



Using Tracking & Timing as part of a Multi-method Study



Summative Evaluation
Conducted for
Museum of Science, Boston
Carey Tisdal
Tisdal Consulting

Overview of Topics



- Using data sets that including tracking & timing data and an exit survey with the same respondents
- Comparing traveling exhibitions at multiple sites
- Using different T & T measures to answer questions
 - Exhibition wide measures
 - %DV
 - & SWI
 - Exhibit level measures
 - Attraction
 - Holding
- Using in-depth interviews to explore issues more deeply



Attraction & Holding

Attraction and Holding -- Exhibits

- Level of attraction -- percentage of respondents who stopped at an exhibit
- Holding power -- how long respondents stop at an exhibit element

(Bitgood and Shettel, 1994)

The 51% Solution -- Exhibition

- Percentage of Diligent Visitors (%DV) –percentage who stopped at more than half of the exhibit elements
- *Sweep Rate Index (SRI)* --total number of square feet in the exhibition divided by the mean total amount of time in minutes

(Serrell, 1998)

The Exhibition



- Developed by the Museum of Science, Boston and Lucas Film Ltd.
- Funded by National Science Foundation

Traveling
Exhibition

Engineering /
Technology Design

- Create and test technological solutions to problems.
- Recognize the role of imagination and creativity in technology design.
- Assess the implications of futuristic technologies.
- Recognize topics of current research and follow their ongoing development. (adults)
- See role as future scientists, engineers, workers, consumers and citizens (children)

- Using popular culture theme to make connections to science and technology
- Themed Areas
 - Transportation
 - Robotics
- Artifacts, physical interactives, virtual interactives, videos

Strategies

Types of Exhibits



Artifact
Cases



Demonstration
& Exploration
(Videos &
Timed
Experiences)



Simple
Design



Engineering
Design Labs
(EDLs)



