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The Relationship Between Active Learning and Workload During Clinically Relevant Simulations

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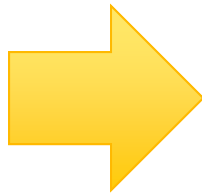
THE RELATIONSHIP BETWEEN ACTIVE LEARNING AND WORKLOAD DURING CLINICALLY RELEVANT SIMULATIONS

VCU Health Science Research

Symposium March 20, 2019

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2 + 2 MODEL

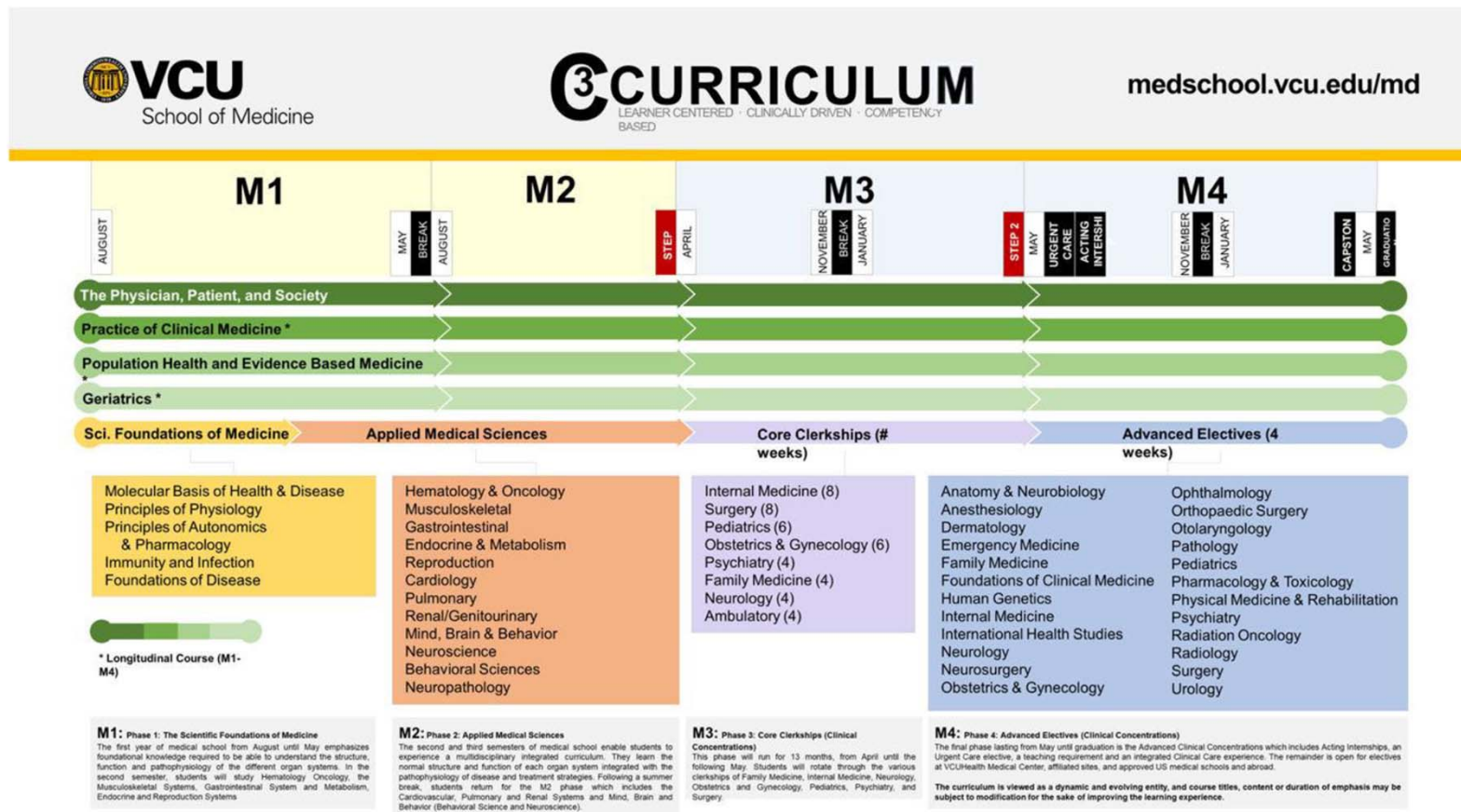
2 yrs
Basic Sciences



2 yrs
Clinical Sciences



VCU School of Medicine “C3” Curriculum



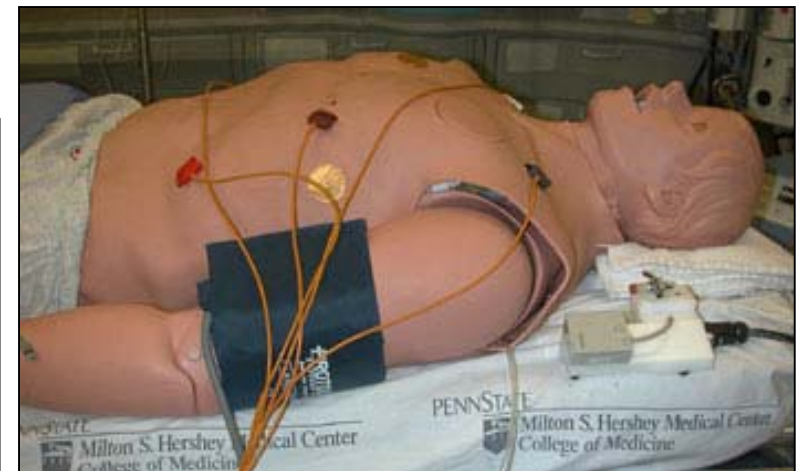
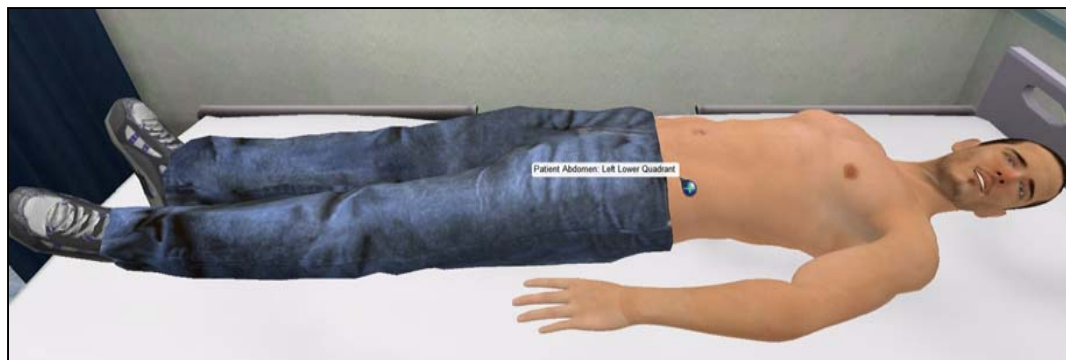
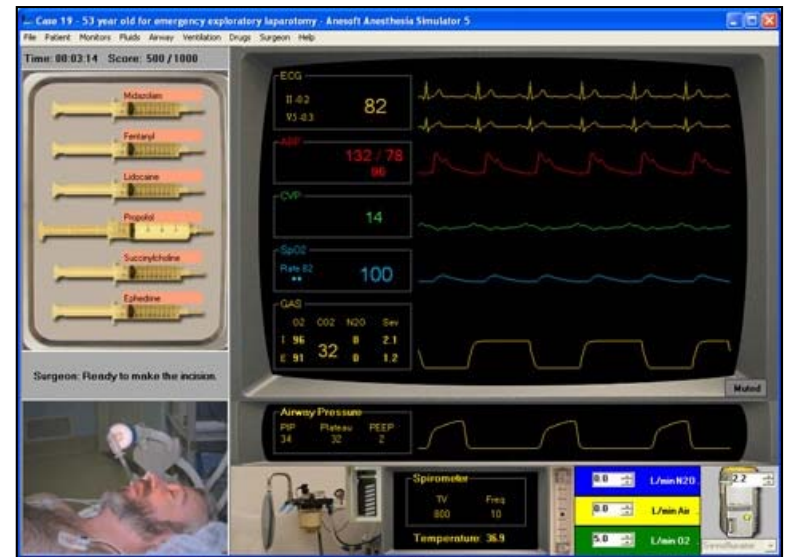
- Systems based
- Horizontal and vertical integration

