

A Gaze-Based Attention-Aware Technology to Address Mind Wandering during Learning in Classrooms

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Mind Wandering

- The unintentional shift of attention away from the current task towards internal task-unrelated thoughts [1]
- Happens frequently in learning technology [2]
- Negative relationship to performance

Design Activities

- Developed a series of Design Constraints to protect learning experience
- Conducted Interviews With 25 students
- Focus group with 3 High School Teachers

Implementation

Repetition

Attention Redirection Phrase

Repeat Phrase

Question

Attention Redirection Phrase

Content Question

Diffusion involves particles moving from places in the cell where there are a lot of particles, to places where there are fewer of those particles. That's pretty neat!

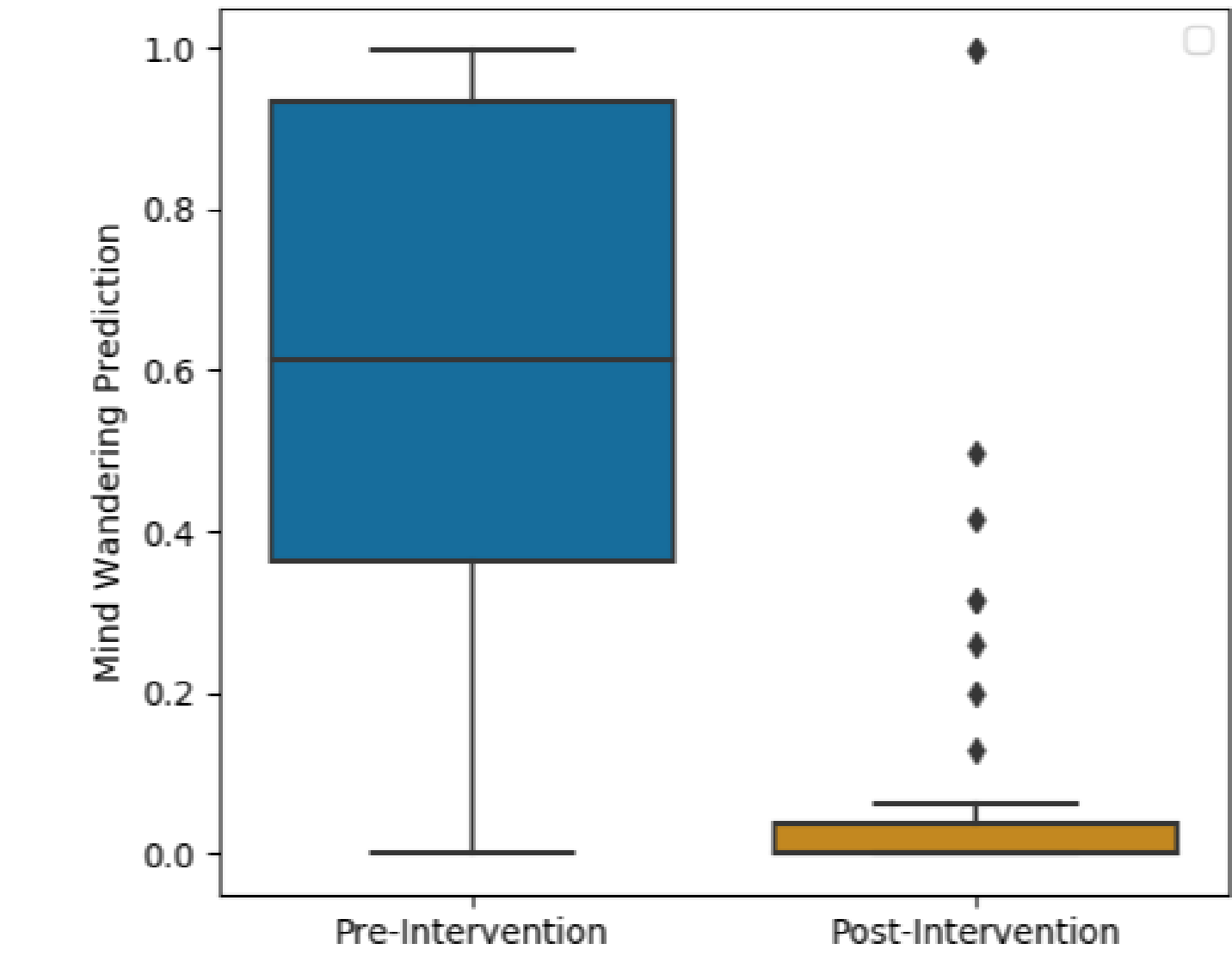
[Let's go back over that; this will be on the quiz later. Diffusion involves particles moving from places in the cell where there are a lot of particles, to places where there are fewer of those particles.]

