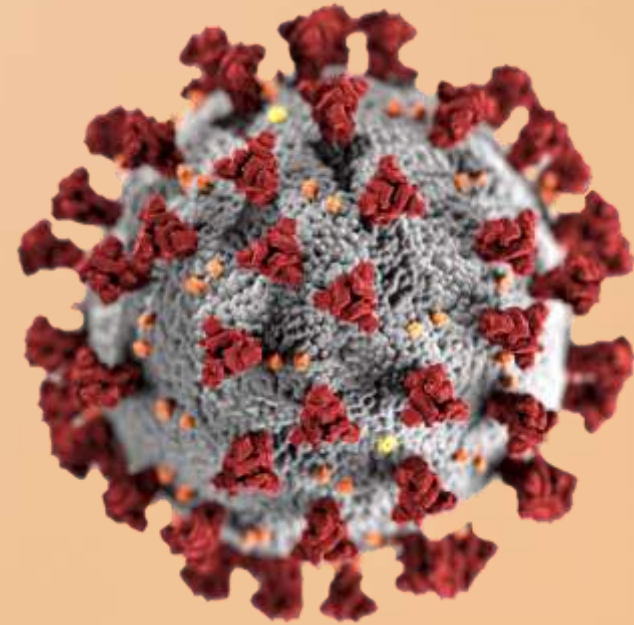
Online Instructors' Use of the Cognitive Theory of Multimedia Learning Design Principles: A Mixed Methods Investigation

WCU Virtual Research and Creative Activity Day

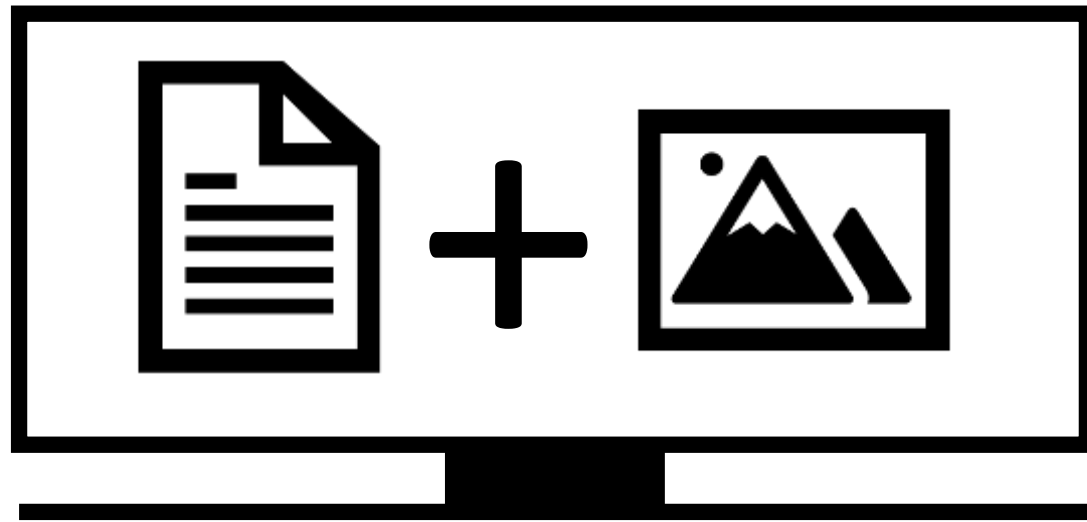
April 29, 2021

Thomas Pantazes, Ed.D.





Cognitive Theory of Multimedia Learning



>



or



CTML Design Principles

Extraneous
Cognitive
Load



Essential
Cognitive
Load



Germane
Cognitive
Load



CTML Design Principles

Extraneous
Cognitive
Load

Coherence



Signaling



Redundancy



Spatial
Contiguity



Temporal
Contiguity



Essential
Cognitive
Load

Pretraining



Modality



Segmenting



Germane
Cognitive
Load

Personalization



Embodiment



Voice



Problem Statement



Investigations of digital instructional video at an early stage (Chorianopoulos, 2018).



Focused on students and not instructors (Kay, 2012; Pan et al. 2012)



More research is needed on how faculty learn to implement technologies like digital video into their instruction (Belt & Lowenthal, 2020)

Research Questions

To what extent are higher education instructors who create digital instructional video for online learning applying the 11 multimedia design principles of the Cognitive Theory of Multimedia Learning?

