

Chapter 2

State of the Art of Time Effectiveness

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Abstract In this chapter comprehensive reviews and earlier meta-analyses are summarized to arrive at an impression of the effectiveness of the various ways in which educational time can be intensified, enhanced, and expanded. The chapter has three main sections, one on “within school time,” one on homework, and one on expanded school time, beyond regular lesson hours. In these three sections key publications will be used to provide a concise description of the way the time variable is defined and applied in regular school activities or special programs. Next, reviews and meta-analyses are used to establish the degree of impact of time related interventions on student achievement and other outcome indicators, including occasionally social and behavioral outcomes. The results show that regular school time, homework, and extra out-of-school time appear to have small to moderate positive effects on educational achievement in basic subjects, mathematics and reading. The average effect sizes (in terms of the d-coefficient) for these three “arena’s” for optimizing learning time are .37, .29, and .18, respectively.

Time for Teaching and Learning at School

Conceptualization

As stated in the introduction, the conceptualization of effective time at school was developed on the basis of John Carroll’s model (Carroll 1963, 1989). As a matter of fact the basic type of variable used in subsequent effect studies on time was the

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variable that Carroll called “opportunity to learn”, the allowed, or available time for learning. In more comprehensive models of teaching effectiveness like mastery learning and direct teaching, additional variables that related to content covered and quality of instruction were added. Subsequent studies between 1980 and 2000, were generally based on three distinct categories of time:

- allocated time
- time on task
- academic learning time (Anderson 1980; Haertel et al. 1983; Poway 2002).

Allocated time is the amount of time that is formally specified, further subdivisions are school time and classroom time.

Instructional time is equal to what was indicated under “exposure” in the introduction, a kind of “net” measure of “engaged” teaching time, leaving aside time for organizational arrangements, and keeping order during lesson hours.

Time on task is the amount of time that students are actively engaged in learning tasks during lesson hours. According to Poway (2002), time on task refers to portions of time when students are paying attention to learning tasks and attempting to learn. “Engaged time excludes the time students spend socializing, wandering about with no apparent purpose, daydreaming, or out of the classroom”. The following instructional conditions are associated with time on task: interactive activities with a teacher, carefully prepared activities and closely monitored seat work, focusing students’ thoughts on cognitive strategies and on motivational tasks, immediate feedback, focused questions, praise and reinforcement, listening and thinking, discussion, review, thinking out loud and drill and practice (Poway 2002).

Academic learning time refers to that portion of engaged time that students spend working at an appropriate level of difficulty for them and experiencing high levels of success. It excludes engaged time that is spent on tasks that are too easy or too difficult (Anderson 1983; Bloom 1976; Fisher et al. 1980; Berliner 1990; Poway 2002).

It is our impression that this literature has difficulty in presenting an unequivocal conceptualization of time on task. Additional elements are already creeping in as far as time on task is concerned, see for example Poways’ list of time on task instructional conditions that require certain qualities of teacher preparation and monitoring. The concept of academic learning time is totally confounded with specific didactic requirements (facets of teaching quality one might say; like the requirement that the task should be of an appropriate level of difficulty) and even circular in a context of educational productivity, as it builds in academic success.

Given the truism that time is an empty vessel, the “pure effects” of engaged time at school could only be disentangled from other effectiveness enhancing conditions, by keeping these contexts constant or otherwise controlled, when assessing the impact of various quantities of time. This is what happens, for example, in what Wang indicates as “content exposure”, where time engaged with respect to a specified chunk of subject matter is investigated (Wang 1998). In fact some authors describe exposure time as an intrinsic characteristic of opportunity to learn (e.g. Brophy and Good 1984).

The concept of academic learning time goes much further in messing together time and other aspects of teaching quality and tends toward a rudimentary multidimensional model of teaching effectiveness.

A specific facet of engaged time is the pacing of instruction, distinguishing for example, spaced and massed¹ practice. (see also Brophy and Good 1984, on the tempo of spacing and waiting time). This variable is again more of an interactive concept that mixes time and content, and is therefore not suited to assess the effect of time per se.

