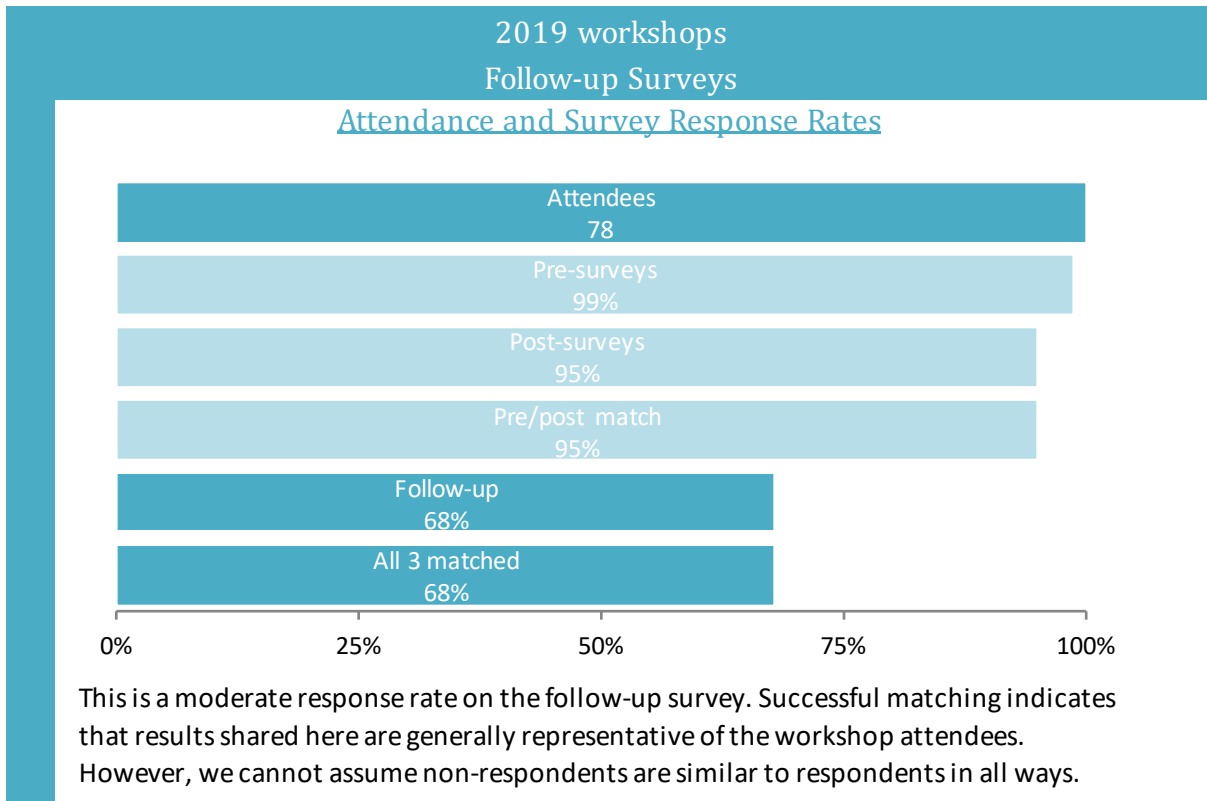


Collaborative Research: PROfessional Development and Uptake through Collaborative Teams (PRODUCT) Supporting Inquiry Based Learning in Undergraduate Mathematics

Follow-Up Report: 2019 workshops April 2021

Tim Archie, Charles Hayward, Devan Daly and Sandra Laursen
Ethnography & Evaluation Research, University of Colorado Boulder