1. Which Cognitive Theory of Multimedia Learning design principles are higher education online instructors incorporating into self-made digital instructional videos? (*quantitative*)
2. Why do higher education online instructors choose components of digital instructional video production to focus on when creating digital video for use in online courses? (*qualitative*)
3. Which CTML design principles appear in higher education online instructors self-selected “best” self-made instructional video? (*quantitative and qualitative*)
4. To what extent are CTML design principles an area of focus for higher education online instructors as they create digital instructional video? (*quantitative and qualitative*)

Phase 1: Quantitative

Survey - 3 weeks

1. Identified 138 instructors
2. Surveyed for 3 weeks

3. Calculated descriptive statistics
4. Calculated CTML implementation scores
5. Identified highest and lowest scoring design principles
6. Adjusted interview questions

Phase 2: Qualitative

Interviews - 4 weeks

1. Used CTML scores to identify 5 instructors for interviews
2. Conducted interviews over four weeks
3. Generated transcript
4. Sent transcript for a member check
5. Completed reflective self memo

6. Hypothesis coded transcript
7. *In vivo* coded transcript

Video artifacts - 2 weeks

1. Collected video artifact from each instructor

2. Hypothesis coded each video

Phase 3: Integration

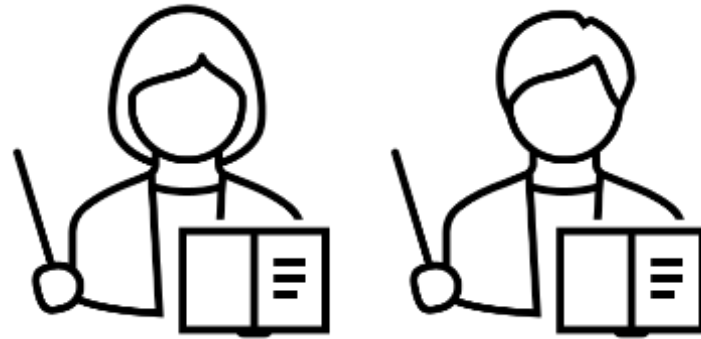
4 weeks

1. Conducted pattern matching across three data sets
2. Wrote quantitative report
3. Wrote qualitative report

Setting and Sample



Public
University



900
Instructors



140 Teaching
Online

Instructor Profile

39.86%

response rate
(55/138)

College	# Instructors
Business	15
Humanities	7
Social Work & Education	9
Health Sciences	14
Sciences	7
Other	3

94.6%

Interest	Frequency
Strongly interested	36
Somewhat interested	16
Neutral	1
Somewhat uninterested	2
Total	55

Digital Video Use

88.55% of online courses used video (116/131)