Meta-analyses

Fraser et al. (1987) present results from meta-analyses based on “several thousands of studies”. “Time” is defined as “instructional time”, not specifying whether this is allocated time, engaged time, or time on task. The impression one gets is that all of these operationalizations have been combined. It should be noted that these meta-analyses contain many other school and classroom level correlates of educational achievement, time is just one of them.

They report an average effect size of $d = 0.36$. Of this result they say that it is neither the chief determinant, nor a weak correlate of learning. “Like the other essential factors, time appears to be a necessary ingredient, but insufficient by itself to produce learning” (p. 160). They emphasize that the factors presented in Walberg’s model of educational productivity (Walberg 1986) should be seen as operating jointly. The authors also state that increasing time is likely to show diminishing returns.

In a second study by the same authors (Fraser et al., *ibid*) results of a synthesis of (134) meta-analyses are presented (involving 7,827 studies and 22,155 correlations). The effect sizes are now rendered as correlations; for engaged time and time on task they are 0.38 and 0.40, respectively. These effect sizes are about twice as large as those reported in the above. This might be explained by the possibility that the first meta-analyses used a more general definition of time, including allocated time, whereas the second meta-analysis of meta-analyses used the more restricted definitions of engaged time and time on task.

Re-addressing the issue of diminishing returns of time, particularly when this is not accompanied by adequate content coverage and instruction, the authors say that the task is rather to “arrange matters so that student learn more in the same time”.

Since these meta-analysis results are carried out for a lot of other malleable variables that are expected to correlate with student achievement, it is possible to assess the relative importance of time, as compared to other factors, like feedback

¹ Massed practice refers to working for extended time on specific subject matter, whereas spaced practice means more frequent engagement on smaller chunks of subject matter.

and reinforcement, one-to-one tutoring, homework, etc. The position of time in the first meta-analyses is about average, whereas the effects reported for engaged time and time on task in the synthesis of meta-analyses, is fairly high, quality of instruction, for example has an effect size of $r = 0.47$.

It should be noted that these studies use broad generalizations, both with respect to the dependent variables (like mathematics, science and reading all thrown together) and with respect to the independent variables, it seems that allocated time, engaged time, and time on task are all analyzed together. Next, there is no mention of studies being experimental or observational, and, in the latter case, whether outcomes were adjusted for prior achievement or other student background characteristics.

Scheerens et al. (2007) combined the results of a meta-analysis on studies before 1995 with studies that were carried out between 1995 and 2005. Several operational definitions of time at school were combined.

Learning time	• Importance of effective learning • Time • Monitoring of absenteeism • Time at school • Time at classroom level • Classroom management
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In the Annex to this chapter a more detailed overview of operational variables, cited from this study, is presented.

The number of studies used for the analyses was 30, including 111 effect sizes (associations between time and educational achievement). In their analyses moderator variables referring to study characteristics were included. The results were as follows:

The estimated mean effect size of *learning time* was a correlation coefficient of 0.147 (significant at the 1 % level). Indicating that the 95 % prediction interval ranges between $Z_r = -0.0197$ and $Z_r = 0.491$ The analysis relating moderators to the effect size indicate that studies carried out in secondary schools show significantly lower effect sizes than studies in primary schools (a difference of -0.185), while studies employing other than multi-level techniques yield significantly higher effect sizes than studies that had applied multi-level techniques (a difference of 0.21). Finally, there was also a difference between countries. Studies carried out in the Netherlands came up with significantly lower effect sizes than all other countries, excluding the USA (a difference of -0.145). On average, the effect size of Dutch studies was about 0.05.

As compared to other effect sizes for school effectiveness enhancing variables in this study, time had about the highest effect.