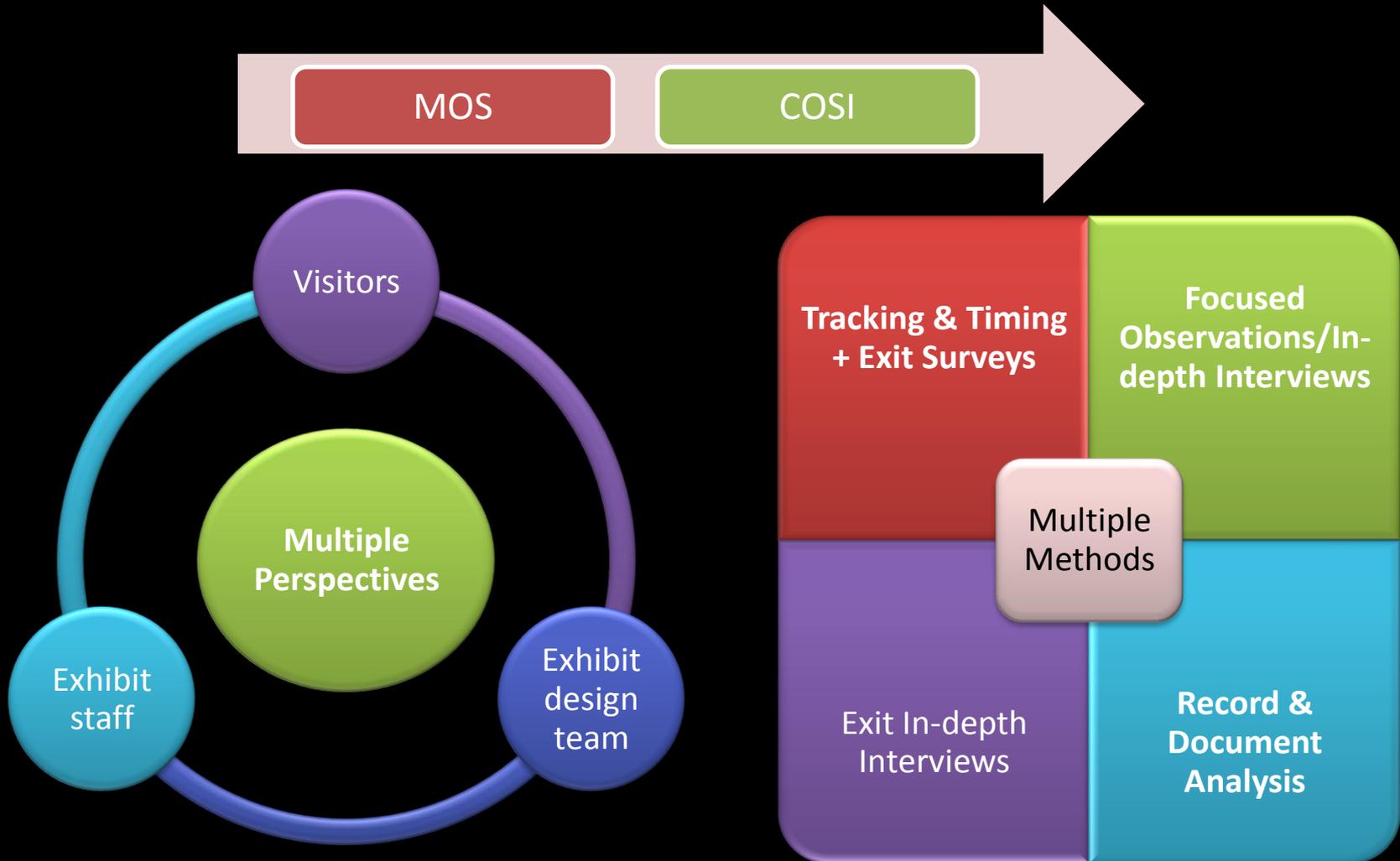
Selected Questions