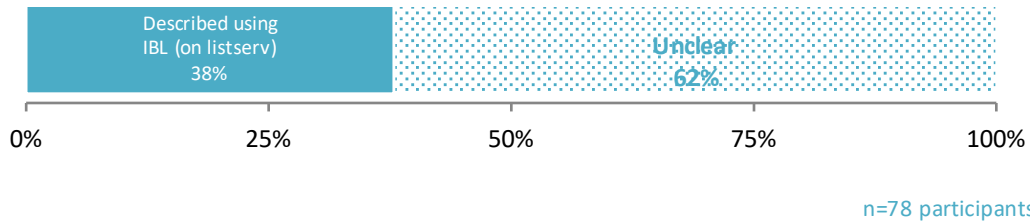
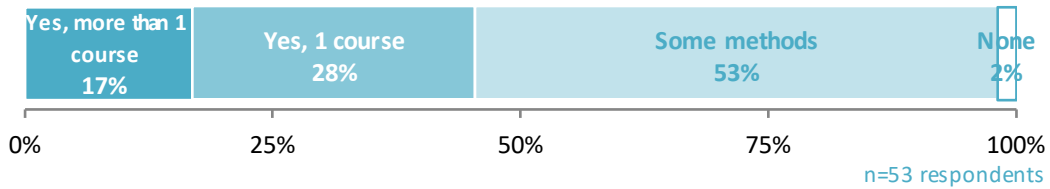
This evaluation report shares findings from the follow-up surveys conducted with participants from three workshops: St. Thomas University, St Paul, MN, June 18-21, 2019 (IWS 9), at the Paramount Hotel in Portland, OR, June 25-28, 2019 (IWS 10), and at the Staybridge Suites, Torrance, CA, July 9-12, 2019 (IWS 11). After a full academic year (about 15 months) following the workshops, we surveyed participants to see if they were using IBL methods in their classes and to learn more about the outcomes from the workshop. Detailed descriptions of the project, the data set, and the research methods are available in a previous report (Hayward & Laursen, 2013). The follow-up surveys were administered through Qualtrics from October 2020 through January 2021.



Outcomes

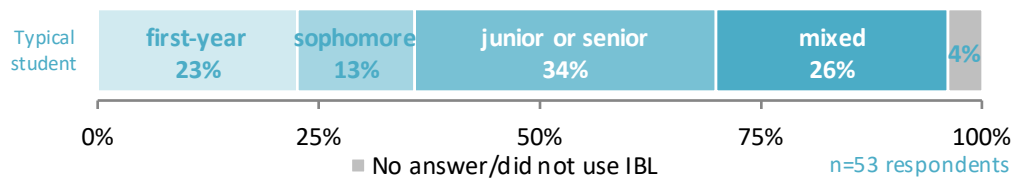
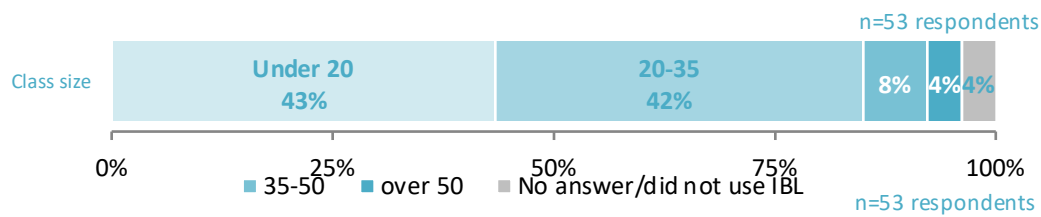
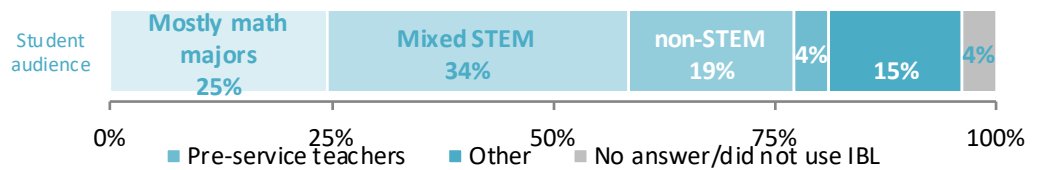
Results shared throughout this report are only for the follow-up survey respondents (53 of 78, 68%), except where noted. Implementation rates for *all* participants may differ from those values presented here, as we do not know if survey non-respondents implemented in the same ways that survey respondents did.