Kyriakides et al. (2010) conducted a meta-analyses that involved school and classroom level variables incorporated in the dynamic model of educational

effectiveness (Creemers and Kyriakides 2008). “Management of time”, is one of the school level factors that was incorporated. It is described as: “school policy on the management of teaching time”, and considers issues like whether lessons start on time and finish on time, and the (non-)occurrence of interruptions of normal lesson time, due to staff meeting, festivals, and other school events. In their summary table they use the term “quantity of teaching” and report an effect size, in terms of a correlation, of 0.16 based on 18 studies. This effect size was comparable to what they found for other school level variables from their model, e.g. 0.15 for opportunity to learn, 0.17 for quality of teaching and 0.18 for student assessment.

Hattie (2009, p. 184) summarized the effect sizes reported in four meta-analyses about “time on task”. The overall effect size, based on these four meta-analyses amounts to $d = 0.38$. This average effect is based on a total of 100 studies and 136 replications. Details on the way time on task was defined and measured in these meta-analyses and the studies on which they were based are not provided. In the discussion of these results, Hattie, like other authors, emphasizes that what matters is the productive use of time, implying that what matters most is to create conditions that keep students engaged, rather than just extending time.

A variable that comes perhaps closer in measuring engaged time is “classroom management” as defined by Marzano (2000), and cited by Hattie (2009, p. 102). Marzano obtained an average effect size across 100 studies of 0.52. Similarly related is the variable “decreasing disruptive behavior”, as this variable can also be read as a straightforward measure to increase engaged time even if the allocated time would remain the same. The overall effect size for this variable is $d = 0.34$, based on three meta-analyses, comprising 165 studies and 416 replications.

In Table 2.1 an overview of the results of the cited meta-analyses is presented.

Table 2.1 Overview of effect sizes of “time” in earlier meta-analyses

Meta-analysis by	Time described as	Mean effect size (Cohen’s d)	Mean effect size (Correlation coefficient r)	Number of studies	Number of replications
Fraser et al. (1987) (1)	Instructional time	$d = 0.36$	$r = 0.18$	7,827	22,155
Fraser et al. (1987) (2)	Engaged time	$d = 0.83$	$r = 0.38$		
Fraser et al. (1987) (2)	Time on task	$d = 0.88$	$r = 0.40$		
Scheerens et al. (2007)	Learning time	$d = 0.31$	$r = 0.15$	30	111
Creemers and Kyriakides (2008)	Quantity of teaching	$d = 0.33$	$r = 0.16$	18	
Hattie (2009)	Time on task	$d = 0.38$	$r = 0.19$	100	136
Hattie (2009)	Decreasing disruptive behavior	$d = 0.34$	$r = 0.17$	165	416
Marzano (2000)	Classroom management	$d = 0.52$	$r = 0.25$	100	

In order to present comparable estimates, conversion from d to r and vice versa was carried out (Borenstein et al. 2009, p. 48). The average effect size found in these meta-analyses amounts to $d = 0.49$ and $r = 0.23$. When leaving out the outlying value from Fraser et al. (1987), these values would be reduced to $d = 0.37$ and $r = 0.18$.

Conclusions

Compared to the effects of other educational effectiveness enhancing conditions the mean effect size computed on the basis of the results shown in Table 2.1, is to be seen as a sizeable effect, although compared to general effect size standards (Cohen 1969) still a small effect. According to Cohen (1988), effect sizes rendered as correlations of 0.10, 0.30, and 0.50 are to be interpreted as small, medium, and large, respectively. When d is used to express effect sizes these values are 0.2, 0.5, and 0.8.

When interpreting these results, two limitations should be taken into consideration. First, it appears that in most of the analyses a broad range of different operational definitions of time was used in the studies on which the meta-analyses were based, see for example the range of options shown in the annex, based on Scheerens et al. (2007). In most publications the variability in operational definitions is not made explicit. Second, these meta-analyses are based on bi-modal associations, in this case between time and educational achievement, mostly reading and mathematics achievement. In case of correlation of time with other effectiveness enhancing factors, for instance, opportunity to learn, it is likely that the time effect will also include some influence from these other variables. The relatively high effect sizes would suggest support for the common sense consideration that when schools pay attention to effective use of time, and to foregoing time loss and disruptions, they would also be likely to make good use of time, in other words fill the available time with good quality teaching and instruction. To the degree that studies have succeeded in measuring engaged or productive learning time this latter condition is more or less part of the construct as defined.

