Collaborative learning

A collaborative (or cooperative) learning approach involves pupils working together on activities or learning tasks in a group small enough for everyone to participate on a collective task that has been clearly assigned. Pupils in the group may work on separate tasks contributing to a common overall outcome, or work together on a shared task.

Some collaborative learning approaches put mixed ability teams or groups to work in competition with each other in order to drive more effective collaboration. There is a very wide range of approaches to collaborative and cooperative learning involving different kinds of organisation and tasks. Peer tutoring can also be considered as a type of collaborative learning, but in the Toolkit it is reviewed as a separate topic.

How effective is it?
The impact of collaborative approaches on learning is consistently positive. However, the size of impact varies, so it is important to get the detail right. Effective collaborative learning requires much more than just sitting pupils together and asking them to work in a group; structured approaches with well-designed tasks lead to the greatest learning gains. There is some evidence that collaboration can be supported with competition between groups, but this is not always necessary, and can lead to learners focusing on the competition rather than the learning it aims to support. Approaches which promote talk and interaction between learners tend to result in the best gains.

How secure is the evidence?
Over 40 years a number of systematic reviews and meta-analyses have provided consistent evidence about the benefits of collaborative learning. In addition to direct evidence from research into collaborative approaches, there is also indirect evidence that has shown that collaboration can increase the effectiveness of other approaches such as Mastery learning or Digital technology. Collaborative learning appears to work well for all ages if activities are suitably structured for learners’ capabilities and positive evidence has been found across the curriculum. Not all of the specific approaches to collaborative learning adopted by schools have been evaluated, so it is important to evaluate any new initiative in this area.

What are the costs?
Overall the costs are estimated as very low. Ongoing training for teachers is advisable, with estimated costs of about £500 per teacher, or £20 per pupil per year for a class of 25 pupils.

Collaborative learning: What should I consider?

Before you implement this strategy in your learning environment, consider the following:

1. Pupils need support and practice to work together; it does not happen automatically.
2. Tasks need to be designed carefully so that working together is effective and efficient, otherwise some pupils will try to work on their own.
3. Competition between groups can be used to support pupils in working together more effectively. However, overemphasis on competition can cause learners to focus on winning rather than succeeding in their learning.
4. It is particularly important to encourage lower achieving pupils to talk and articulate their thinking in collaborative tasks to ensure they benefit fully.
5. Have you considered what professional development is required to support effective use of these approaches?
Technical Appendix

Definition
Collaborative or cooperative learning is defined as learning tasks or activities where students work together in a group small enough for everyone to participate on a collective task that has been clearly assigned. Each student can then achieve his or her learning goal if and only if the other group members achieve theirs. Cooperative learning can result in better achievement, improved intergroup relations, acceptance of mainstreamed classmates, enhanced self-esteem, and positive attitudes.

Search terms: cooperative/collaborative learning; group activities; cooperative/collaborative learning instruction/strategies

Evidence Rating
There are ten meta-analyses, with five conducted in the last ten years, which suggest that collaborative learning strategies can improve learning. However, the effects vary, with pooled effects between 0.09 and 0.91 and there is no clear explanation of why this spread occurs. It appears that collaborative learning can work well for all ages if activities are suitably structured for learners’ capabilities, and positive evidence has been found across the curriculum. Overall, the evidence is rated as extensive.

Additional Cost Information
Overall the costs are estimated as very low. Ongoing training for teachers is advisable, with estimated costs of about £500 per teacher, or £20 per pupil per year for a class of 25 pupils.
References


Cooperative learning instruction & science achievement for secondary and early post-secondary students: A systematic Review.

Dissertation, Colorado State University (2009)

Promoting early adolescents' achievement and peer relationships: the effects of cooperative, competitive, and individualistic goal structures.


The Effects of Cooperative Learning Strategies on Mathematics Achievement Among Middle-grades Students: A meta-analysis


When and why does cooperative learning increase achievement? Theoretical and empirical perspectives.

## Summary of effects

<table>
<thead>
<tr>
<th>Meta-analyses</th>
<th>Effect size</th>
<th>FSM effect size</th>
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<tbody>
<tr>
<td>Capar, G., &amp; Tarim, K., (2015)</td>
<td>0.59</td>
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<tr>
<td>Igel, C., (2010)</td>
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<td>Johnson, D. W., Johnson, R. T., &amp; Stanne, M. B., (2000)</td>
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<td></td>
<td>0.62</td>
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<tr>
<td></td>
<td>0.86</td>
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<td></td>
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<td>(jigsaw groups)</td>
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<td>(student-team achievement)</td>
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<td></td>
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<td>(co-op read &amp; composition)</td>
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<td></td>
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<td>(co-operative vs individualistic)</td>
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<td></td>
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<td>(co-op v competitive)</td>
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<td>Puzio, K., &amp; Colby, G. T., (2013)</td>
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<td>Romero C.C., (2009)</td>
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<td>Roseth C.J., Johnson D.W., Johnson R.T., (2008)</td>
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<td>Stoner, D. A., (2004)</td>
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<td>Single Studies</td>
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<td>Borman, G. D., Slavin, R. E., Cheung, A. C., Chamberlain, A. M., Madden, N. A., &amp; Chambers, B. (2007)</td>
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</table>

| Weighted mean | 0.38 |

The right hand column provides detail on the specific outcome measures or, if in brackets, details of the intervention or control group.