Implementation



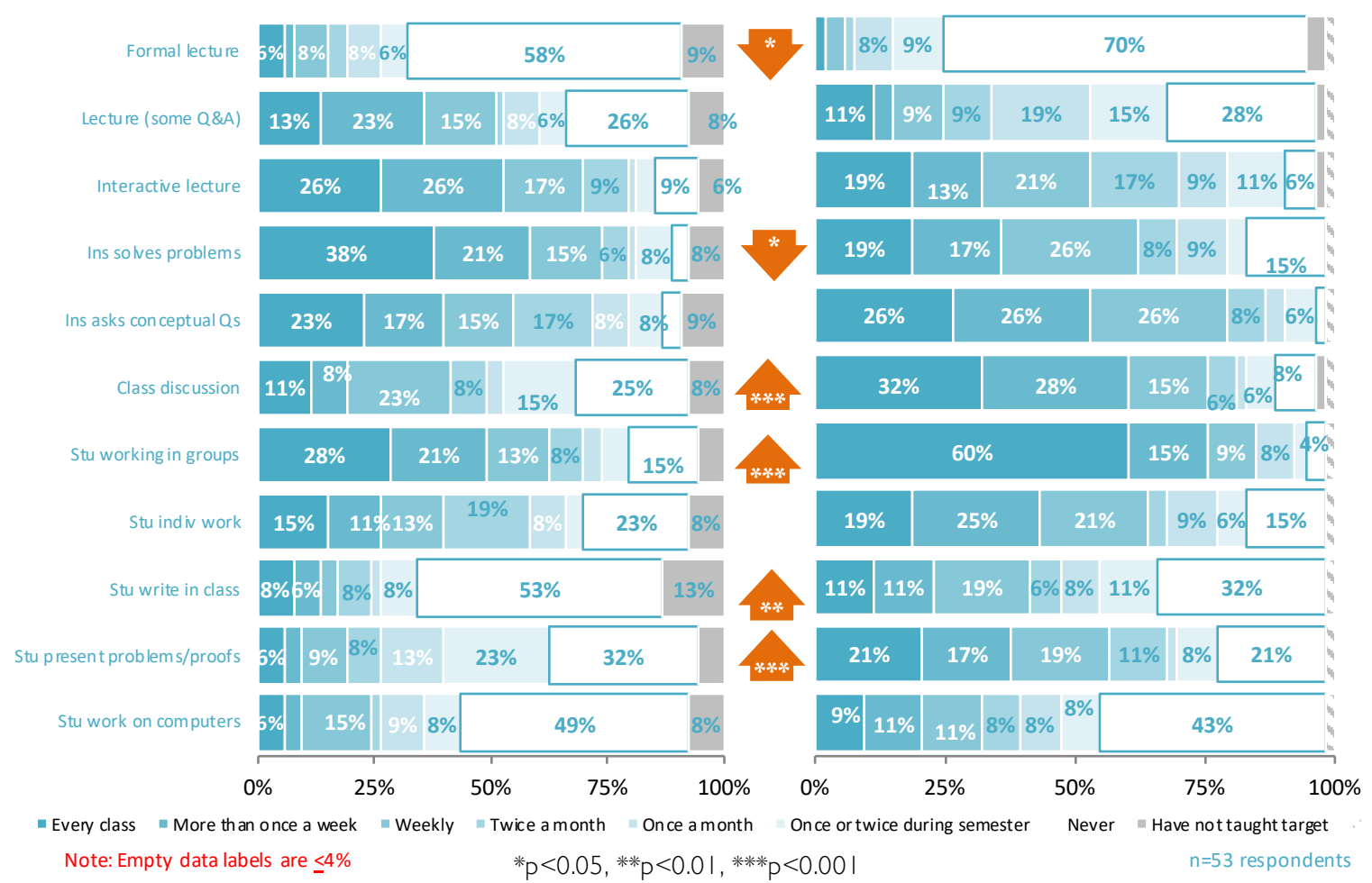
Spreading IBL to:

140+ classes
3600+ students
in the first year following the workshop.