Human Patient Simulation

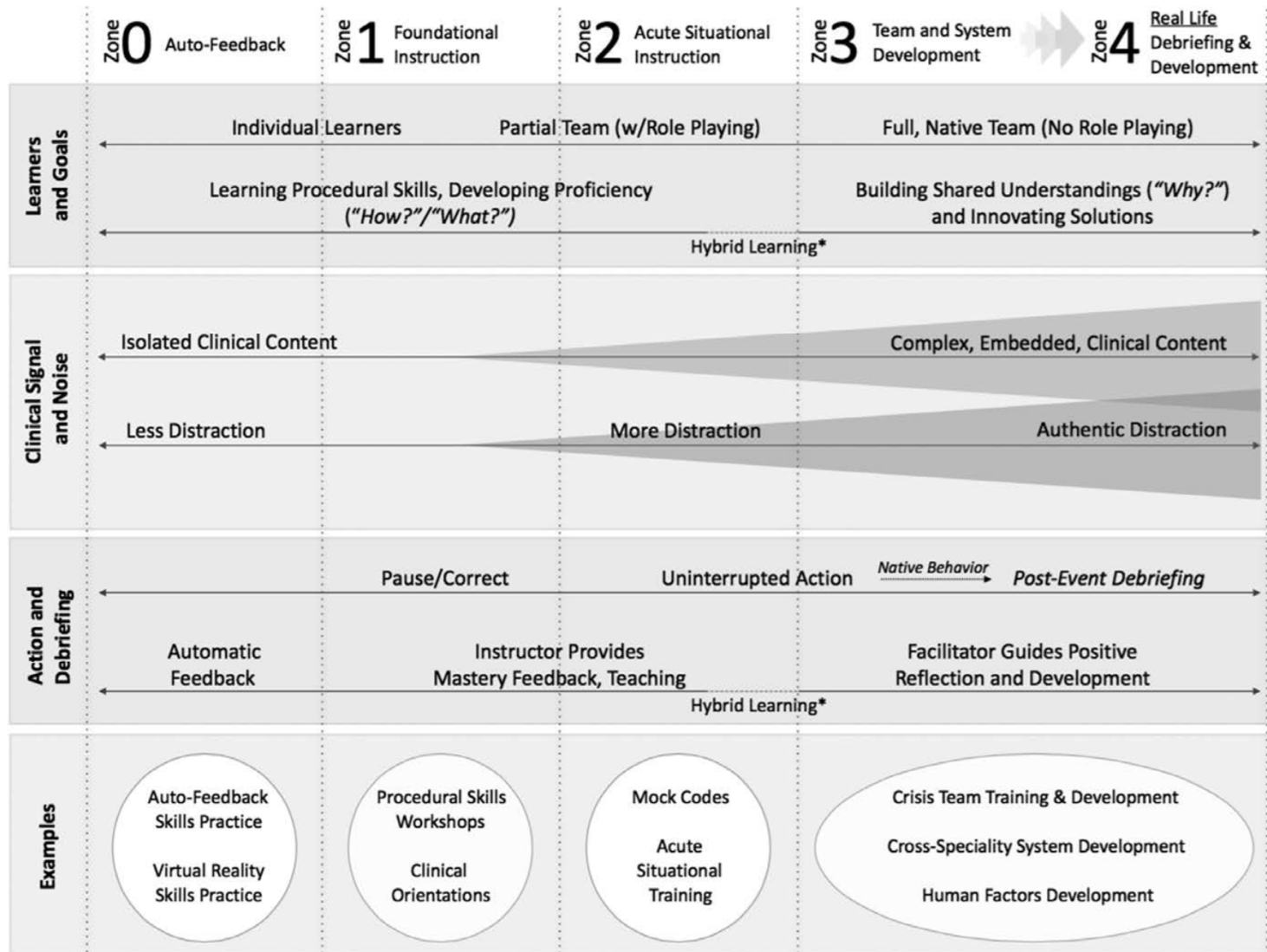


SIMULATION BASED EDUCATION

- Deliberate practice
- Safe learning environment
- Standardization
- Customization of fidelity



SIMULATION ZONES (Roussin, 2017)



*Hybrid learning encompasses elements of multiple zones to meet learning objectives

SIMULATION DESIGN (Rousin 2017)

➤ Participants and learning goals

- Novice, expert (skill based)
- M1....continuing education (time based ?)