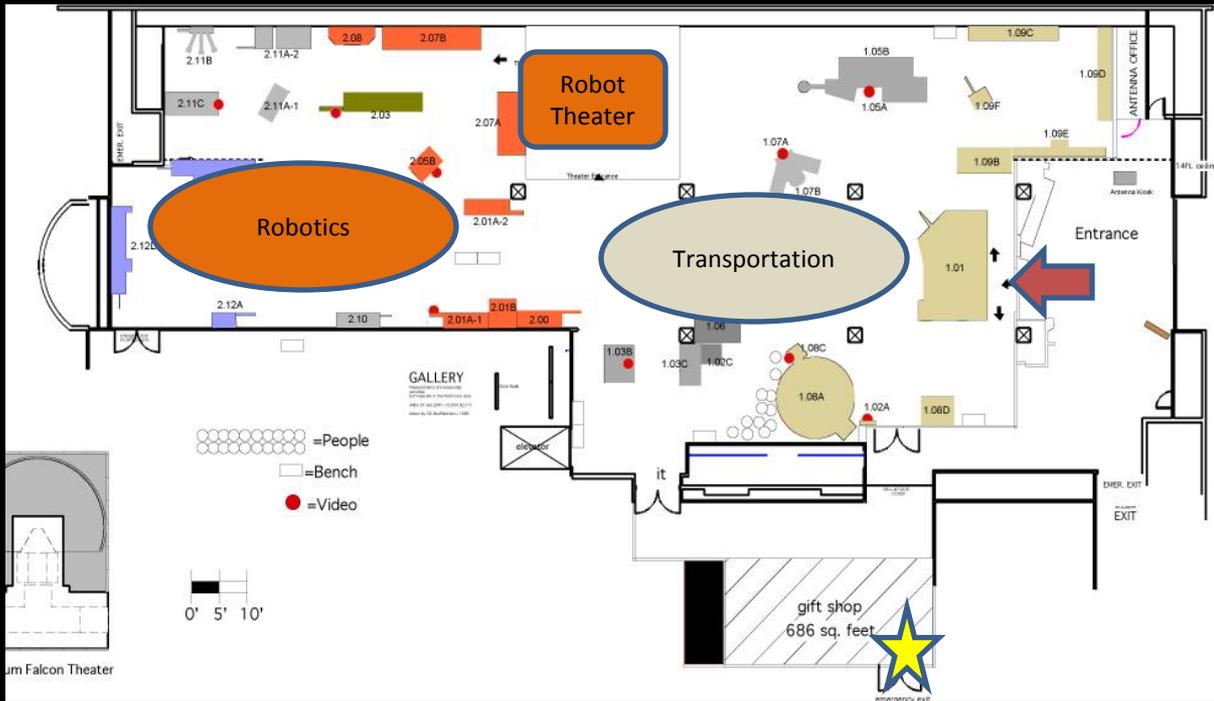
Did the exhibition perform reliably at different sites?