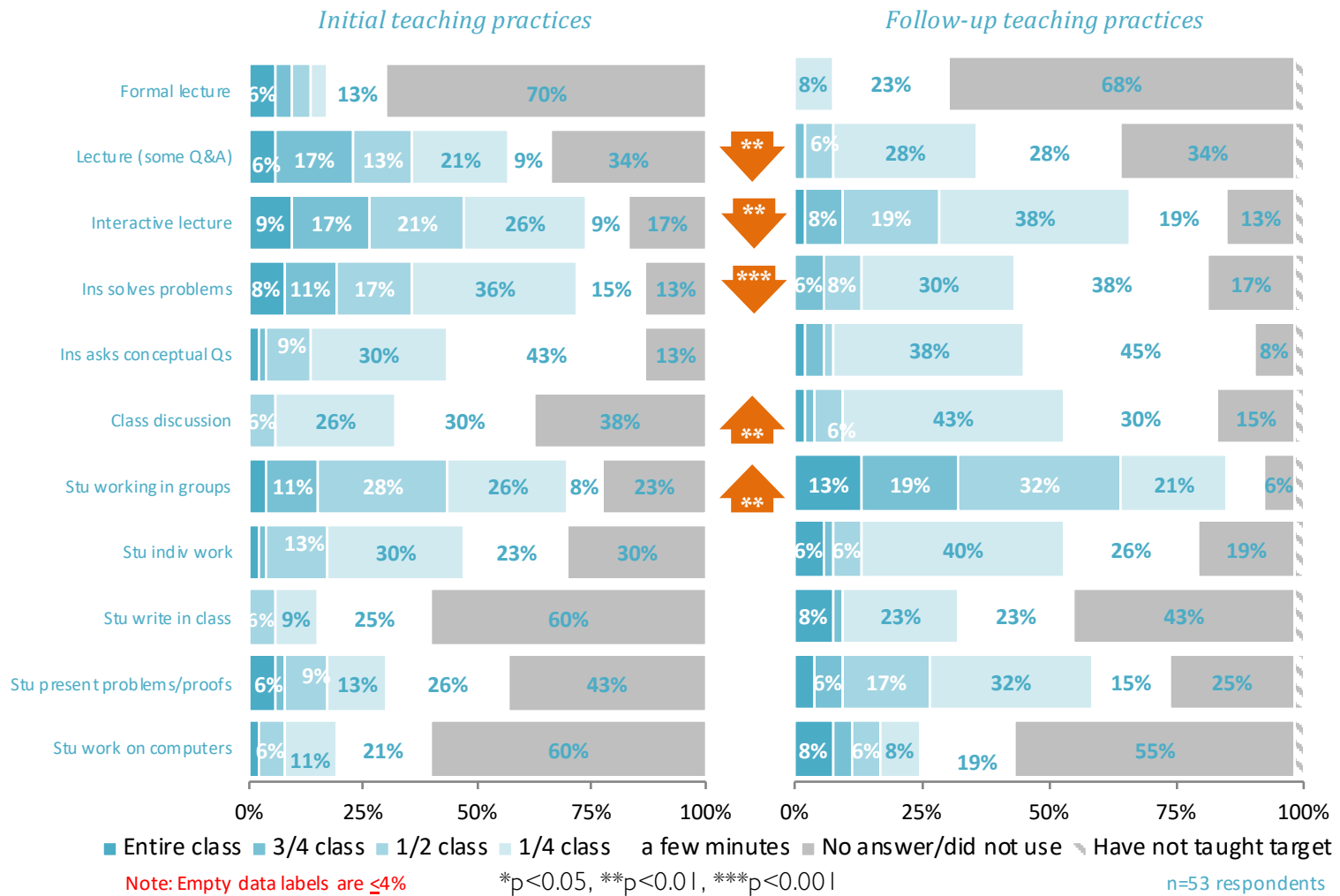


Changes in Teaching Practices, Frequencies