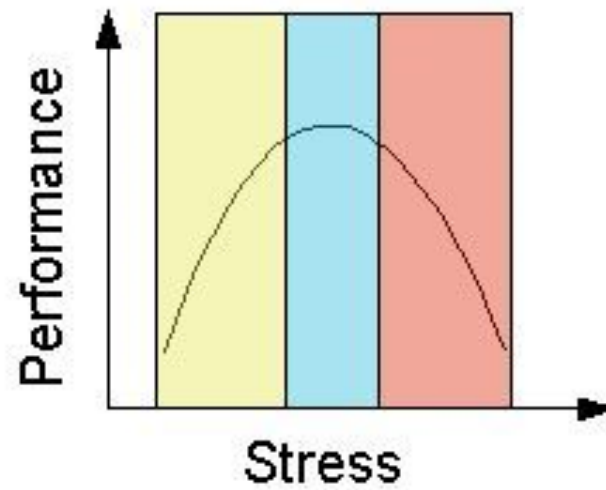
➤ Signal and noise

- Simulation fidelity
- Clinical cues (e.g. code alarm, vitals monitor, patient complexity)

➤ Action and debrief

- Skill transparency (Knowing what is being assessed or practiced)
- Appropriate for learning goals

The Yerkes-Dodson Curve



Unproductive – Not Enough Stress

Optimal Production
(Width Varies Based Upon Stress Tolerance)

Unproductive-Too Much Stress

CURRENT STUDY

- Can clinically relevant simulations be designed to address teamwork for beginning M1 students?
- Does perceived workload discriminate between different simulation scenarios?
- Is perceived workload during clinically relevant scenarios related to cognitive and team learning engagement?

METHODS

Simulation Based Orientation to Clinical medicine (SBOC)

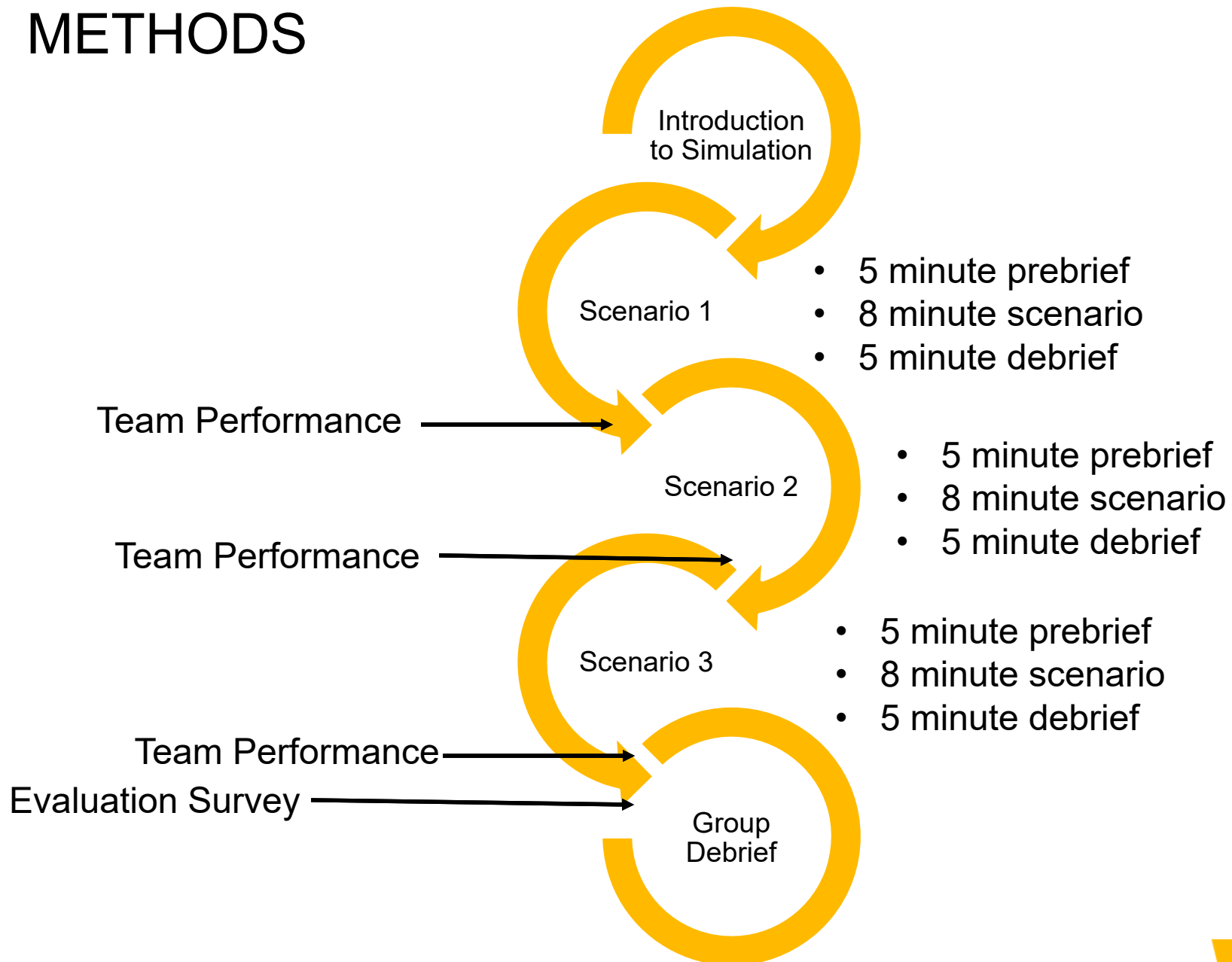
Objectives:

- 1) Orient students to clinical medicine
- 2) Introduce and practice teamwork
- 3) Orient students to simulation based learning and the Center for Human simulation and Patient Safety

SBOC SCENARIOS

Scenario	Tasks
Trauma Triage (EPA 1, 2, 9, 10)	<ul style="list-style-type: none">• assess and triage patients injured on scene of an automobile accident.
Error Hunt (EPA 1,5,9)	<ul style="list-style-type: none">• gather information from patient exam, medical monitors, and family members to identify errors in the patient record while managing patient.• Complete a daily progress note with accurate information.
Differential Diagnoses (EPA 1, 2)	<ul style="list-style-type: none">• Assess a patient at urgent care center• Develop a set of differential diagnoses

METHODS



TEAMWORK MODEL (Smith-Jentsch, 1996)

<p>Leadership/Followership</p> <p><i>Leadership:</i></p> <ul style="list-style-type: none">• providing goals, directions and priorities to your team <p><i>Followership</i></p> <ul style="list-style-type: none">• raise issues/concerns• hold each other accountable• suggest changes to plans/actions	<p>Situation Monitoring</p> <ul style="list-style-type: none">• searching for information,• pushing information to the group• form a shared mental model through big picture summaries
<p>Communication</p> <ul style="list-style-type: none">• how information is delivered• ensures that messages are understood as intended.	<p>Supporting Behavior</p> <ul style="list-style-type: none">• pointing out or correcting errors that you observe• providing help when needed• requesting backup when you need help.

MEASURES

Learner satisfaction

- 6 items (1=strongly disagree; 5=strongly agree)
- *“This activity improved my ability to work on a healthcare team”*

Learner engagement

- Mindful Attention and Awareness Scale (Brown 2003)
- 5 items (1=strongly disagree; 7=strongly agree)
- *“I found myself doing the activity without paying attention”*

Team Problem Solving

- Safety Organizing Scale (Vogues 2007)
- 8 items (1=strongly disagree; 7=strongly agree)
- *“We developed a good “map” of each other’s talents and skills”*

MEASURES

Workload

- NASA-TLX scale
- 6 dimensions of workload (1=very low workload, 7=very high workload)
 - Mental demand
 - Physical demand
 - Temporal demand
 - Performance
 - Effort
 - Frustration

MEASURES

TEAM PERFORMANCE

M1 ORIENTATION SIMULATION (CLASS OF 2021) PERFORMANCE ASSESSMENT
ROOM: 203 (Morning) SCENARIO:

PURPOSE: The purpose of this form is to collect overall performance assessments teams as perceived by each facilitator. These ratings will be used to better understand the level of difficulty of each simulation and identify potential characteristics of high performing M1 teams and will not be used for summative assessment or student grades in any way. At the end of each simulation, complete an overall rating of the team’s performance using the table below for each group listed. An optional notes section is provided if you have any specific comments. We

Directions: Please rate each team’s overall performance during the scenario using the 7 point scale below? (circle your answer)

1	2	3	4	5	6	7
<i>lower level</i> of performance for beginning M1 students			<i>average level</i> of performance for beginning M1 students			<i>higher level</i> of performance for beginning M1 students

understand that teams often display complex behaviors and clinical performance expectations are vague for beginning M1 students, but ask you use your best judgement.