average number of videos per course was

23.13

14.04

videos made by the instructor

9.47

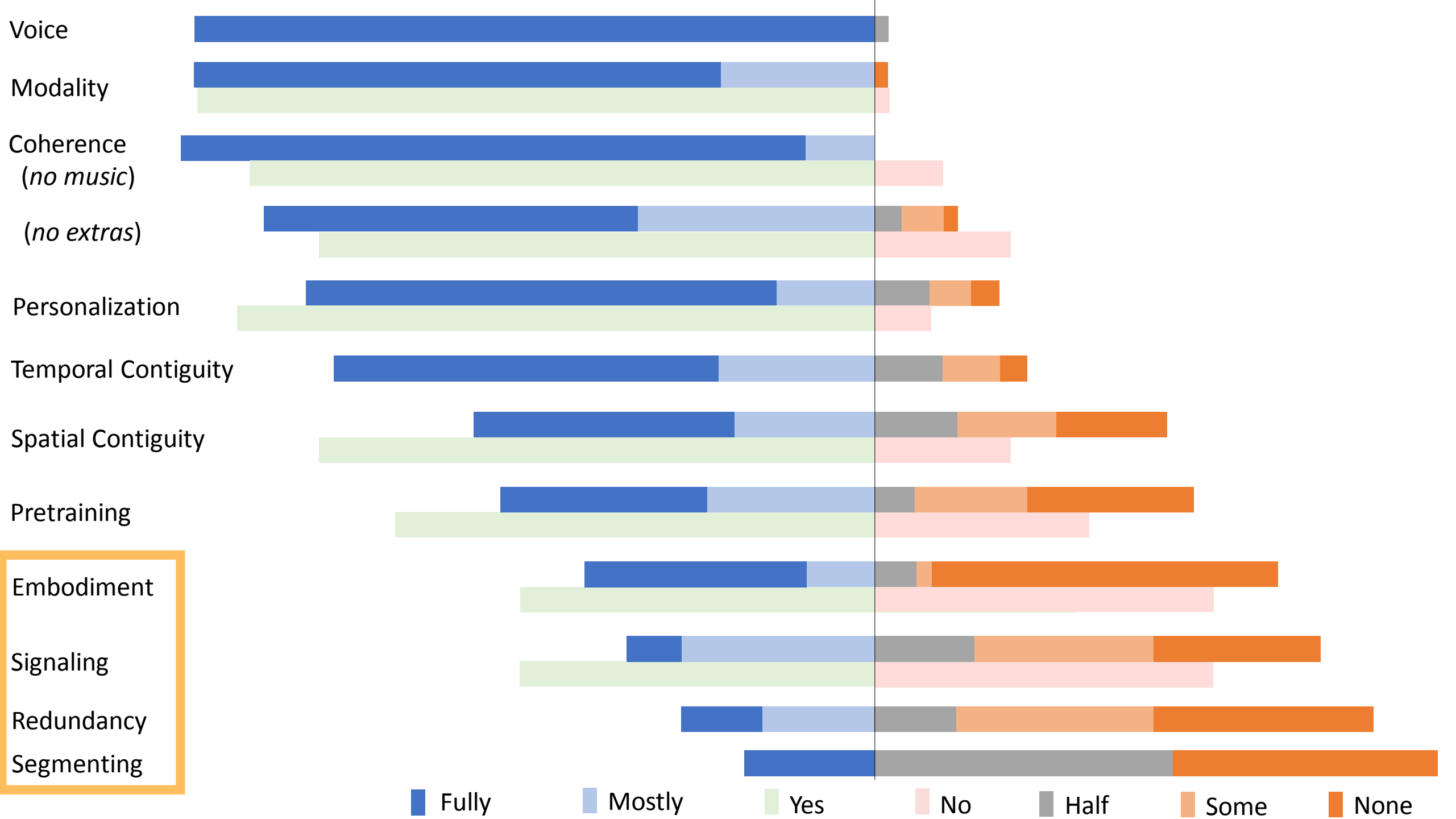
videos made by others