A final limitation of the meta-analytical results is that nuances with respect to subject matter area and different effects for different kinds of students are usually not included. On the basis of a review of the literature Poway (2002) states that the effect of time is stronger for highly structured subjects, like mathematics, science, and reading, than for the more open subjects like art and social studies. There is also a strong suggestion in the literature that sufficient time is especially important for the weaker students. This notion is one of the core ideas of Mastery Learning.

Homework

Conceptualization

Homework is defined as performing school curriculum tasks outside regular school classes (Cooper 1994 cited in De Jong et al. 2000, p. 132; Walberg and Paschal 1995).

The assumed benefits expected of homework are: more time, in a situation of curriculum overload, more content, opportunity to learn, more time to understand the subject matter, stimulation of meta-cognition, and improved study skills, fostering independent learning and endurance. Homework is not just to be seen as an individual effort from students. Support and facilitation are expected from school management, teachers, and parents. At school level it is relevant whether or not the school has an explicit policy on homework. At the level of teachers, grading of homework and providing feedback are important conditions. And, finally, a supportive and activating role of parents is relevant as well.

De Jong et al. (2000) distinguish three facets of homework: amount of homework, homework frequency, and time spent on homework. Of these three variables amount of homework was the only one that had a positive significant effect on student achievement. In their study, amount of homework was defined as how many tasks from the math curriculum were finished during homework. So, one could say that the effect of extra time, by means of homework, depended solely on the extra content that was covered. Other authors use terms describing facets of homework differently. Time spent on homework is often defined as the time spent on homework *per week*. Trautwein and Köller (2003) define “amount of homework” as the combination of homework frequency (i.e., frequency of homework assigned by the teacher, a class-level variable) and homework length, i.e. the time typically spent on homework *per day*, a typical student-level variable, which can nevertheless be aggregated at the class level). Schmitz and Skinner (1993) define *homework effort* as the way students rate their subject effort needed to do homework.

From the study by De Jong et al. (2000), it appeared that in Dutch secondary education school homework policies hardly existed. The authors also noted that checking homework is not a routine practice in Dutch secondary schools. The average amount of time that students spent on homework, each time homework was assigned, was 30 min. The correlation between time spent on homework and achievement was negative in this study ($r = -0.15$), while carrying out homework assignments during lesson hours correlated positively ($r = 0.15$). The negative correlation for homework time could be interpreted in the sense that high performing students spent less time on homework. Trautwein and Köller (2003, p. 133) say about the negative correlation between homework time and achievement that “Overall we assume that time actively spent on learning activities (including homework) fosters achievement, but there is no relationship, or perhaps even a negative relationship between time *needed* for homework and achievement”

As was the case in interpreting the effect of extra or more efficient use of teaching time, effects of homework are not easily definable as a pure matter of time, but strongly conditioned by variables like content covered and quality of teacher support. Trautwein and Köller (ibid, p. 121), discuss a study by Cool and Keith (1991). These authors found a positive correlation of time spent on homework and achievement of 0.30, but this effect totally disappeared: “After controlling for motivation, ability, quality of instruction, course work quantity, and some background variables, however, no meaningful effect remained (p. 121)”.

Multilevel modeling allows for distinguishing homework time effects at aggregated (school, classroom) level and individual student level. A frequently occurring result is that at aggregate level a positive association is found, and a negative association at the individual student level (Trautwein et al. 2002; Gustavsson 2010). This could be interpreted as the potentially positive effects of homework policies being off-set at individual level by reversed causation (low achieving students need more time for homework).

Several authors emphasize the relevance and opportunity homework assignments offer for stimulating self-regulated learning, including meta-cognitive strategies and influences of motivation and self-efficacy (Trautwein et al. 2002; Winne and Nesbit 2010; Zimmerman and Kitsantas 2005). These latter authors tested a path model in which prior achievement impacted on quality of homework and self-efficacy of students, while these variables in turn were positively associated with Grade Point Average.