In fact, the particles spread out naturally and randomly, just by floating around and bouncing off of other molecules!

[Let's work on this together, I have a question for you! Does Facilitated Diffusion require energy?]

Results

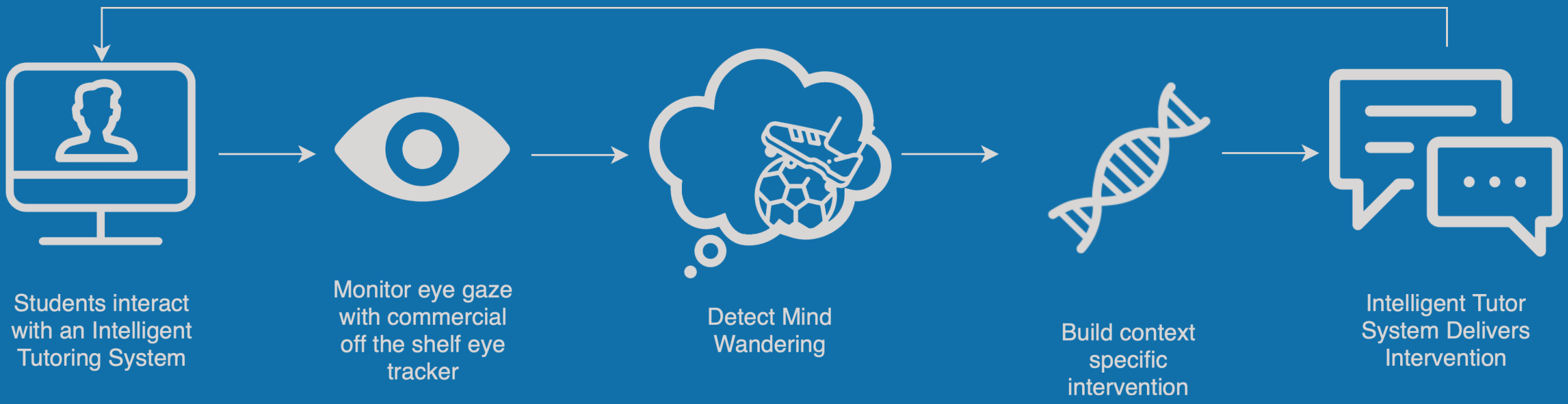
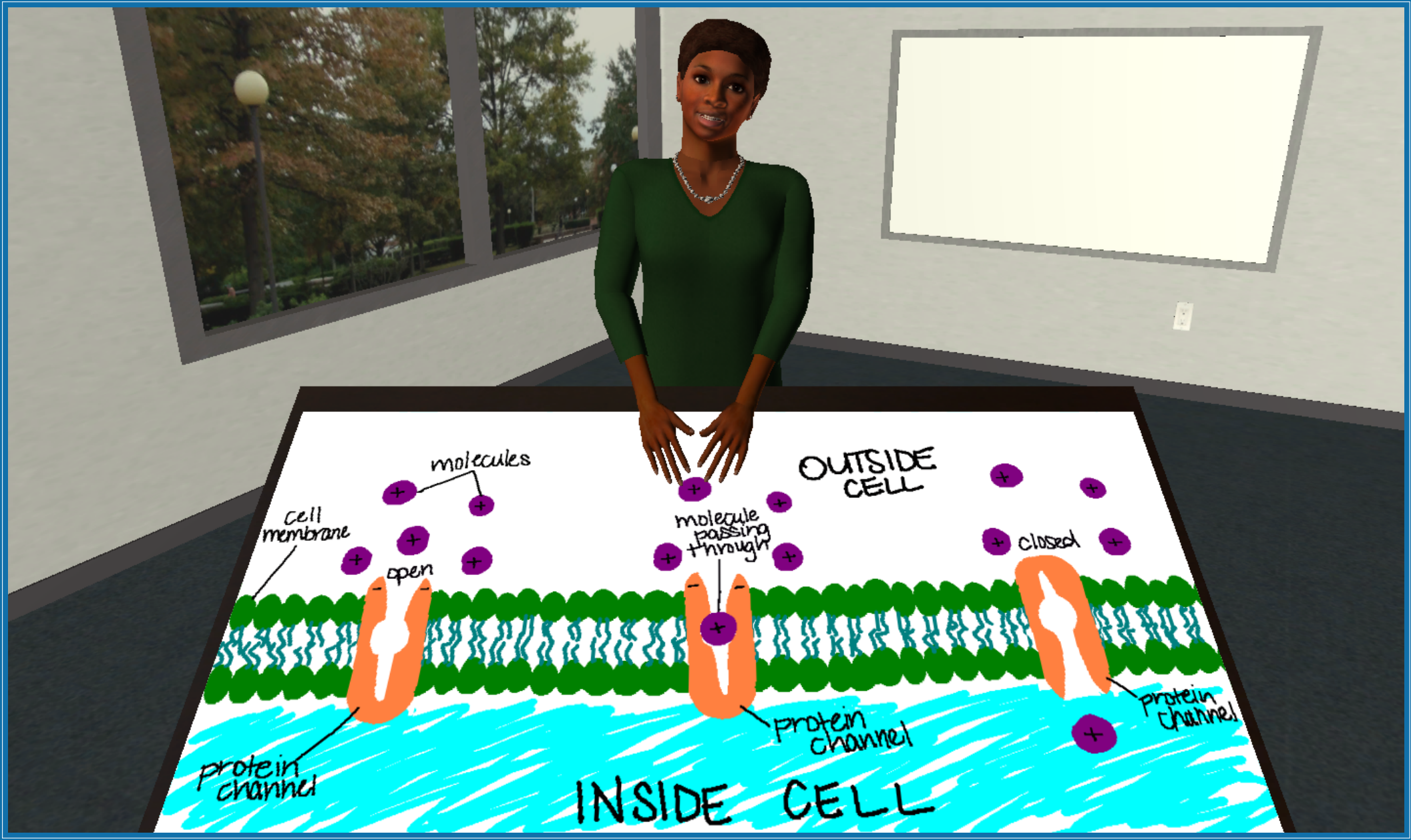
MW predictions before and after interventions



