

Analyzing Individual and Cooperative Electronic Response Systems in Astronomy

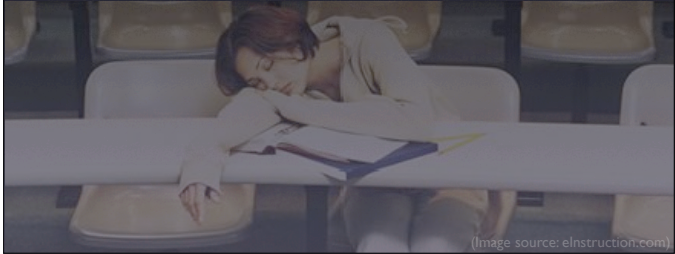
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Background/Goals

“Clickers” used to engage and challenge students
(Classroom Performance System, elnstruction.com)

What motivates “collaborative” clicker use?
What motivates “self-tester” clicker use?



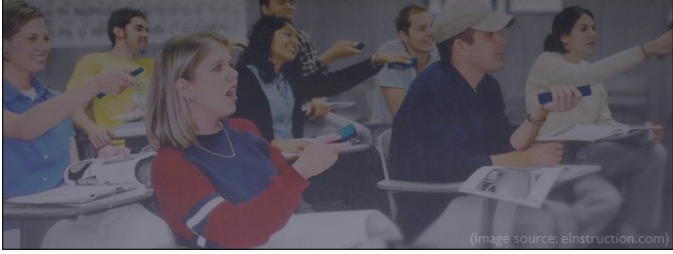
(Image source: elnstruction.com)

Clicker Reward Structures

Introduction questions versus review questions

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- Introduce new material
- Confront common misconceptions
- Participation credit awarded, regardless of response



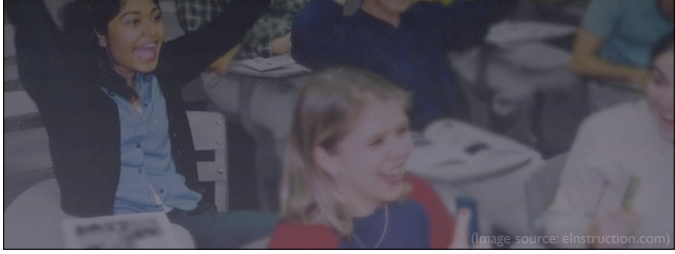
(Image source: elnstruction.com)

Clicker Reward Structures

Introduction questions versus review questions

↓

- Test comprehensive understanding
- Are based on sample exam questions
- Participation credit *doubled* if success rate $\geq 80\%$



(Image source: elnstruction.com)

Response/Success Rates

(Fall semester 2005, N = 36)

111 Intro. questions (participation only)

Clickthroughs $80\% \pm 13\%$

→ Success $45\% \pm 7\%$

100 Review questions (participation + success bonus)

Clickthroughs $80\% \pm 14\%$

→ Success $82\% \pm 17\%$

Review questions have same response rate ($p < 0.993$), but higher correct rate ($p < 0.000$) than intro. questions

Student Response Modes

(Self-reported, Fall semester 2005, N = 36)

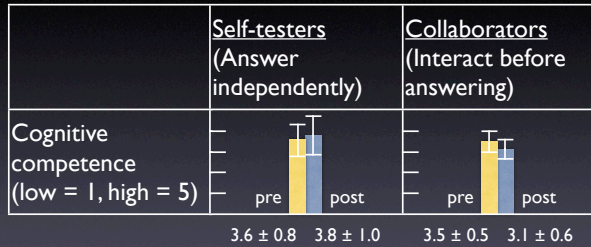
	Self-testers (Answer independently)	Collaborators (Interact before answering)
Intro. questions	13	23
Review questions	1	35

Intro. questions (participation only) divided class into two response types ($p < 0.001$ significance)

Review questions (participation + success bonus) motivated near-unanimous cooperation ($p < 0.001$)

Student Attitudes

(Attitudes Towards Astronomy, Fall semester 2005)



Negative pre- to post- shift for collaborators ($p < 0.001$)
 Lower post-test scores for collaborators versus self-testers ($p < 0.05$)

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Summary/Conclusions

“It was the best of times, it was the worst of times...”

Review questions (participation + success bonus)
 motivate near-unanimous cooperation, interaction,
 and higher success rates



Summary/Conclusions

“It was the best of times, it was the worst of times...”

Collaborators (interact for participation-only credit)
 have lower and negative shifts in attitudes
 towards science

Future Research Questions

What is the difference in science backgrounds (if any)
 between self-testers and collaborators?

Can cooperative clicker behavior be constructively used
 to improve attitudes towards science?



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