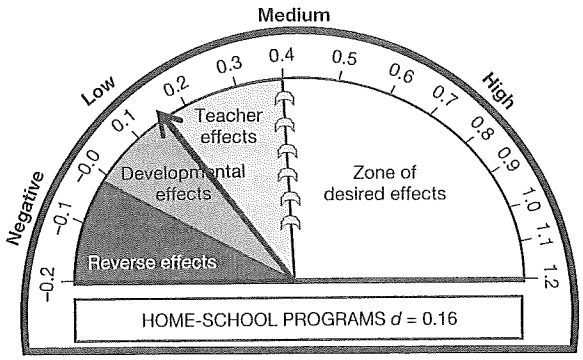


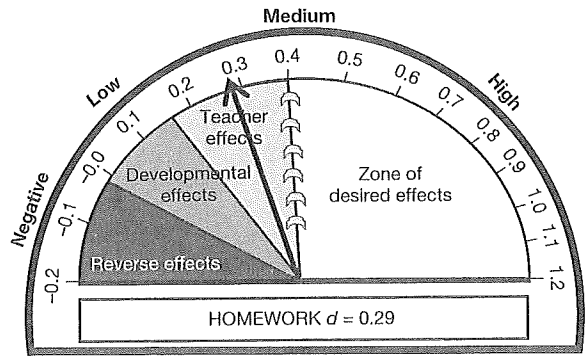
KEY	
Standard error	na
Rank	116th
Number of meta-analyses	1
Number of studies	14
Number of effects	14
Number of people (0)	na

using discrete educational software for use at home and at school, and desktop programs. The effects of these programs on reading were small (d = 0.10), slightly higher for mathematics (d = 0.18). and highest for writing (d = 0.34); there was not a lot of evidence showing enhanced home–school communication or increased parental involvement that affected students' learning.

Homework

Homework involves "tasks assigned to students by school teachers that are meant to be carried out during non-school hours" (Cooper, 1989, p. 7). It is a hotly contested area, and my experience is that many parents judge the effectiveness of schools by the presence or amount of homework—although they expect to not be involved in this learning other than by providing a quiet and secluded space, as they believe that these are the right conditions for deep and meaningful learning. The overall effects are positive, but there are some important moderators.

Cooper (1989) has written many studies and conducted a series of meta-analyses on homework. He argued that the effects of homework are twice as large for high as for junior high, and twice as large again for junior high as for elementary students. The smallest effects were in mathematics, whereas the effects in science and social studies were the largest, with English in the middle. The positive effects of homework were negatively related to the duration of the homework treatment (see also Trautwein, Köller, Schmitz, & Baumert, 2002). Shorter is better, but, for elementary students, Cooper, Lindsay, Nye,



KEY	
Standard error	0.027 (Low)
Rank	88th
Number of meta-analyses	5
Number of studies	161
Number of effects	295
Number of people (4)	105,282

and Greathouse (1998) estimated a correlation of near zero ($d = -0.04$) between time spent on homework and achievement. Student attitude to homework was not related to completion or grade, and nor did parent facilitation relate to student attitude to homework: "Parent support for autonomous student behavior showed a positive relationship to achievement, whereas direct instructional involvement showed a negative relationship" (Cooper, Jackson, Nye, and Lindsay, 2001, p. 197). My reading of Cooper's results suggests that more task-oriented homework had higher effects than did deep learning and problem solving homework. It is likely that this interaction is because of the importance of the teaching cycle to ensure appropriate learning, feedback, and monitoring (especially for deeper learning), whereas rehearsal of basic skills (surface knowledge) can be undertaken with minimal teacher supervision.

The nature of the homework also makes a difference. The effects were highest in mathematics, and lowest in science and social studies. The effects were higher when the material was not complex or if it was novel. Homework involving higher level conceptual thinking, and project based was the least effective. Trautwein, Köller, Schmitz, and Baumert (2002) aimed to identify the key components of homework that made the difference, with a particular emphasis on untangling the interactions between homework and student characteristics. They found that a lot of homework and a lack of monitoring seem to indicate an ineffective teaching method. They warned against homework that undermined a student's motivation and that led to the student internalizing incorrect routines, and they favored short, frequent homework that was closely monitored by the teachers. It would probably be more effective to construct these opportunities under the gaze of a teacher, in the school. Teaching does matter when it comes to students' learning. The manner in which parents become involved may or may not make a difference.

The effects are greater for higher than for lower ability students and for older rather than younger students. For too many students, homework reinforces that they cannot learn by themselves, and that they cannot do the schoolwork. For these students, homework can undermine motivation, internalize incorrect routines and strategies, and reinforce less effective study habits, especially for elementary students. The novelist Richard Russo summed up the views of many students:

> She tried shit like doing her homework for a while, but it was counterproductive since she always did it wrong. Doing homework wrong, to her, was worse than not doing it at all, because doing it required time and effort and yielded the same results as not doing it, which required neither. Besides, our teachers had it all figured out in advance, she said, like who was going to get good grades and who'd flunk.
>
> (Russo, 2007, p. 157)

There are marked differences in effect sizes between elementary ($d = 0.15$) and high school students ($d = 0.64$), which probably reflects the more advanced skills of studying involved in high school. It is important to note, however, that prescribing homework does not help students develop time management skills—there is no evidence this occurs. High school teachers are more likely to assign homework related to learning subject matter, and the effects are highest, whatever the subject, when homework involves rote learning, practice, or rehearsal of the subject matter. Perhaps one set of reasons why the effects of homework are lower in elementary levels is that younger children are less able than older children to ignore irrelevant information or stimulation in their environment, have less

effective study habits, and receive little support (from teachers or parents) (Muhlenbruck, Cooper, Nye, & Lindsay, 1999).

Concluding comments

There are many teaching strategies that have an important effect on student learning. Such teaching strategies include explanation, elaboration, plans to direct task performance, sequencing, drill repetition, providing strategy cues, domain-specific processing, and clear instructional goals. These can be achieved using methods such as reciprocal teaching, direct instruction, and problem solving methods. As noted above, effective teaching occurs when the teacher decides the learning intentions and success criteria, makes them transparent to the students, demonstrates them by modeling, evaluates if they understand what they have been told by checking for understanding, and re-telling them what they have told by tying it all together with closure. These effective teaching strategies involve much cooperative pre-planning and discussion between teachers, optimizing peer learning, and require explicit learning intentions and success criteria.

Peers play a powerful role, as is demonstrated in the strategies involving reciprocal teaching, learning in pairs on computers, and both cooperative and competitive learning (as opposed to individualistic learning). Many of the strategies also help reduce cognitive load and this allows students to focus on the critical aspects of learning, which is particularly useful when they are given multiple opportunities for deliberative practice.

The use of resources, such as adjunct aids and computers, can add value to learning. They add a diversity of teaching strategies, provide alternative opportunities to practice and learn, and increase the nature and amount of feedback to the learner and teachers. They do, however, require learning how to optimize their uses.

It is also clear that, yet again, it is the differences in the teachers that make the difference in student learning. Homework in which there is no active involvement by the teacher does not contribute to student learning, and likewise the use, or not, of technologies (such as distance learning) does not show major effects on learning if there is no teacher involvement. Related to these teacher influences are the lower effects of many of the interventions when they are part of comprehensive teaching reforms. Many of these reforms are "top down" innovations, which can mean teachers do not evaluate whether the reforms are working for them or not. Commitment to the teaching strategy, and re-learning how to use many of these methods (through professional development, see Chapter 7) seems important.