Initial teaching practices



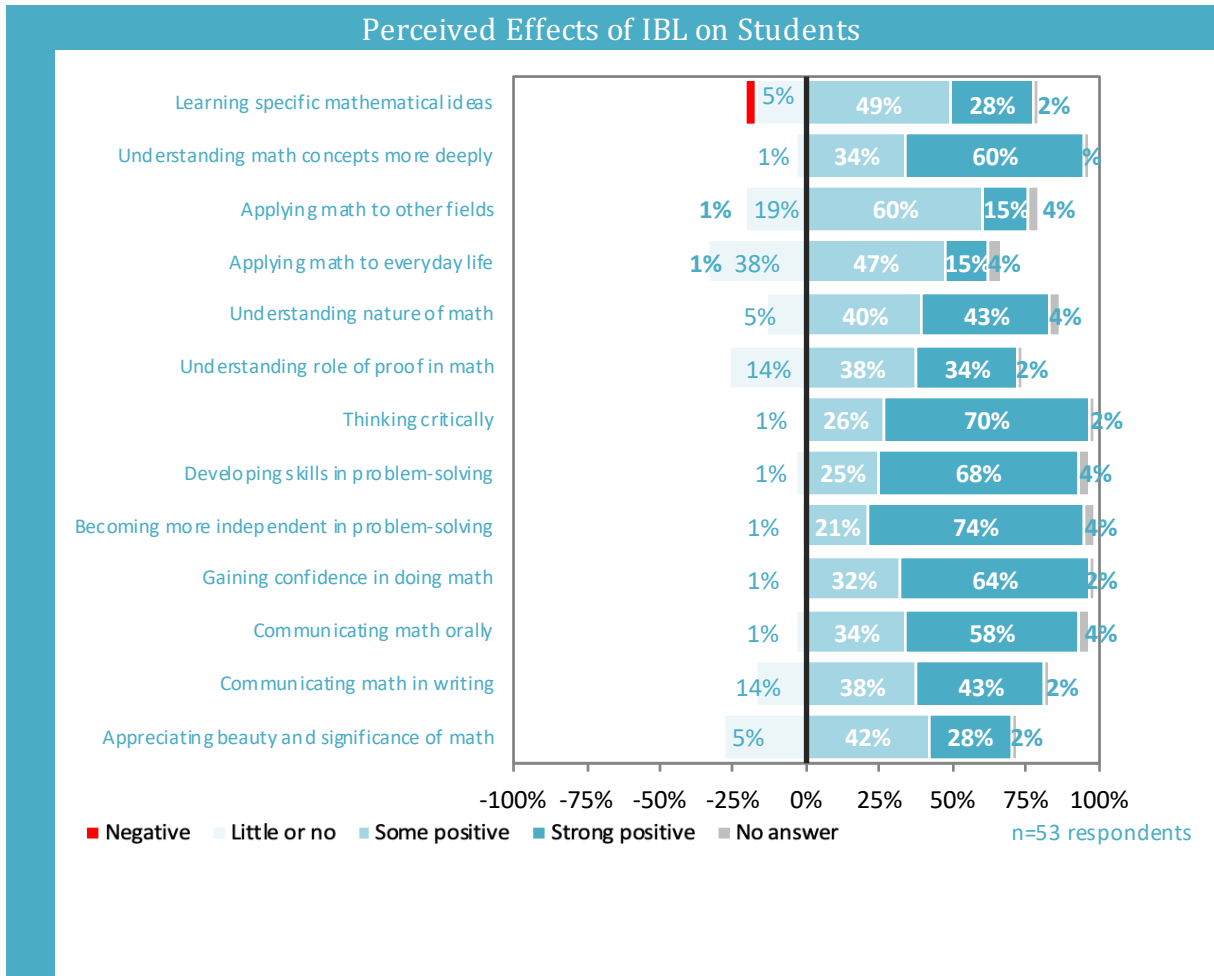
Changes in Teaching Practices, Durations