### Meta-analyses abstracts

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This study synthesizes the mathematics achievement impacts observed in randomized Studies of the Student Teams Achievement Divisions cooperative learning model. A total of 15 randomized studies were retrieved from the extant literature. Analyses of $d = 0.16$ (Cohen’s $d$) effect size estimates indicated an overall statistically significant positive effect. Estimates were also examined for between-class Heterogeneity to ascertain whether there were Differences in effects for younger children in Elementary settings versus adolescent children in Secondary settings. These analyses indicated that cooperative learning had a much stronger effect on student achievement for adolescent children than for younger children.
The purpose of this study was to analyze the findings of research on teaching mathematics through the use of cooperative learning versus traditional teaching methods on achievement and attitude from grade K through grade 12. Meta-analysis was selected as the method which to synthesize findings and indicate the size and significance of the effects. Studies were collected from 1970 to 1992 using educational sources such as ERIC, DAI and Journal for Research in Mathematics Education. In the final analysis there were 40 studies for achievement and 25 studies in attitude. Effects size was calculated for each study using Glass’s (1981) and William’s (1990) methods. The resulting effects sizes were tested for homogeneity using Hunter and Schmidt’s (1990) method. When a heterogeneous result was obtained, then moderating variables were used to create homogeneity of results; since heterogeneous result were still obtained, then the resulting effects sizes were further analyzed using Step-Wise Analysis to obtain categories for homogeneous result. Using the Step-Wise Analysis, the following conclusion was drawn: (a) Peer Tutoring was the best method of instruction for achievement change to occur regardless of rating of research design and (b) Team Assisted Individualization (TAI) was the best method of instruction for attitude change to occur regardless of date of publication.

1 Othman, N. (1996)

2 We conducted a meta-analysis on the effectiveness of cooperative and collaborative learning to support enhanced literacy outcomes. Interventions considered were provided in regular education settings (i.e., not pull-out instruction) with students from Grades 2 through 12. Reviewing more than 30 years of literacy research, we located 18 intervention studies with 29 study cohorts. Included studies primarily used standardized assessments to report on students’ reading, vocabulary, or comprehension achievement, which we analyzed separately. Overall, students had significantly higher literacy achievement scores when instructional interventions utilized cooperative and collaborative activity structures. The overall weighted mean effect sizes ranged from 0.16 to 0.22 (p < .01) with more than 94% of the point estimates being positive. Because cooperative or collaborative learning was always one of multiple intervention components, it was impossible to estimate the unique, added effects of cooperative and/or collaborative learning. Although the small number of eligible studies precludes any claims about the effectiveness of specific forms of grouping and the circumstances under which programs have more impact, our findings suggest that cooperative and collaborative grouping was a core component of effective literacy interventions, particularly at the elementary level.


4 A systematic review of 2,506 published and unpublished citations identified in a literature search on science outcomes associated with cooperative learning in secondary and early post-secondary science classrooms between 1995 and 2007 was conducted. The goal of this review was to determine what impact cooperative learning had on science achievement of students compared to traditional instruction. A tri-level screening and coding process was implemented and identified 30 original, empirical studies that met the inclusionary criteria while yielding an overall effect size estimate. The minimum methodological criteria for inclusion were as follows: (a) the study utilized a treatment/control design, (b) cooperative learning was the intervention, and the control group experienced traditional instruction, (c) the subjects in included studies were secondary or early-post-secondary students, (d) the study was performed in a science classroom, and (e) student achievement was the outcome measure. This meta-analysis describes the main effect of cooperative learning; additionally, a variety of moderator analyses were conducted in order to determine if particular study and participant characteristics influenced the effect of the intervention. The results of this review indicate that cooperative learning improves student achievement in science. The overall mean effect size was .308, a medium effect (Cohen, 1988). Moderator analyses on study participant characteristics gender and ability level were inconclusive based on the small number of studies in which data on these characteristics were disaggregated. If the intervention was structured in a particular fashion, the effect on student achievement was greater than that for an unstructured intervention. The intervention showed a greater effect on student achievement in biology classes than in other science disciplines. Studies performed using cluster randomized or quasi-experimental without subject matching methodologies showed a greater effect on student achievement in science than studies that used the quasi-experimental with subject matching methodology. Implications for teacher education policy and recommendations for improvements in methodological practices and reporting are given.

5 Romero C.C. (2009)

6 Emphasizing the developmental need for positive peer relationships, in this study the authors tested a social-contextual view of the mechanisms and processes by which early adolescents’ achievement and peer relationships may be promoted simultaneously. Meta-analysis was used to review 148 independent studies comparing the relative effectiveness of cooperative, competitive, and individualistic goal structures in promoting early adolescents’ achievement and positive peer relationships. These studies represented over 8 decades of research on over 17,000 early adolescents from 11 countries and 4 multinational samples. As predicted by social interdependence theory, results indicate that higher achievement and more positive peer relationships were associated with cooperative rather than competitive or individualistic goal structures. Also as predicted, results show that cooperative goal structures were associated with a positive relation between achievement and positive peer relationships. Implications for theory and application are discussed.


8 The purpose of this study was to examine the existing body of literature and through the use meta-analysis determine the effect of cooperative learning strategies on the mathematics achievement of middle-grades students, grades 4-8. A collection of 25 quantitative studies produced an effect size which indicated that cooperative learning strategies have a positive effect on the mathematics achievement of middle-grades students. Through correlational analysis, the current study examined relationships between the duration of the studies and effect size of the studies. Also examined was the duration of the studies and grade 4 and grade 8 NAEP mathematics proficiency scores for 2003. Correlation Tables as well as scatter plots for each correlation were provided for visual examination. Also examined were the location of the studies; the particular method of data analysis that each study used; and the dependent outcome measure of each of the studies. Conclusions and recommendations for further research were provided.