As with time on task, spaced versus masses practice has also been studied with respect to homework. Bembenuddy (2011) found that frequent short episodes are better than fewer longer assignments.

Meta-analyses

Paschal et al. (1984) report on a meta-analysis based on (quasi-) experimental studies. Treatments were homework versus no homework, and graded versus non-graded homework. They report that in 8 out of 9 comparisons the treatment group did significantly better. Based on 81 comparisons, they found a weighted average effect size of $d = 0.36$.

Cooper (1989) reports an overall effect size of 0.21, based on 20 studies. Effect sizes for elementary schools (grade 4–6, $d = 0.15$) were lower than for middle schools (grades 7–9, $d = 0.31$), while the strongest effects were found at the level of high schools (grades 10–12, $d = 0.64$). Effect sizes were weaker in mathematics as compared to language ($d = 0.16$). Cooper’s results were criticized for methodological shortcomings (cf. Trautwein et al. 2002). Only in four cases were the effect measures counterbalanced (adjusted for student background characteristics) or were gains reported. In these cases a negative d of -0.08 was found, suggesting that the positive overall effect might be confounded by the effect of student background characteristics.

A more recent study led by the same author (Cooper et al. 2006) was largely based on the National Educational Longitudinal Study (NELS). In different sub sets of experimental and cross-sectional studies, the effect of homework versus no homework was analyzed. The overall result was an effect size of $d = 0.61$. In addition 32 correlational studies were analyzed and they indicated an average effect of $r = 0.24$ when applying a fixed effects model and of $r = 0.16$ when applying a random effects model. In the 2006 report slightly stronger homework effects were found for mathematics as compared to reading.

Scheerens et al. (2007) carried out a meta-analyses in which 21 studies and 52 replications were analyzed, yielding a mean effect size of $r = 0.07$. By way of illustration the kind of operational measures (questionnaire items) that were used in the underlying studies are summarized in the table below.

Homework	• Attention for assigning homework at school/agreements in school work plan • Homework after last (arithmetic) lesson: yes/no • Number of homework assignments per week • Type of homework (arithmetic/language) (reading/composition writing) • Amount of homework • Amount of time needed for homework (per day) • Extra homework for low achieving pupils • Successes and problems now and 5 years ago with respect to: - Prioritizing homework - A consistent homework policy • Whether homework assignments are graded or not
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When taking account of moderator variables (study characteristics) the effect sizes were substantially higher in the USA and the Netherlands, than in all other countries. No subject effect was found.

Hattie (2009, 234) reports an average effect size for homework of $d = 0.29$, based on 5 meta-analyses, 161 studies and 295 effects (replications). He draws attention to the findings of Cooper that effects are higher for high school students than for middle school and elementary school students. In his comment he expresses a certain degree of skepticism with respect to the expectations that homework will stimulate higher order cognitive processes and meta-cognition. This is not likely to happen, particularly for low achieving students. According to Hattie, (ibid, p. 235) the effects of homework are highest, whatever the subject, when homework involves rote learning, practice, or rehearsal of the subject matter.

In Table 2.2 an overview of the results of the cited meta-analyses is presented together with two additional references to meta-analyses, cited from Marzano and Pickering (2007), Bloom (1984), Graue et al. (1983).

Table 2.2 An overview of results from meta-analyses on the effects of homework

Meta-analysis by	Homework described as	Mean effect size (Cohen's <i>d</i>)	Mean effect size (Correlation coefficient <i>r</i>)	Number of studies	Number of replications
Graue et al. (1983)	Homework	$d = 0.49$	$r = 0.24$		29
Bloom (1984)	Homework	$d = 0.30$	$r = 0.15$		
Paschal et al. (1984)	Homework	$d = 0.36$	$r = 0.18$		81
Cooper (1989)	Homework versus No Homework	$d = 0.21$	$r = 0.10$	20	20
Cooper et al. (2006)	Homework versus No Homework	$d = 0.61$	$r = 0.29$	18	18
Scheerens et al. (2007)	Homework	$d = 0.14$	$r = 0.07$	21	51
Hattie (2009)	Homework	$d = 0.29$	$r = 0.14$	161	295

Transforming the effect size found in Scheerens et al. (2007) to a *d* of 0.14, the average effect size across these meta-analyses amounts to $d = 0.34$. Leaving out the outlying value of $d = 0.61$ from the Cooper et al. study (2006), this average reduces to $d = 0.30$, $r = 0.15$, equal to the average effect size reported by John Hattie based on 5 meta-analyses.

