



FIG. 3. Relationship between percentage of participation code in LAs in the Fall semester and the Spring semester.

V. DISCUSSION AND CONCLUSION

Although the sample size of our study is small, the consistent relationships we found across two semesters lends some confidence to our results. Participating in LAs has significant correlation with teamwork learning. In addition, there is a significant correlation between participation in LAs during the Fall semester, and in the Spring semester. Taken together, these two results suggest to us that a) productive/unproductive collaborative habits formed during in-class learning activities carry over to the collaborative exam context, and b) once students have established how to work successfully in a highly collaborative ILE, these habits of collaboration transfer over from one semester to another, irrespective of who the students work with. While it is possible that students learned to learn collaboratively elsewhere, we find this hypothesis unlikely. Students entering our class have great difficulty adapting to the ILE and it takes persistent effort on the part of the instructors to shift students from passive

recipients of knowledge to active participants in their own knowledge construction process.

Another striking result is that being disengaged in the RSs has consistent negative relation with teamwork learning. While we cannot ascribe a causal link between such behaviors and success or failure in the course, we suggest that a mindful instructor could use observations of disengaged students in group discussions as a useful diagnostic tool to identify those at risk of failing in his/her course. In our experience it is easy to help students who are engaged, but challenging to get disengaged students to join more actively in the learning process.

Finally, there is no significant relation between participation in RSs and teamwork learning. In previous research [12] we found that students' participation in RS was significantly correlated with growth of conceptual understanding as measured by the Force Concept Inventory. Therefore, in future work, we will take a closer look at the "participation" category of RS. We suggest that the lack of correlation between participation in RS and teamwork learning may occur because RSs offers fewer chances to get involved in discussion since the entire class worked together during the RS. In future work we are going to analyze students' participation patterns in RS one more semester in a large interactive learning class. This analysis will allow us to make more convincing suggestions about the impact of learning how to interact and collaborate effectively with each other in a highly interactive learning environment.

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