

# MAPPING STUDENTS' SELF-REPORTED COGNITIVE LOAD, SITUATIONAL ENGAGEMENT & ATTENTIONAL-COGNITIVE STATES IN AN ONLINE MULTIMEDIA LEARNING MODULE



N. Sanjay Rebello & Jeremy Munsell, Dept. of Physics & Astronomy, Purdue University  
Prasanth Chandran & Lester C. Loschky, Dept. of Psychological Sciences, Kansas State University  
Yifeng Huang & Minh Hoai, Dept. of Computer Science, Stony Brook University  
Sidney D'Mello, Depts. of Computer Science, Psychology & Neuroscience, Univ. of Colorado Boulder



## MOTIVATION

- Online learning is becoming increasingly ubiquitous.
- A key issue is gauging and maintaining learners' attention.
- Learners' attentional states are not always aligned with external gaze but can instead be oriented internally to either on- or off-task thoughts.

## RESEARCH QUESTIONS

- What is the self-reported proportion of time that online learners spend in each of the four quadrants when completing an online instructional module?
- How does the time in each quadrant correlate with the learning gains on the instructional module?
- How does the self-reported time in each quadrant correlate with cognitive load types, situational engagement and learning?

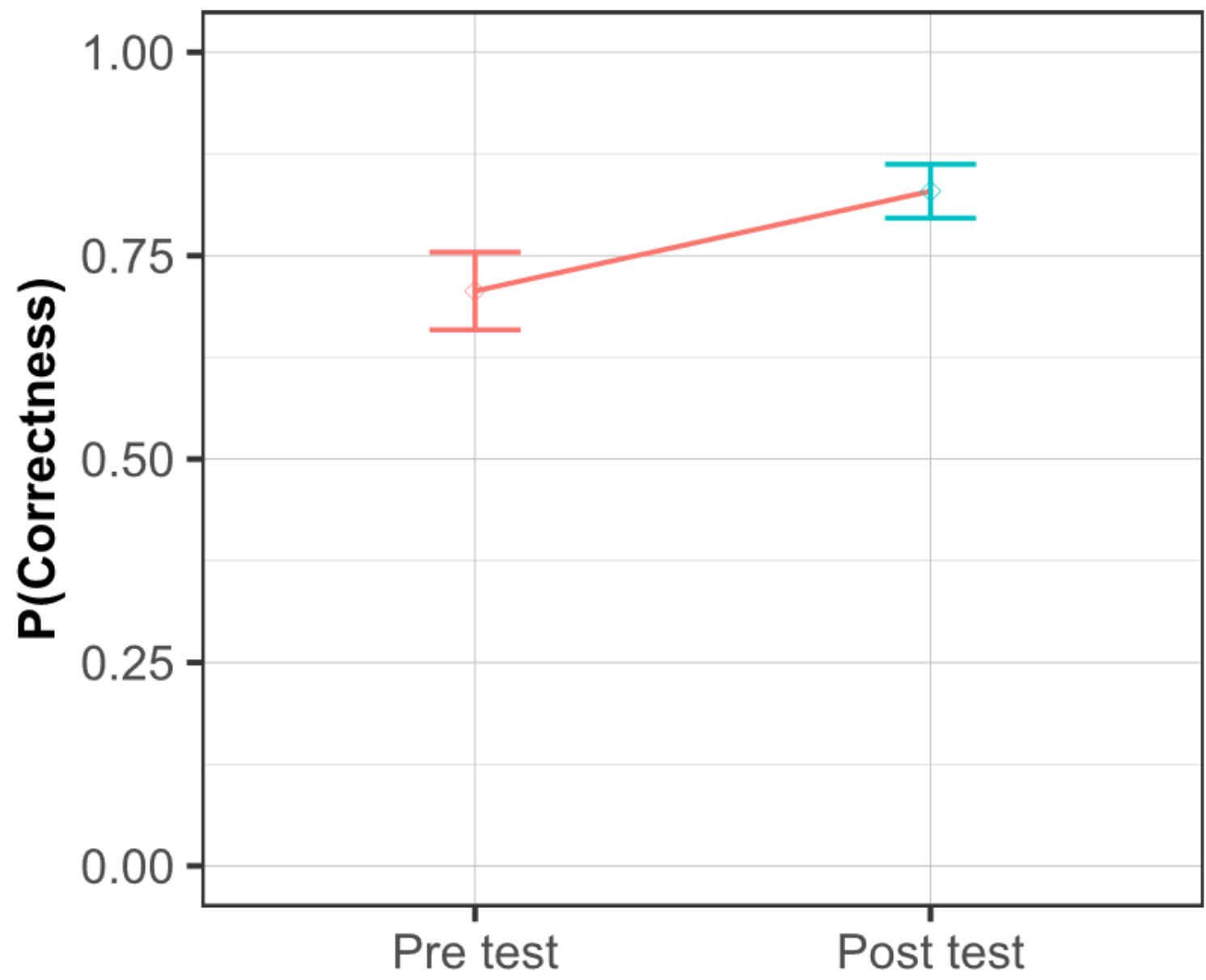
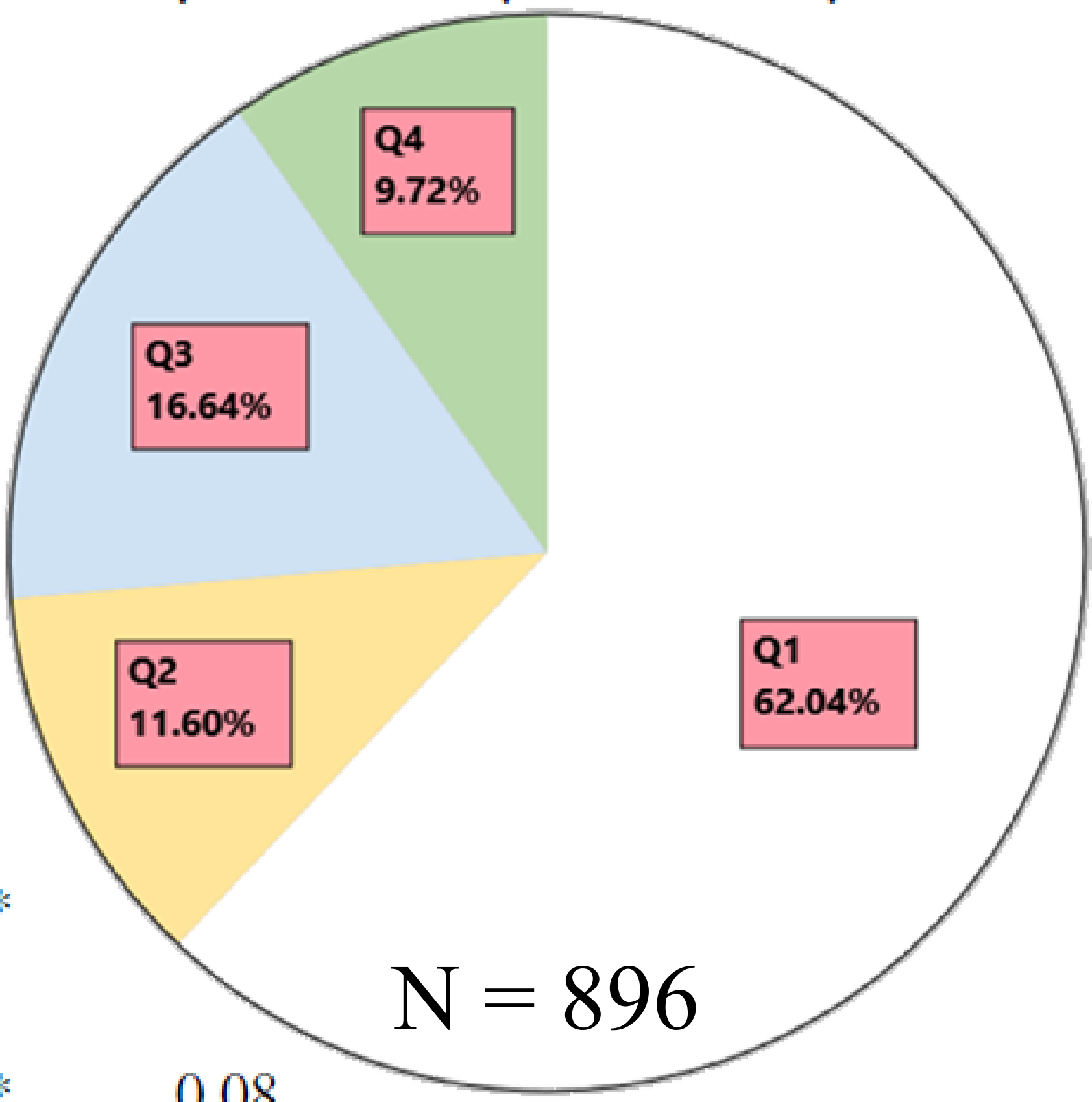
## THEORETICAL FRAMEWORK