An interesting research synthesis that did not present overall effect sizes, but just categorized effect sizes of homework as negative or positive, and small, medium, and large, was carried out by the Canadian Council on Learning (2009). They examined the results of three kinds of studies on the achievement effects of homework: net impact studies, pedagogically enhanced homework studies, and parental involvement studies. In the domain of the net impact studies 24 outcomes were positive, of which 18 showed outcomes that are described as large enough to have practical significance. Still eight outcomes showed negative results. On further inspection these eight negative outcomes all resided from studies by Trautwein et al. (2006), and Trautwein (2007), and resulted from multilevel analyses showing moderate positive effects of time spent on homework at school or classroom level, and negative effects at the individual student level. Pedagogically enhanced homework experiments and experiments that stimulated parental involvement with homework showed medium-sized positive effects.

Conclusion

The results of meta-analyses on the effects of homework on achievement show small to medium positive effects. A limitation of these results is that they are usually a mixture of different specifications of homework, and are more to be read as a general overall effect. Individual studies, like the ones by De Jong et al. (2000),

Trautwein (2007) and Trautwein et al. (2006), indicate that it matters a lot, which in specific operational definition of homework is used.

Time spent on homework has mixed effects. When multilevel modeling is applied effects shows up only at the aggregate (school or classroom) level while effects are negligible or negative at individual student level.

Amount of homework defined as the quantity of content covered during homework assignment had a clear effect in the study by De Jong et al. (2000). This operational concept is close to what Mooring (2004) calls homework completion, and for which she found a strong effect.

Homework effort is based on students' ratings of the effort invested in homework. For this variable, Trautwein (2007) reports medium to strong effect sizes.

Homework effort and amount of content covered in homework assignments appear to be more powerful associates of achievement than time spent on homework and frequency of homework assignments.

After-School Programs and Extended Learning Time

Conceptualization

While homework was defined as students performing learning tasks outside regular school hours, programs that provide activities outside regular school hours include the involvement of adults, either volunteers, youth or social workers, and educational professionals. After school programs have a long history in the United States and, where it is still growing in importance. Zief et al. (2006) state that the amount of after school programming in the USA has been growing tremendously during the last two decades. In the year 2000 two-thirds of school principals reported that their schools offered these programs. The estimated budget for these programs, including funding from the federal government, states, localities, and private foundations were estimated to nearly \$1 billion in 2004. According to Zief et al., a "care-taking" motive is predominantly behind this, namely doing something about the fact that growing numbers of children between the ages of 6 and 12 are frequently unsupervised after school, figures that have increased as more women entered the working force. After school programs may be dedicated to fun, community activities, sports, and arts, and only a subset has enhanced educational performance as a key objective.

After school programs may be carried out in the form of an extended school day, an extended school week, temporary programs outside school hours, or programs during the summer holiday, (summer learning).

Miller (2003) mentions four prototypes of After School Programs: school-age child care, youth development, extended learning, and enrichment activities. The major goals of school-age child care are to provide supervision for children of working class families and to support child development. Youth development programs are aimed at promoting youth development and prevent risky behaviors.

Extended learning is aimed at improving academic achievement and decrease gaps in academic achievement. Enrichment activities are to increase skills in particular areas (arts, sports) and stimulate interest in various topics and activities. The third prototype program, “extended learning”, is most in line with the overall focus in this report, namely the effect of more efficient use and expansion of structured teaching and learning activities on student outcomes. Among Miller’s four prototypes, extended learning is the only one that has teachers and paraprofessionals as staff, whereas the other prototype programs depend on child care staff, youth workers and “experts in a particular area”. Three major categories of intended outcomes of after school programs are reducing negative behavior, increased attitudes and behaviors linked to school success, and improved academic performance. The first two intended outcomes are mostly associated with child care, youth development, and enrichment activities, the last outcome, improved academic performance, is more specifically associated with extended learning.

