

COMP 523 project:
Bringing real-time collaboration into online education

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Jan 24, 2020



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Broader context



- ▶ Small group interaction is a well-established and highly-valued classroom practice
- ▶ Online education has not yet intergrated the kinds of structured, small group activities that lead to positive interactions

Collaboration in the workplace and in the classroom

Figure 1: Fortune 500 Most Valued Skills

	1970	1999
1	Writing	Teamwork
2	Computational Skills	Problem Solving
3	Reading Skills	Interpersonal Skills
4	Oral Communications	Oral Communications
5	Listening Skills	Listening Skills
6	Personal Career Development	Personal Career Development
7	Creative Thinking	Creative Thinking
8	Leadership	Leadership
9	Goal Setting / Motivation	Goal Setting / Motivation
10	Teamwork	Writing

- ▶ Most-valued skills have been steadily shifting¹
- ▶ Similar story from 2010 - 2018: Employers rate teamwork and problem solving among the most important skills/qualities of job candidates²

Table 1
Mean Effect Sizes for Impact of Social Interdependence on Dependent Variables

Dependent Variable	Cooperative vs. Competitive	Cooperative vs. Individualistic	Competitive vs. Individualistic
Achievement	0.67	0.64	0.30
Interpersonal attraction	0.67	0.60	0.08
Social support	0.62	0.70	-0.13
Self-esteem	0.58	0.44	-0.23
Time on task	0.76	1.17	0.64
Attitudes toward task	0.57	0.42	0.15
Quality of reasoning	0.93	0.97	0.13
Perspective taking	0.61	0.44	-0.13
High-quality studies			
Achievement	0.88	0.61	0.07
Interpersonal attraction	0.82	0.62	0.27
Social support	0.83	0.72	-0.13
Self-esteem	0.67	0.45	-0.25

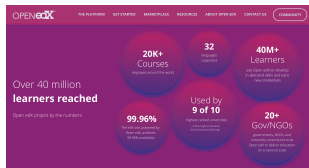
- ▶ J & J (2009) document 1200 studies about cooperative learning.³

¹ Figure: Darling-hammond, L., Herman, J., Pellegrino, J., Abedi, J., Aber, J. L., Baker, E., ..., Steele, C. M. (2013). Criteria for High-Quality Assessment. SCOPE, CRESST, LSRI Policy Brief. (Link to report)

² National Association of Colleges and Employers Annual Job Outlook, 2010-2018; Annually, $N \approx 300$ responses ($\approx 25\%$ of NACE members)

³ Figure: Johnson, D. W., & Johnson, R. T. (2009). An Educational Psychology Success Story: Social Interdependence Theory and Cooperative Learning. *Educational Researcher*, 38(5), 365-379. <https://doi.org/10.3102/0013189X09339057>

What we've tried so far

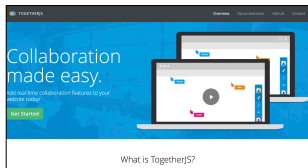


Open source, actively developed online learning platform with an established API (Xblock) for incorporating community-developed components

Pre-reqs:

- Python
- JavaScript
- HTML and CSS
- Git

+



Open source, JS library developed by Mozilla to allow RTC on any website

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- ▶ Demo: youtube.com/watch?v=79zBIKfMcJQ
- ▶ Code: github.com/collabassess/cpsx

Why is this a good project?

- ▶ Prototype is evidence of feasibility: can fork, or start from scratch
- ▶ Lots of cool problems that are relatively modular
 - ▶ Teacher-facing UX (Studio: authoring content)
 - ▶ Student-facing UX (LMS: delivers content to students)
 - ▶ Queuing and Matching protocols (how to put students into groups)
 - ▶ Database API that can support real time analytics
 - ▶ Collaborifying open source educational content (e.g., <https://phet.colorado.edu>)
 - ▶ Design (making it look good!)
- ▶ Contributing to an active online community: github.com/edx has 475 contributors
- ▶ An open source CS project for social good: Improving online education

Summary of recent activity

► Publications:

Mohan, K., Bergner, Y. & **Halpin, P. F.** (in press) Predicting group performance using process data in a collaborative assessment. *Technology, Knowledge, & Learning*.

Halpin, P. F. & Bergner Y. (2018). Psychometric models of small group collaborations. *Psychometrika*.

► Code (early beta):

CPSX: An XBlock for realtime chat in OpenEdx.

Demo: collaborative-assessment.org Code: github.com/collabassess

scirt: An R package for estimating social combination IRT models.

Code: github.com/peterhalpin/scirt

► Research Support (recent):

Institute of Education Sciences (Pending decision). Curriculum-based assessments of student collaboration (Goal 5) (PIs: Halpin & Bergner)

Moore Sloane Data Science Environment Seed Grant (2018). Bringing real-time collaboration into online education (PIs: Halpin & Bergner)

► Collaborators:

Yoav Bergner (NYU CDS / LEARN) | Kaushik Mohan (McKinsey) | Junyan Yao (Elevation Securities) | Jacqueline Gutman (Plated) | Ajay Thorve (NVIDIA)