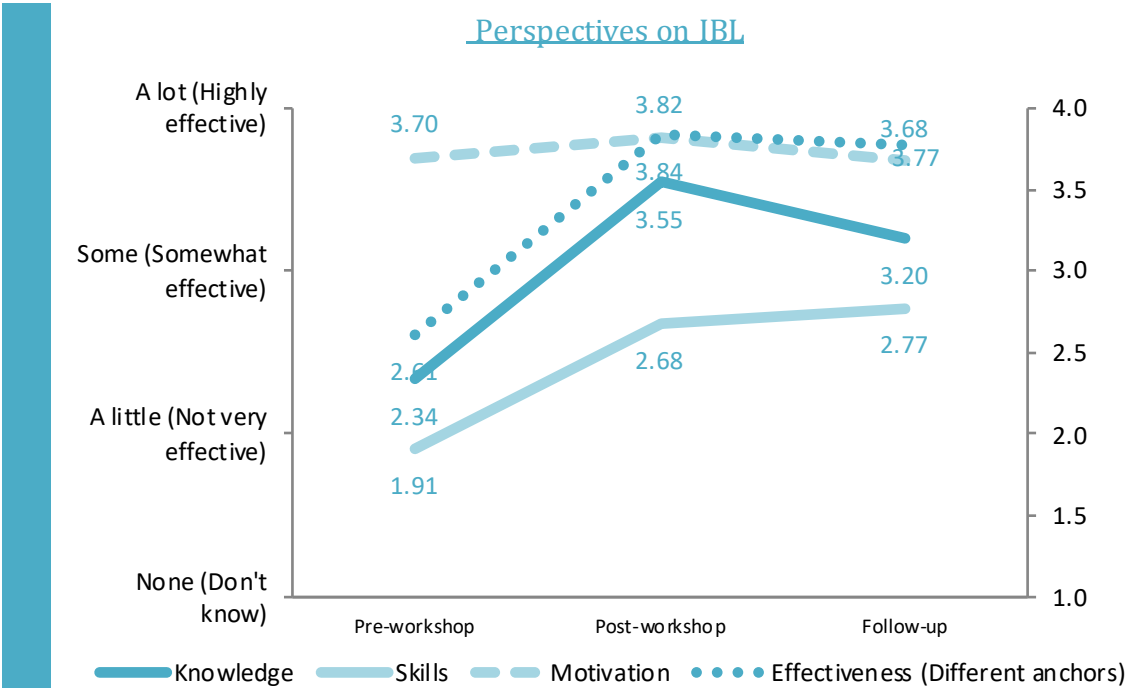


Of those who responded to the survey, 98% reported implementing at least some IBL methods. Overall, this means at least 67% of the 78 workshop participants have implemented some IBL in the year following the workshop. We also analyzed listserv traffic to measure implementation. In total, 60% of all workshop participants were active on the listserv and 38% of all participants made comments indicating that they were implementing IBL.

Changes in teaching practices also revealed a shift towards IBL pedagogies with significant decreases in lecturing and solving problems, and significant increases in student-centered activities including whole class discussion, group work, and student presentations.

The instructors who did implement IBL have exposed over 3600 students to IBL methods in over 140 classes in just the first year after the workshop. Most commonly, they taught small to midsize classes (under 35 students) for math and other STEM majors of all levels. Participants implemented IBL in a variety of courses, including calculus courses, linear algebra, introduction to proofs, geometry, graph theory, and others.



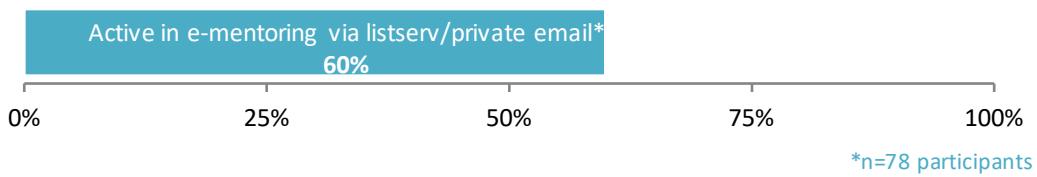


Knowledge of IBL, IBL skills, and belief in the effectiveness of IBL increased significantly from pre-workshop to post-workshop. IBL knowledge significantly decreased from post to follow-up. IBL skills and beliefs did not significantly change from post to follow-up. There were no significant differences between IBL motivation at any time point.