After school programs may have a compensatory purpose, and be specifically designed to support disadvantaged learners, and/or an enrichment purpose, where extra content, like language arts, are offered. A final purpose of after school learning is fostering social and independent learning skills. “After school programs are uniquely poised to help young people to see themselves as learners in an informal hands-on learning environment. They can bring peers, parents, and the community together. They can create the foundation for a positive peer culture that values learning skills and contributes to society” (ibid, p. 29).

Current policy in the United States emphasizes the educational and didactic quality of after school extended learning programs (National Academy of Education, White Paper 2009). The White Paper suggests that if “extra” just means extending time, the expectations of achievement gains are poor. They cite a study by Levin and Tsang (1987), who found that 10 % extra time resulted in 2 % more learning. At the same time they refer to a study by Berliner (1990), which supported the claim that if time is purposefully used to enhance achievement outcomes, more gain is actually achieved. Although the White Paper supports the position that programs should be more intensive and structured, they also note that examples of very intensive programs experienced problems of attrition, of staff and students. With respect to the White Paper’s hope that private funding could be a turnaround option, the experiences with Charter Schools do not seem to unilaterally make this promise true. Stein and Bess (2011), report that Charter Schools did not offer more extra learning time than regular schools.

Fischer and Klieme (2013) report on experiences with an extended school day in Germany. This policy comes down to extending the traditional lesson hours that are limited to the morning, to afternoon school. The study suggests that the extended school day in Germany has broader pedagogical and social aims than enhanced student achievement in school subjects. Countering misbehavior is one of them. Adult supervision is provided by youth workers and educational professionals. The value of the extended school day for educational achievement depends on the linkage between the school curriculum and the way the extra time is being spent. Effects on school grades were only noted for those students who

took active part in curriculum-related activities. Positive effects were noted with respect to countering misbehavior.

The British program “Playing for Success”, is targeted under achieving students (Appelhof 2009). They are invited to take part in a 2-months intensive program, enforced by soccer players and other sport idols. The aim is to foster self-confidence and to allow for successful experiences. Preliminary evaluations (Sharp et al. 2001) have shown positive effects on self-confidence. More recent results show diverging success, depending on the intensity of the approach (Sharp et al. 2007, cited by Appelhof 2009).

The objective of this limited international overview was just to show the broad range of program variation in the After School programs. (In the final chapter of this report, the Dutch policy initiatives and experiences will be referred to). The results obtained obviously depend on the intended outcomes, that may range from extended cognitive school learning, special attention for independent learning, to fostering self-esteem and self-confidence, and countering misbehavior. Programs may also have a more or less specifically targeted emphasis on improving the position of disadvantaged learners. Moreover, programs may have a more general caretaking and social and pedagogical monitoring function, as compared to an educational achievement orientation.

Meta-analyses

Cooper et al. (2000) carried out a meta-analysis of remedial and accelerated learning oriented summer school programs. The summer learning programs were classified as accelerated, remedial, or other. The average effects size across all 54 programs, and 477 effect sizes based on math and reading achievement, was $d = 0.26$. Cooper et al. (2000) say that this effect size should be considered “small” according to the established norms (Cohen 1969), but nevertheless comparable to the effect of all kinds of other school year long intervention programs. Borman and d’Agostino (1996), for example, found an overall effect size of 0.11 for such a general set of intervention programs (ibid, p. 99). An other reference point to compare effect sizes was Lipsey and Wilson’s (1993) compendium of meta-analyses based on studies in education, mental-health, and organization psychology, arriving at an average effect size across these domains of $d = 0.50$. The authors conclude that about three-fourth of the 180 meta-analyses carried out in education had larger effect sizes than theirs on summer learning.