10.2% of instructors not creating video during semester

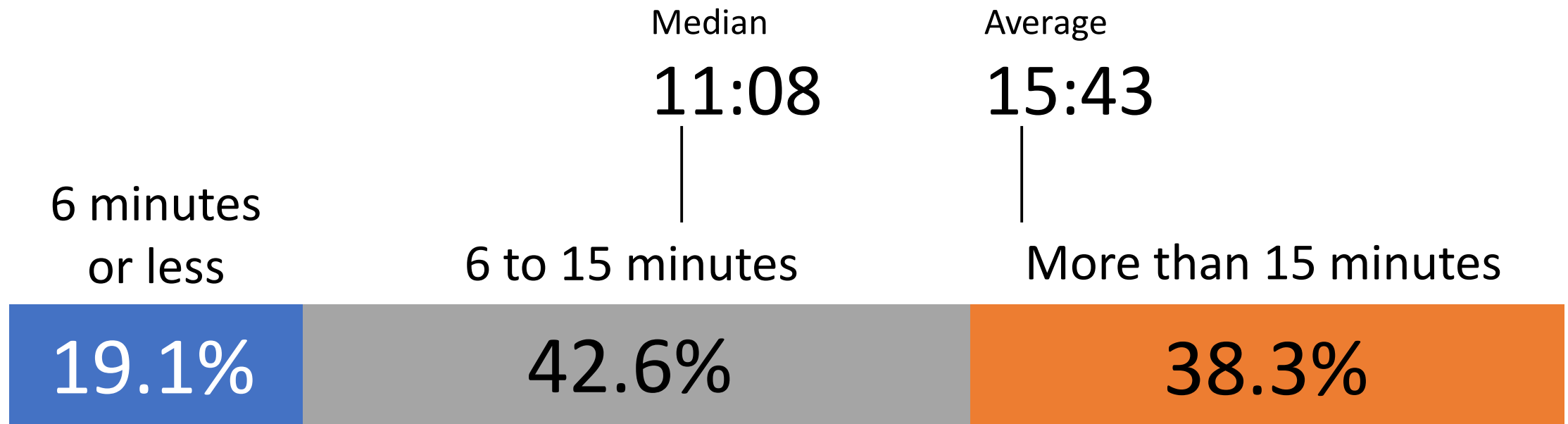
1. Which CTML design principles are instructors incorporating into the videos they create?