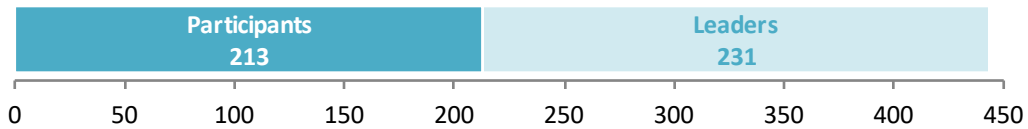
Overall, these patterns are generally consistent with other workshops, and indicate that the workshop was effective in producing gains in all areas and that these gains were sustained (except IBL knowledge) in the 16-month period following the workshops. Ongoing support may be helpful for participants to work through difficulties and continue using IBL and sustain the reported gains following the workshop.

Ongoing Support

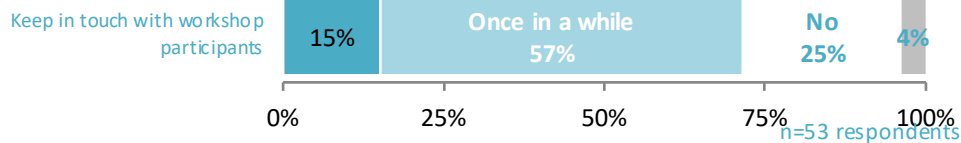
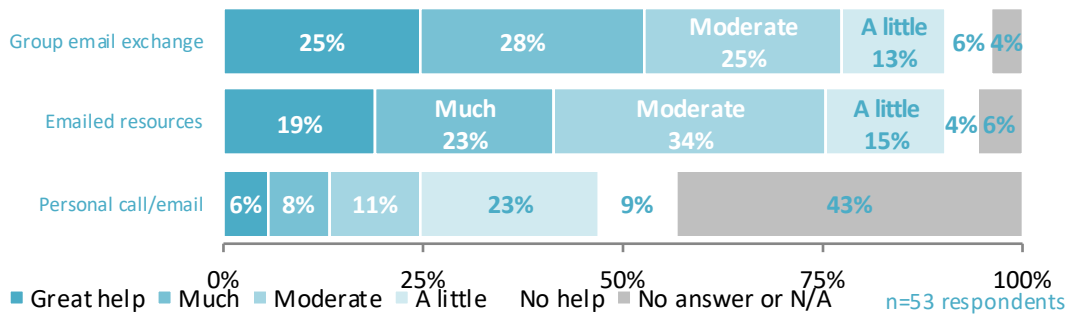
Workshop Resources



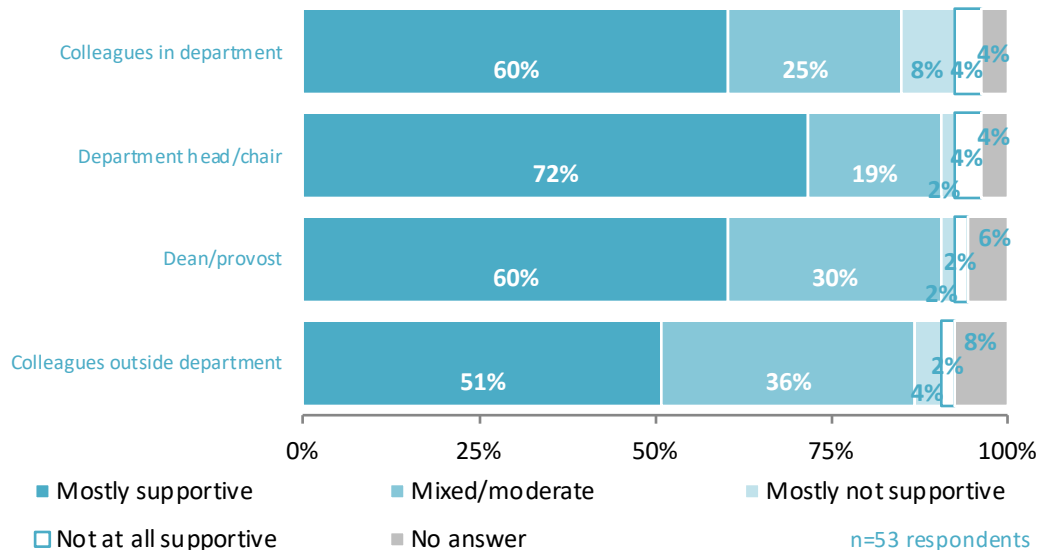
Group listserv messages in one year following workshop