Did waiting time (lines) affect satisfaction?

How did visitors use the Engineering Design Labs?

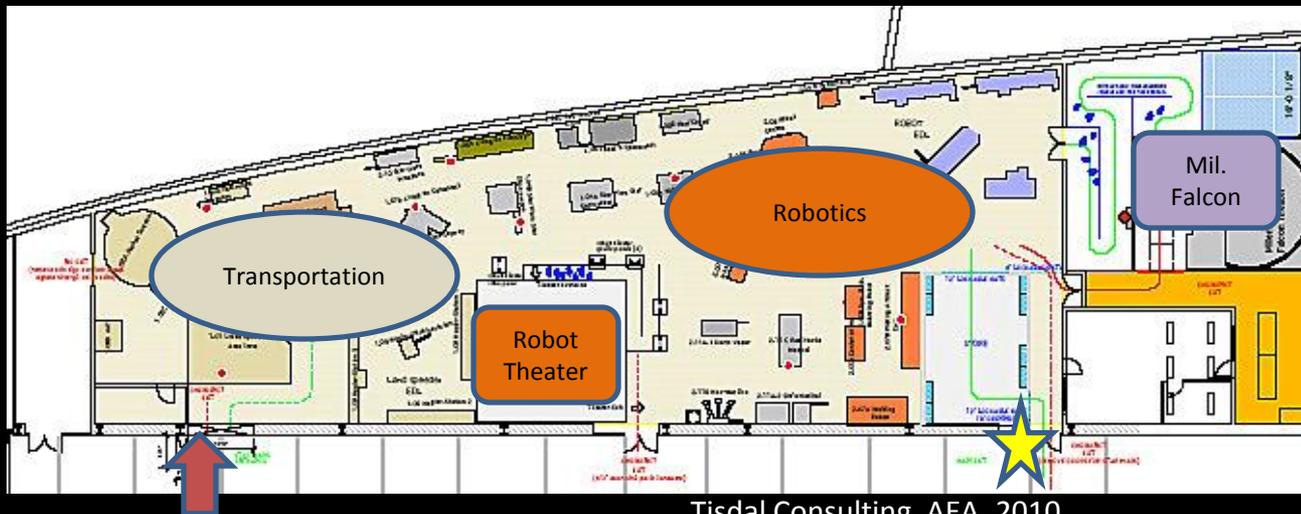
Naturalistic Methodology





MOS

- 37 exhibit elements
- 12,000 square feet
- 2 timed experiences
- Remedial changes not completed
- April data collection



COSI

- 38 exhibit elements
- 11,500 square feet
- 3 timed experiences
- Costumed characters
- Remedial changes completed
- July data collection

Data Source Table

Method	Site	Data Sets	Unit of Analysis	Unique Respondents
Tracking & Timing	MOS	70	Individual	70
	COSI	55	Individual	55
Exit Surveys	MOS	44	Individual	0
	COSI	25	Individual	0
In-depth Interviews	MOS	16	Group	48
	COSI	17	Group	60

Did the exhibition perform reliably at different sites?

Site

Size

Exhibits

Mean Total Time

%DVI

SRI

Satisfaction

MOS

12,000 sq. feet

37

57.6 minutes

51%

208

3.6 (*SD* = .5)

COSI

11,500 sq. feet

38

62.3 minutes

50%

168

3.4 (*SD* = .9)

Did waiting time (lines) affect satisfaction?