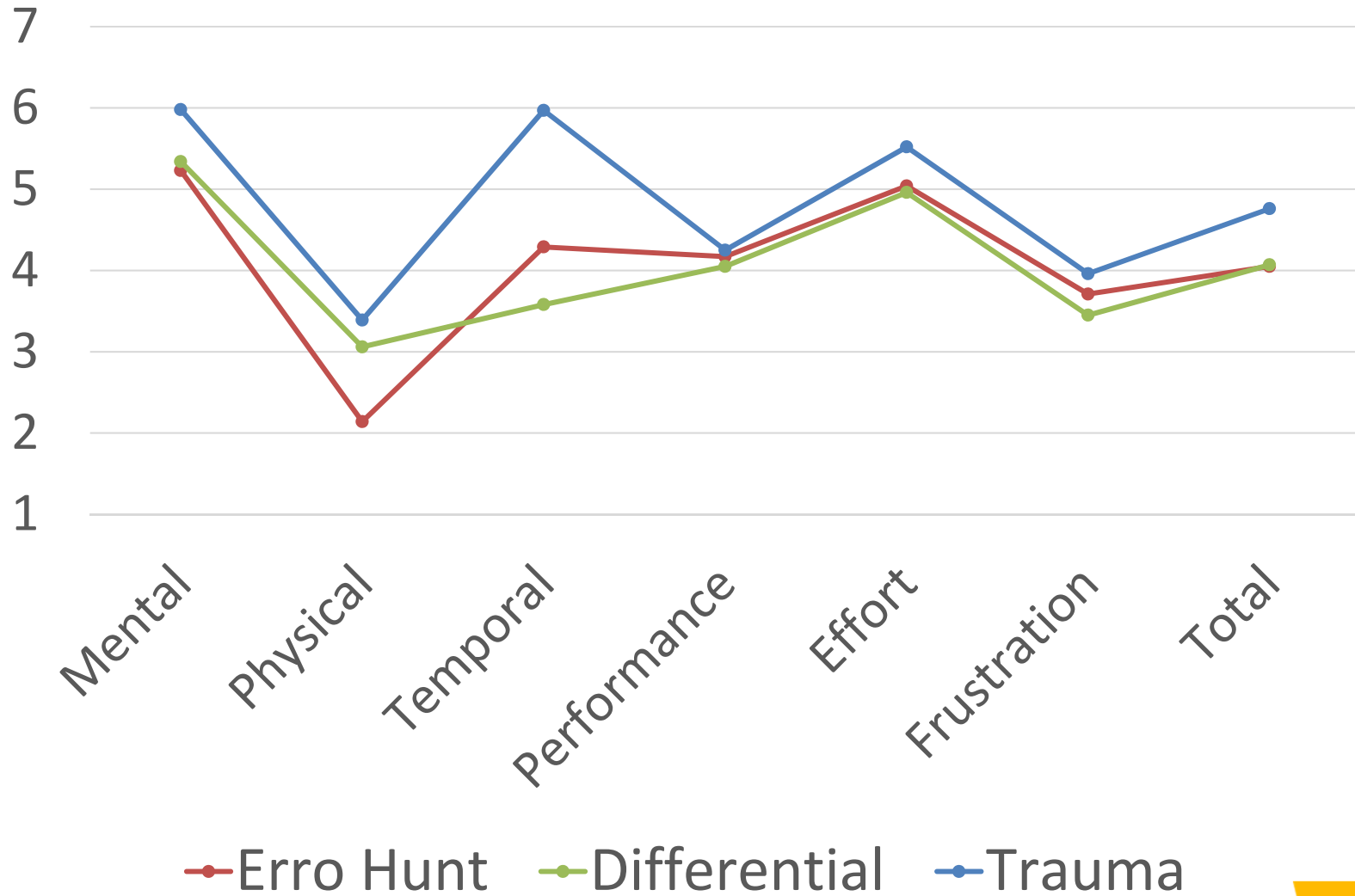
Group #	Time	Overall Performance Rating							Notes
	9:00 am - 9:15 am	1	2	3	4	5	6	7	

STUDENT REACTIONS (n = 189)