Helpfulness of e-mentoring activities

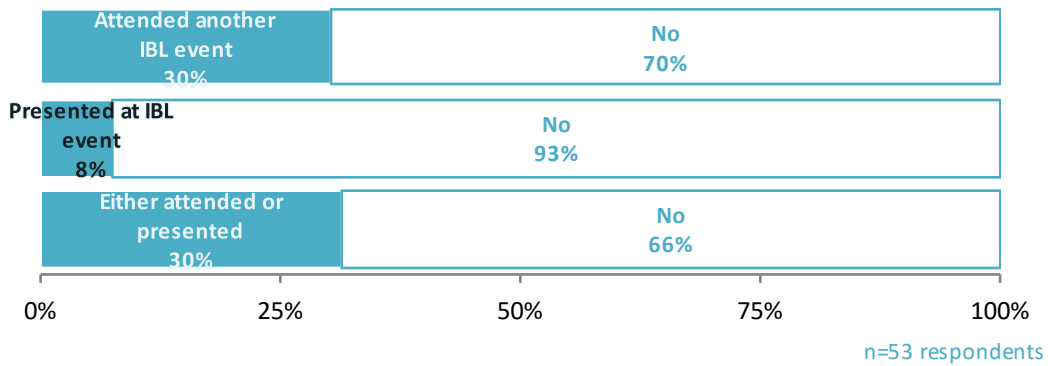


Institutional Support

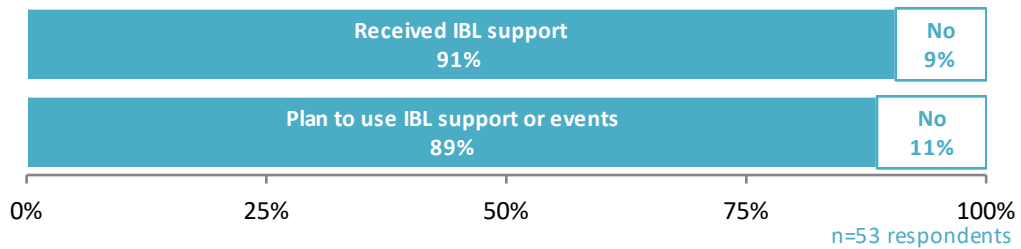


Other IBL Supports

IBL events



Use of IBL supports



Conclusion

Results from the follow-up surveys help to learn about impacts of the workshop on participants' teaching practices. At least 59% of all workshop participants (98% of the 53 respondents) reported using at least some IBL methods in the year following the workshop. The proportion from survey self-report is higher than that found by analyzing messages sent through the group listserv (38% of all participants). The most likely explanation for the discrepancy between the self-reported implementation and listserv derived implementation rate is that the listserv messages may mention implementation, but participants are not explicitly asked about implementation as was done on the survey. The implementation rates are comparable to those from Workshops 1-8 (average of 71%).

Workshop participants spread IBL methods to about 3600 students in over 140 courses in just the first year following the workshop. Participants reported implementing IBL in a wide variety of courses in respect to typical student audience and level. However, most courses had 35 or fewer students. Consistent with other workshops, participants reported that using IBL had many positive effects on their students - in fact, almost all effects reported were positive.

As with other workshops, results indicate that follow-up support is important for participants with most respondents (91%) reporting using some form of support. The workshop listserv was the most commonly used form of support, as 60% of participants were active on the listserv at least once. While staff often prompted discussions and responded to questions on the listserv, participants themselves were very active, sending an average of 2.7 messages per workshop participant. Participants either used or plan to use many of the available supports, and the variety of opportunities seems to allow each person to find one that works for him or her.

References

Hayward, C. & Laursen, S. (2013). *Collaborative research: Supporting pedagogical innovation for a generation of transformation via inquiry-based learning in mathematics (SPIGOT) evaluation report: Workshop 1 at California Polytechnic State University, San Luis Obispo, June 24-27, 2013. Ethnography & Evaluation Research. Center to Advance Research and Teaching in the Social Sciences. University of Colorado Boulder.*