Lines for Timed Experiences



Wait time and satisfaction

- Mean wait time ($p < .05$)
 - MOS 6.9 m ($SD = 7.3$)
 - COSI 18.9 m ($SD = 21.7$)
- Satisfaction (nsd)
 - MOS -3.6 ($SD = .5$)
 - COSI -3.4 ($SD = .9$)
- Correlation .23 (nsd)

Did waiting time (lines) affect satisfaction?

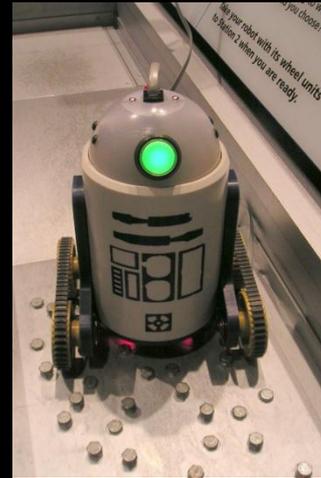


Wait time at timed experiences

- Robot Theater
 - MOS -- 7.9 m ($N = X$, $SD = .9$ m)
 - COSI – 5.2 m ($N = Y$, $SD = 2.7$ m)
- Millennium Falcon at COSI
 - Wait Time: 25.3 m ($SD = 20.0$ m)
 - Satisfaction: ($p < .05$)
 - Viewed: 3.9 ($N = 10$, $SD = .3$)
 - Did not: 3.1 ($N = 15$, $SD = 1.0$)



Engineering Design Labs



- Design Challenge
- Multiple Stations
- Learning outcomes
 - Process: create, test, refine
 - Real world analogies

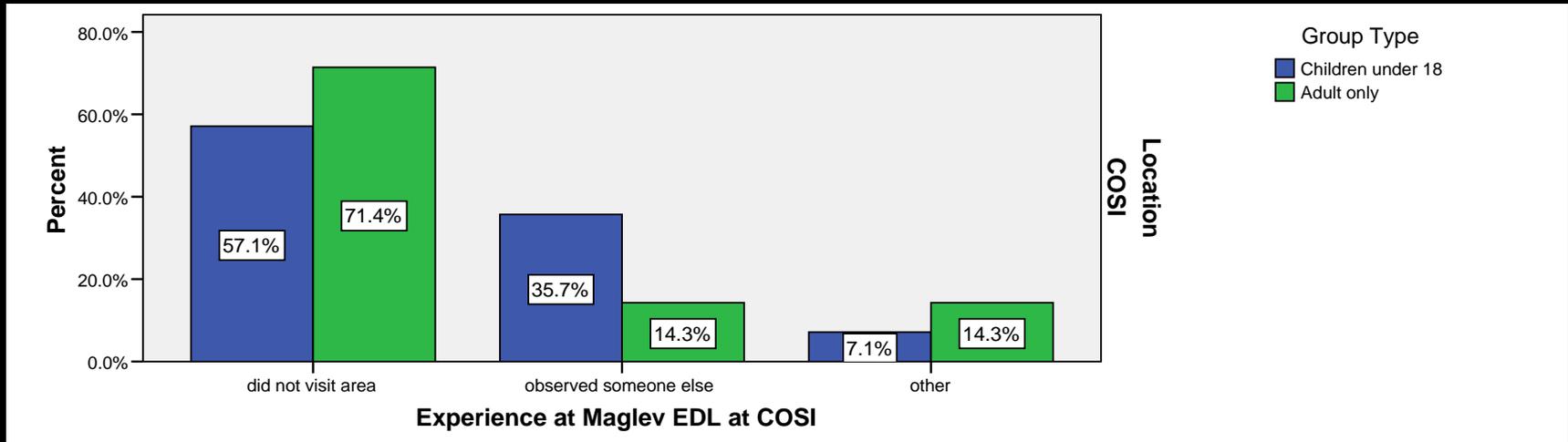
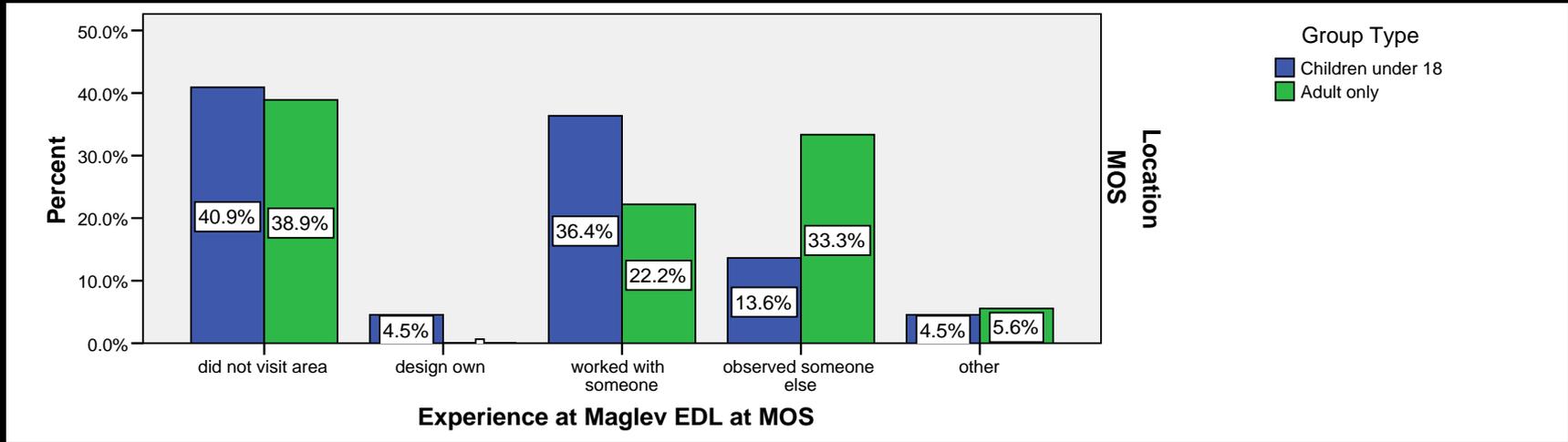