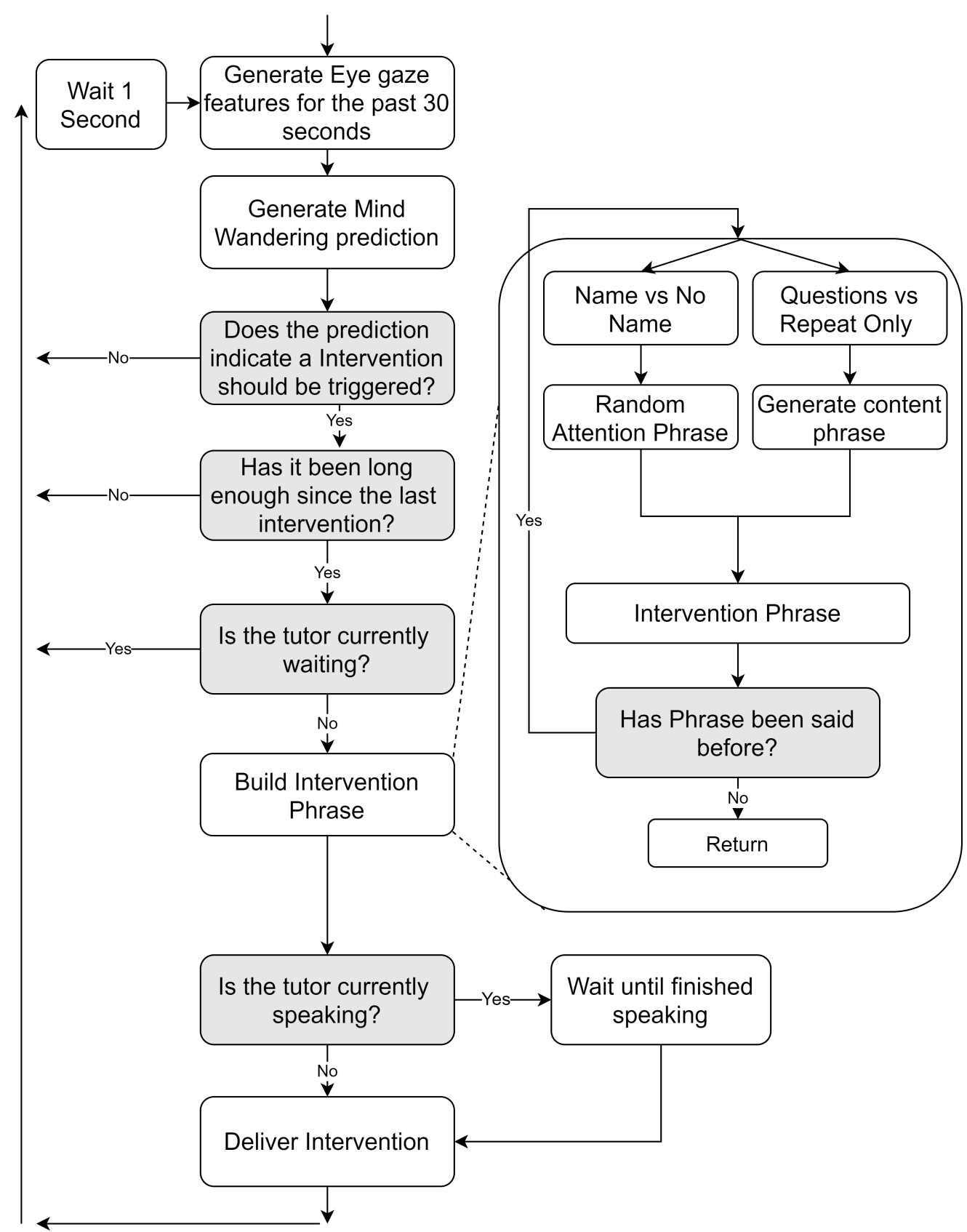
Conclusion

Our findings show that interventions can be successfully implemented in this environment and reduce MW, thereby presenting exciting new opportunities to assist student learning both in and out of the classroom.

We designed and implemented interventions to combat mind wandering in an intelligent tutoring system used in classrooms.