	Simple CTML Scale (0 – 12)	Complex CTML Scale (11 - 55)
Average Score	7.0408	39
Median	7	39
Mode	8	36
Minimum	4	39
Maximum	10	47
Application	58.7%	70.9%

strong correlation between the scales of .728, $p < 0.01$



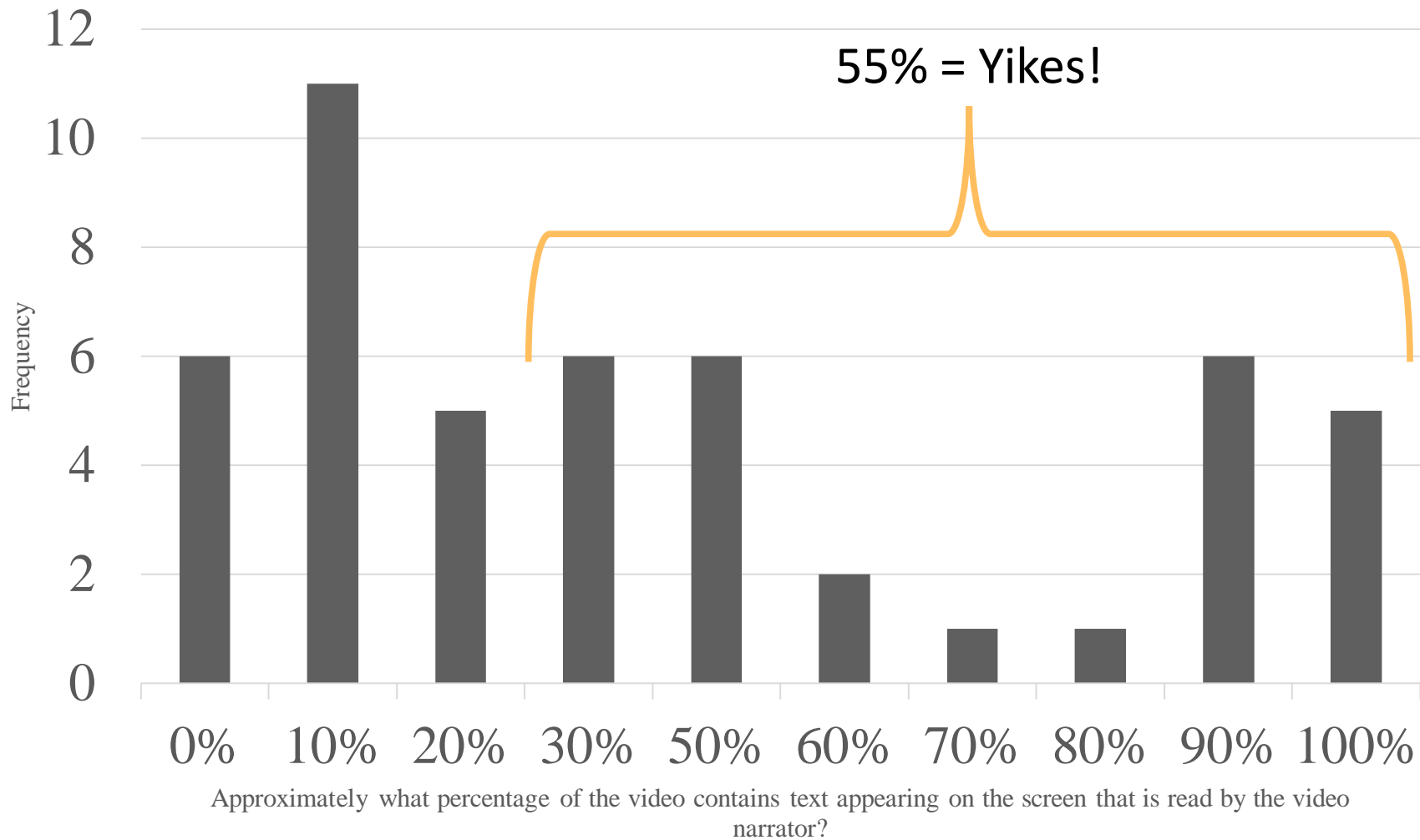
Segmenting



Redundancy



or



1

Visual Design informs
Principle Application

2

Instructors may improve
with experience

3

Desire to signal may be
causing more redundant
reading

Video Creation



1:48

Camtasia
43.75%



Kaltura
29.17%

Zoom
22.92%

PowerPoint
12.5%

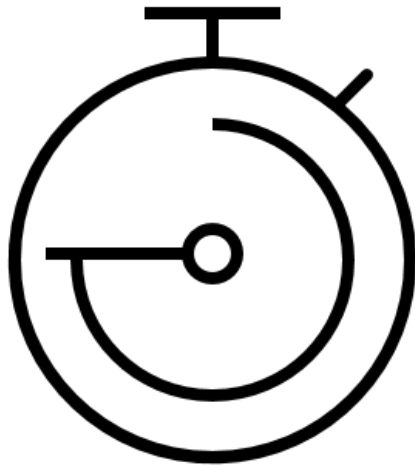
Lecture Style **76.32%**

Video Creation Process

“I'm also aware that I have to get this done in a short period of time.”

“It is so much work.”

~Kristine



“Anytime I'm somewhere in the real world and I go, a lightbulb comes on that I teach this. I'm pulling out my cell phone. I'm recording the quick video.”

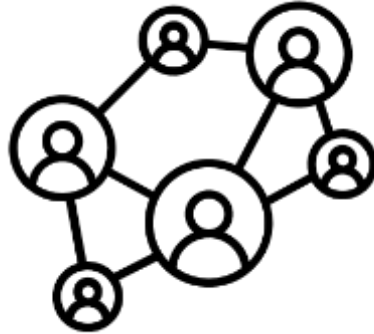
~George



2. Why do instructors choose components of video production to focus on when creating video?



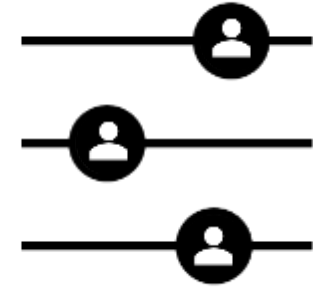
Visualizing Students
to Meet their Needs