How did visitors engage with Engineering Design Labs? Tracking Data (N = 125)

- *Maglev EDL*
 - ranked 4th in level of attraction 70.0% of respondents stopping
 - Holding -- 146 seconds, ranking 3rd overall.
- *Robot EDL*
 - Ranked 9th in level of attraction 65.0% of respondents stopping
 - Median holding time of 133 seconds.



How did visitors engage with Engineering Design Labs? Exit Survey Responses – MOS (N = 44) and COSI (N = 25)



How did visitors engage with Engineering Design Labs? In-depth Interview Data

Question: Did you the exhibit where you built your own levitated train?

Female: I felt like all the activities were being taken over. Like there was never any availability for like anybody else to like have a turn. . . . Yeah, because families would come and there would be eight people in their family, and all eight would have to try it. And you know, you could never get in. (20 year old Ohio State early childhood major)

Male: No, I didn't do it here. So that was kind of the reason I didn't do it is because you know, I'd--and plus again, you know, the kids, I wanted to let the kids do it. And it seemed like there was lines for that. So I didn't want to jump in the line when the kids, you know, and not give the kids a chance to try it out. (21 year old Ohio State physics major)

Affect on Learning – Exit Survey

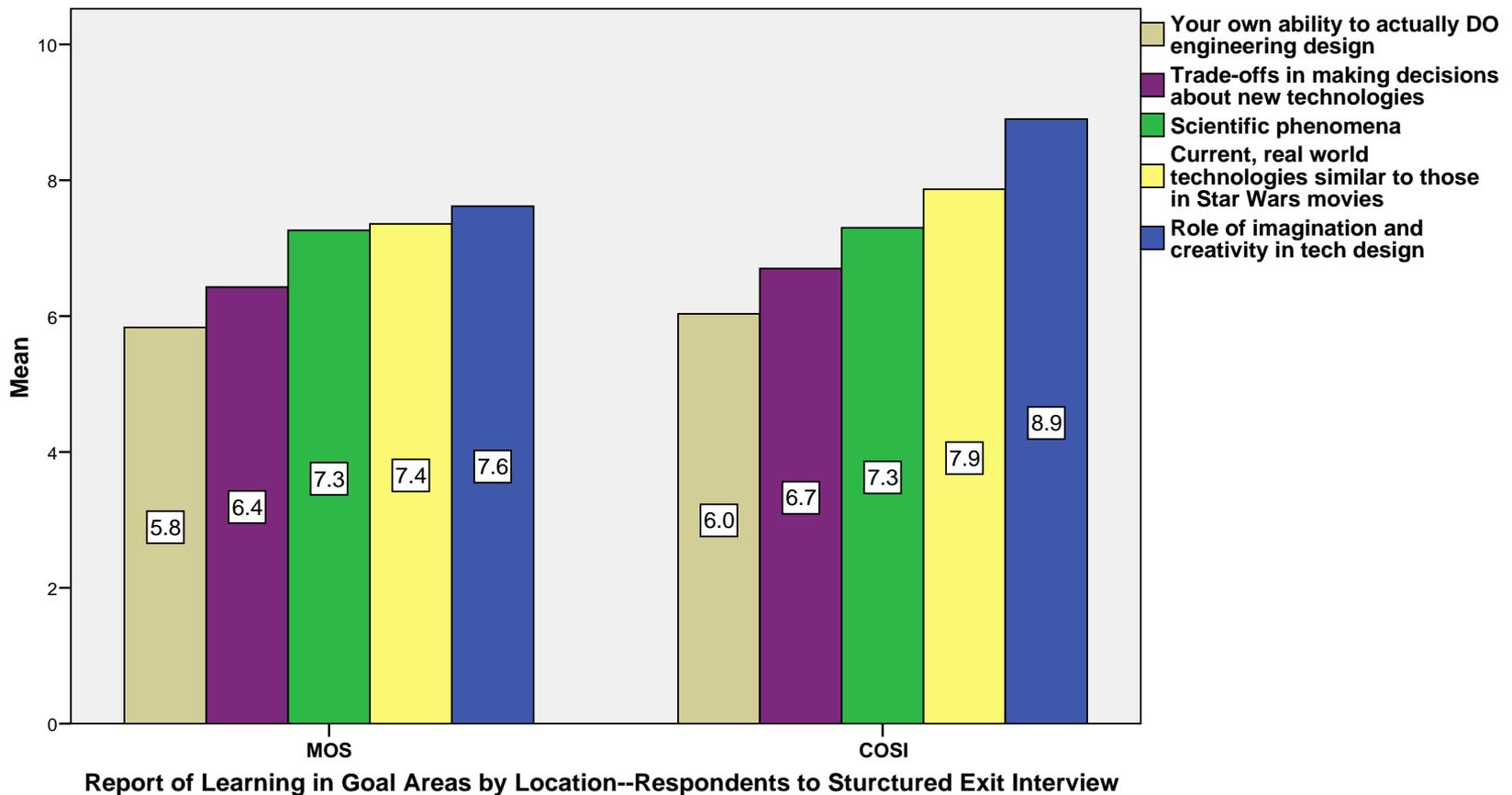


Figure 13. Report of Learning in Goal Areas by Location—Respondents to Structured Exit Survey (N = 77) 1 = low to 10 = high

Summary

- Tracking & timing data can be productively used in multi – method studies to extend understanding of engagement and outcomes.
- Data sets with both tracking & timing and exit survey data allow the connection of observed behavior to perceptions and outcomes.
- Clearly reporting data from multi-methods can be challenging.

References

- Bitgood, S. & Shettel, H. (1994). The classification of exhibition evaluation: a rationale for remedial evaluation. In M. Borun, R. Korn, & R. Adams (Eds.) Introduction to museum evaluation (pp. 69-74). Washington, D.C.: American Association of Museums Technological Information Service.
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