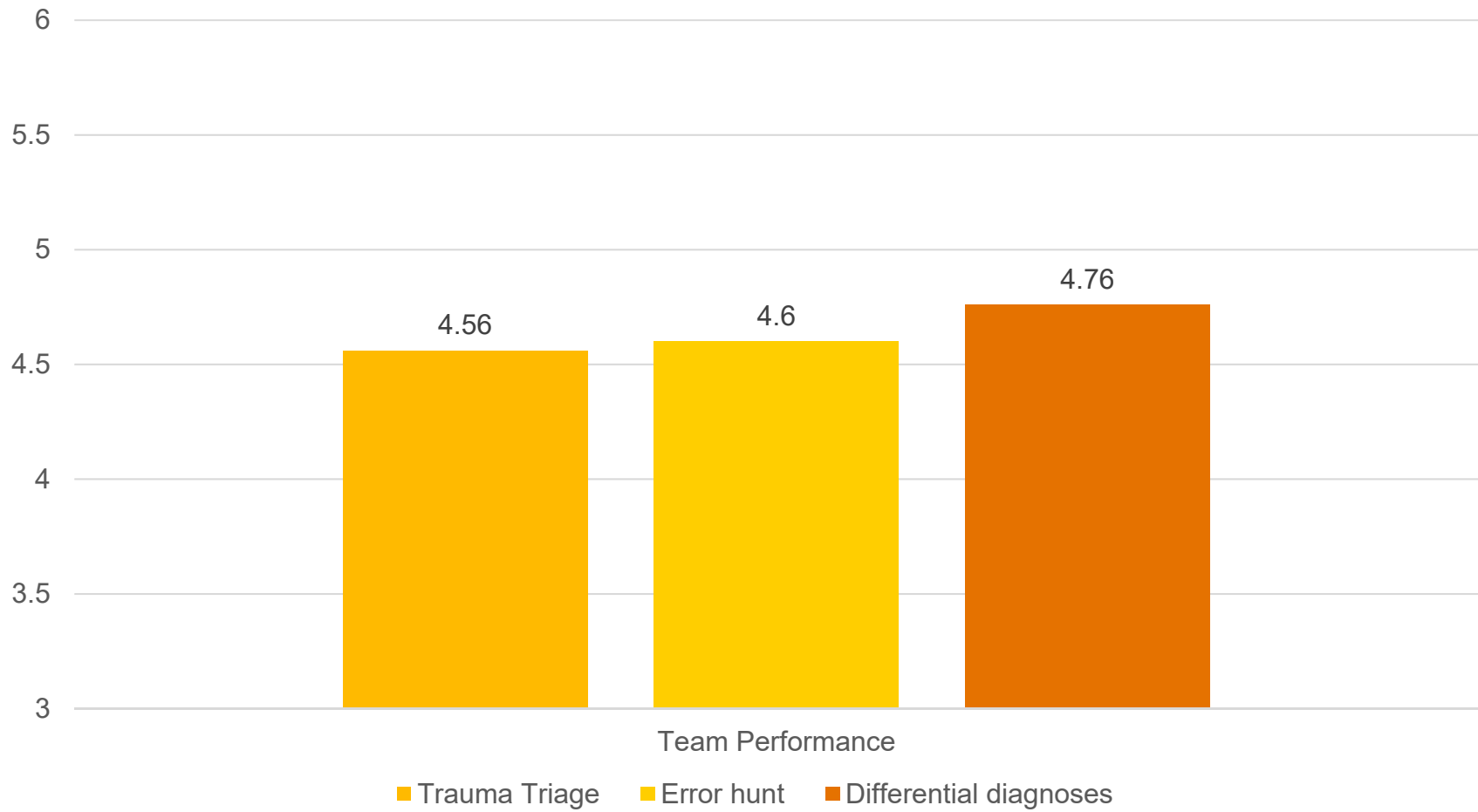
(1=strongly disagree, 5=strongly agree)	%	MEAN/SD
1. The use of simulation enhanced my learning.	96.3%	4.64 (.63)
2. The debrief after each activity effectively reinforced concepts about TEAMWORK	98.9%	4.71 (.53)
3. I have become more knowledgeable in the area of teamwork because of this activity.	97.3%	4.49 (.62)
4. This activity helped me understand how teams can improve patient care.	94.7%	4.57 (.67)
5. This activity improved my ability to work in a healthcare team.	90.5%	4.39 (.73)
6. This activity made me more nervous about beginning medical school.	37.6%	2.94 (1.31)