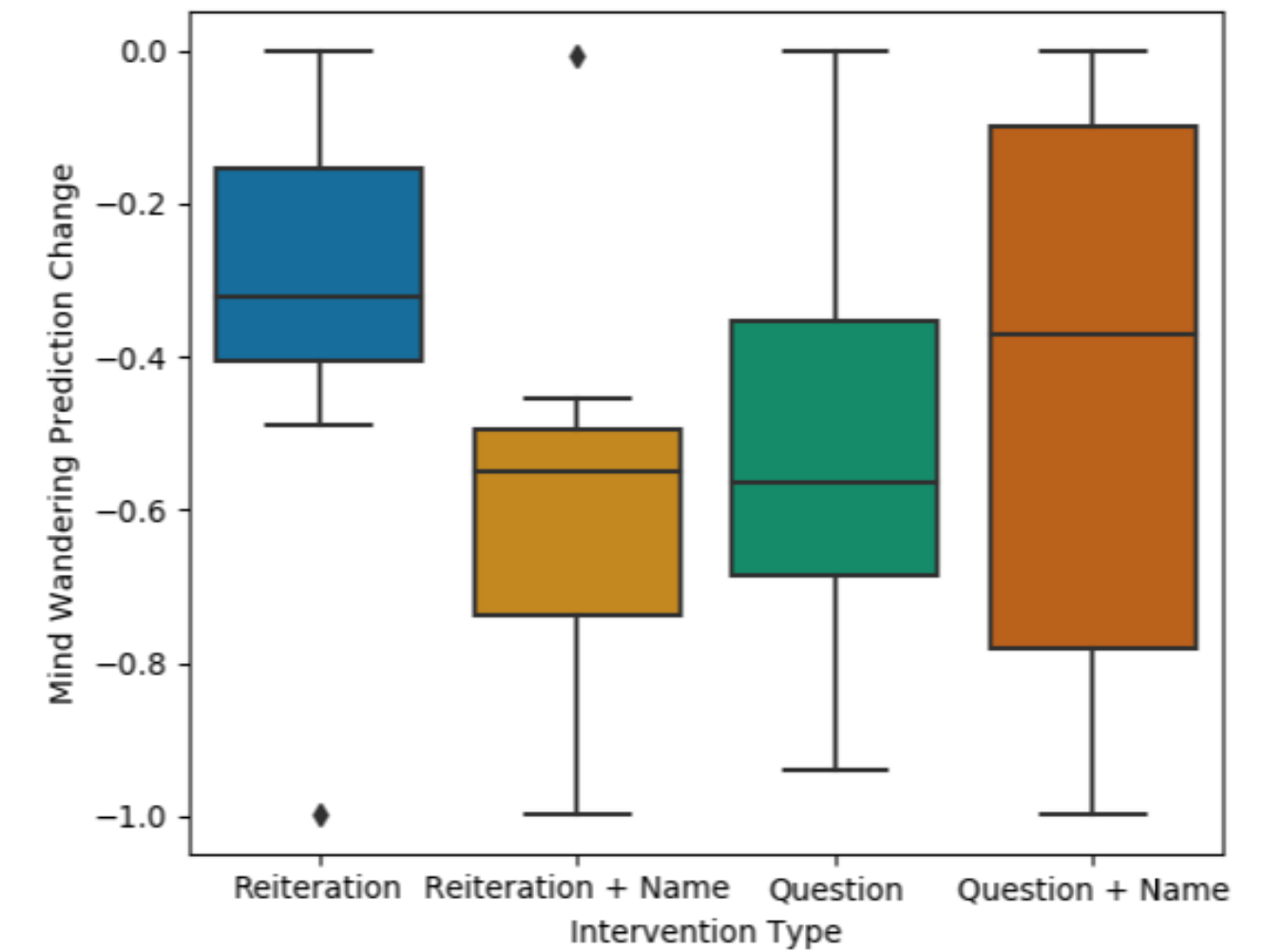
Intervention Diagram:



Spearman Correlation with number of interventions, **bold**: significant ($p < 0.05$) correlation

Variable	Spearman Correlation	Partial Spearman Correlation
Pre Test	-0.341	
Post Test	-0.554	-0.469
Biology Interest	0.092	-0.188
Task Interest	-0.135	-0.116
Perceived Competence	-0.149	-0.139
Pressure/Anxiety	-0.116	-0.052
MW	0.158	0.164

* indicates significant correlation in every fold, $p < 0.001$



References

[1] J. Smallwood and J. W. Schooler, "The restless mind," *Psychological bulletin*, vol. 132, no. 6, pp. 946–958, nov 2006.

[2] S. K. D'Mello, "What do we Think About When we Learn?" in *Deep Comprehension*, K. K. Mills, D. Long, J. Magliano, and K. Wiener, Eds. Routledge, pp. 52–67.