	Looking at learning materials (computer)	Looking elsewhere
Thinking about learning content (On-task)	<b>Quadrant 1 (Q1):</b> Overt sustained attention (On-task) <ul style="list-style-type: none"><li>Focused attention</li><li>Alternating attention</li><li>Divided attention</li></ul>	<b>Quadrant 2 (Q2):</b> Covert sustained attention (On-task) <ul style="list-style-type: none"><li>Note-taking</li><li>Using calculator</li><li>Looking away while thinking hard, etc.</li></ul>
NOT thinking about learning content (Off-task)	<b>Quadrant 3 (Q3):</b> Covert <i>in</i> attention (mind wandering)(Off-task) <ul style="list-style-type: none"><li>Tune outs</li><li>Zone outs</li></ul>	<b>Quadrant 4 (Q4):</b> Overt <i>in</i> attention (Off-task) <ul style="list-style-type: none"><li>Texting</li><li>Fidgeting</li><li>Staring off into space, etc.</li></ul>

The Spearman's coefficient between our various measures: TQ1 (proportion of time ON materials and ON task; TQ2 (proportion of time OFF materials and ON task; TQ3 (proportion of time ON materials and OFF task; TQ4 (proportion of time OFF materials and OFF task; ENG (Situational Engagement); ICL (Intrinsic Cognitive Load); GCL (Germane Cognitive Load); ECL (Extraneous Cognitive Load); NLG (Normalized Learning Gain)

\* represents  $p < 0.05$ , \*\* represents  $p < 0.001$

	TQ1	TQ2	TQ3	TQ4	ENG	ICL	GCL	ECL	NLG
TQ1	.	.	.	.	.	.	.	.	.
TQ2	-0.57**	.	.	.	.	.	.	.	.
TQ3	-0.68**	0.11**	.	.	.	.	.	.	.
TQ4	-0.78**	0.31**	0.42**	.	.	.	.	.	.
ENG	0.24**	-0.06	-0.18**	-0.23**	.	.	.	.	.
ICL	0.00	0.09*	-0.04	-0.01	0.19**	.	.	.	.
GCL	0.35**	-0.12**	-0.34**	-0.35**	0.37**	0.08	.	.	.
ECL	-0.17**	0.07*	0.16**	0.18**	-0.13**	0.37**	-0.25**	.	.
NLG	0.04	-0.05	-0.08*	-0.05	-0.03	-0.11**	0.12**	-0.06	.



## RESULTS

- Significant *positive* correlations between time spent focusing on materials (**Q1**) and both engagement and germane cognitive load.
- Negative* correlation between mind wandering (**Q3**) and learning.
- Unexpected results: no statistically significant dependence of learning on time in the other three quadrants (**Q1**, **Q2**, and **Q4**), or on engagement.

## ACKNOWLEDGEMENTS

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