RESULTS

Scenario Workload Profile



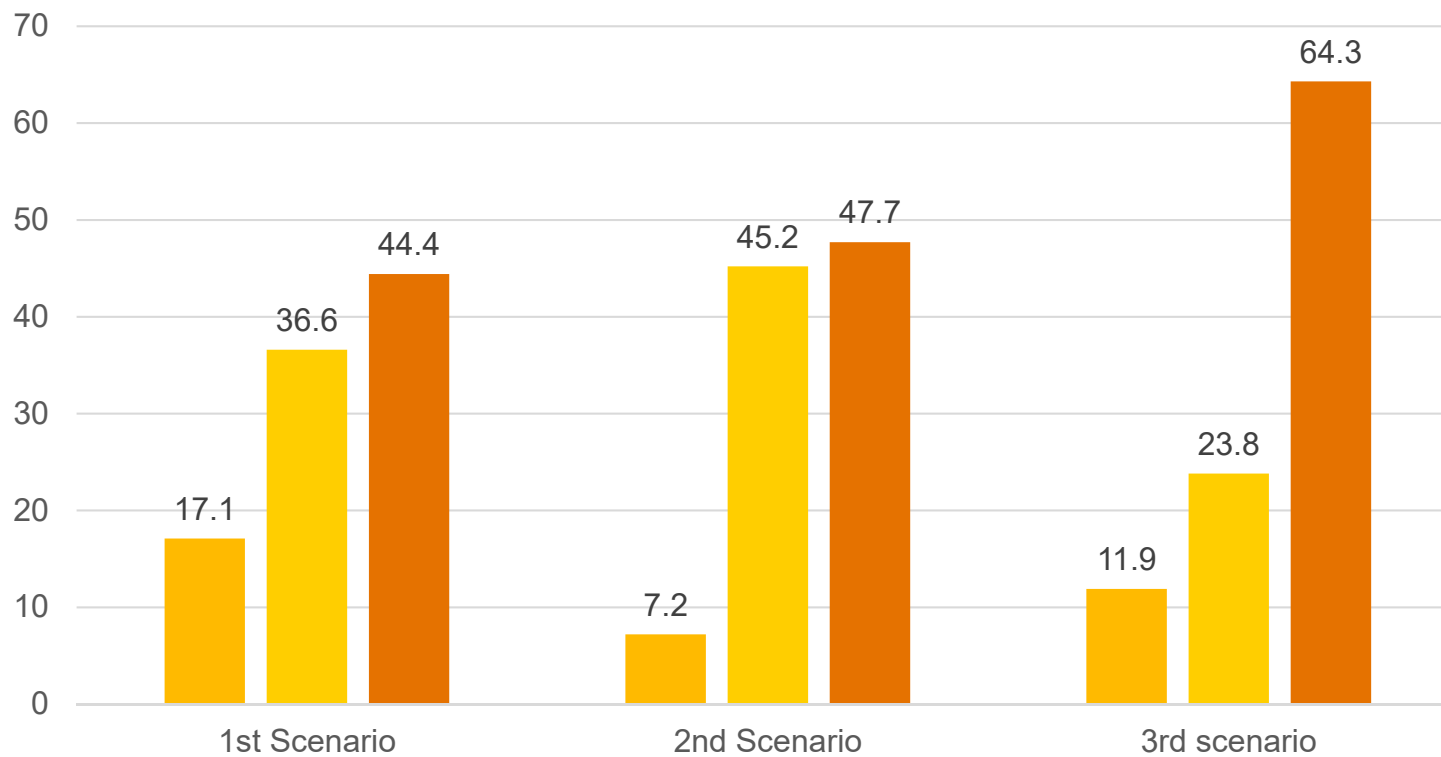
Team Performance by Scenario



TEAM PERFORMANCE

% of teams (n=42) receiving each performance rating

■ lower than average (rating 1-3) ■ average (rating 4) ■ better than average (rating 5-7)



RESULTS

Correlations

- Cognitive task engagement X workload ($R = -.25, p < .01$).
- Team task engagement X workload ($R = -.15, p < .05$)
- Cognitive task engagement X Team task engagement ($R = .31, p < .01$)

Linear Regression

Learner engagement + teamwork = workload

	Beta	R squared
		.07**
Cognitive task engagement	-0.23**	
Team task engagement	-.08	
** = $p < .01$		

CONCLUSIONS

- Clinically relevant simulations focused on teamwork were highly rated by students beginning medical school.
- Workload helped distinguish task requirements of different scenarios.
- Higher cognitive engagement during scenarios was related to lower perceived workload, especially frustration.
- Learners recognized teamwork and demonstrated they were able to practice teamwork.

Designing optimal learning zones