Creating
connection
with students



Respecting students



Changing because
of student
feedback

3. Which CTML design principles appear in instructors self-selected “best” videos?



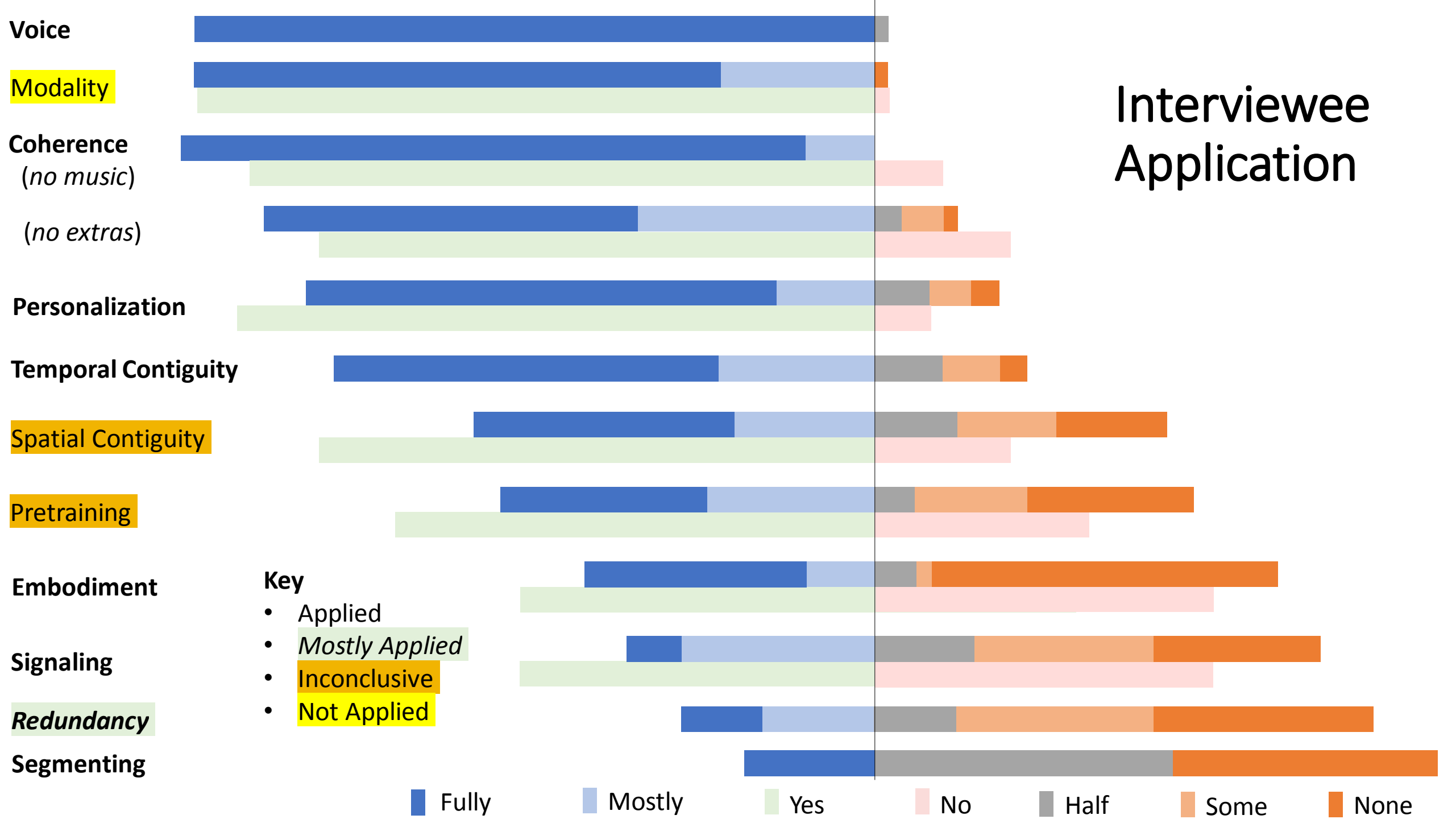
George

Kristine

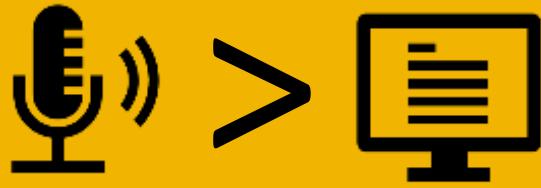
Tessa

Bertha

Tiana



Modality



Instructor	Majority Text Slides (percent of video)	Redundant Reading (percent of majority text slides)
George	0.00	0.00
Kristine	47.36	7.92
Bertha	82.46	12.59
Tiana	100.00	6.74
Tessa	100.00	18.84

4. To what extent are CTML design principles an area of focus for instructors as they create video?

They are not a focus.

Directions for Future Research

1. Refine the survey instrument
2. Examine the CTML principles as a whole and not individually
3. Continue investigating principle “boundary conditions”
4. Instructor values around video production and tools
5. Replicate in other settings, especially not during a global pandemic

1

Be a
Video Star



2

Add Some
Signals



3

Check
Your Text



4

Account for
Time



5

It is Not
the Tool,
It is How
You Use It



Thank You!

WCU Virtual Research and Creative Activity Day

April 29, 2021

Thomas Pantazes, Ed.D.

tpantazes@wcupa.edu

[@TomPantazes](#)

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