In their study students from middle class backgrounds benefitted somewhat more than students from disadvantaged homes, and effects for mathematics were somewhat larger than for reading.

Conditions for successful summer learning programs are: early planning of activities, continuity of programs and staff across years, using summer schools in conjunction with professional development activities of staff, and integration of summer learning experiences with those during regular school hours.

Scott-Little, Hamann, and Jurs (200, p. 388) looked at a broader range of after school programs, than the summer learning programs that were focused in the analysis by Cooper et al. (1996): “After school services were defined as a program offered at the end of the school day where children are involved in planned activities supervised by adults (paid or volunteer)”.

These authors studied 34 extended day and after school programs comprising:

- language arts after school programs
- study skill programs
- academic programs in other curriculum areas
- tutoring programs for reading
- community based programs.

They succeeded in using effect sizes from only six studies, which had used comparison groups. The mean effect sizes found were 0.16 for mathematics and 0.21 for reading.

The success of programs was seen to depend on:

- structure and a predictable schedule
- strong links to the school day curriculum
- well-qualified and trained staff
- opportunities for one-to-one tutoring.

Lauer et al. (2004) published a synthesis of effect studies on extended school time and summer learning. The average (random) effect size for mathematics was 0.17 and for reading 0.13, based on 22 math studies and 27 reading studies. Moderator variables in the analyses were, among others, grade level. The programs for mathematics had the highest effect in high school, whereas the reading programs had the highest effect size in elementary school. Effect sizes were larger for programs that lasted more than 45 hours, however, a non-significant effect was found for a program that lasted over 210 hours. The largest results were found for programs that used one-to-one tutoring. They also found that effect sizes were higher for published as compared to non-published sources.

Zief et al. (2006) concentrated on after school programs that operated on a regular basis during the school year (thus excluding summer programs) and include some kind of educational support service. They used rigorous selection criteria (only experimental intervention studies), which left only five studies that were amenable to meta-analysis. However, 97 impacts (replications) were included in these five studies. They found small effect sizes of 0.028 on a reading test and 0.08 for, when outcomes were measured as school grades. No less than 84 of the 97 impacts that were studied were not significant. The authors also note that impacts for parents were not found in any of the studies. The “null findings”, of this study might be attributable to: the rigorous selection of studies, the relatively limited time duration of the programs, 5–9 months, or the fact that these programs were mixtures of a range of academic, recreational, and enrichment activities.

Durlak et al. (2010) conducted a meta-analyses on after school programs, meant to promote personal and social skills (e.g. self-management, self-efficacy, self-control, and self-awareness). The after school programs which were studied, occurred during the school year, outside normal school hours, and were supervised by adults. Their overall conclusion was that the results demonstrated significant increases in the students’ self-perceptions and bonding to school, positive social behavior, school grades, and levels of educational achievement, as well as significant reductions in problem behaviors (ibid, p. 294).

Their meta-analysis was based on 75 studies and yielded average effect sizes when outcomes were measured as school grades of 0.22 and 0.20 (achievement measured by tests). For social and behavioral outcomes average effect sizes in the order of 0.30 were compiled. They found a moderator effect for the presence of four recommended practices, associated with earlier successful skill training (sequenced, active, focused, and explicit).

A summary of the results of these quantitative meta-analyses is provided in Table 2.3.

Table 2.3 Overview of results from meta-analyses on the effect of after school programs and extended learning time

Meta-analysis by	After school program described as	Mean effect size	Number of studies	Number of replications
Cooper et al. (2000)	Summer school programs	$d = 0.26$	47	477
Scott-Little et al. (2002)	After school services	$d = 0.16$ for mathematics $d = 0.21$ for reading	34	
Lauer et al. (2004)	Extended school time and summer learning	$d = 0.17$ mathematics $d = 0.13$ reading	22 27	
Zief et al. (2006)	Educationally supported after school programs	$d = 0.028$ reading $d = 0.07$ grades	5	97
Durlak et al. (2010)	After school programs meant to promote personal and social skills	$d = 0.22$ grades $d = 0.20$ achievement	75	

The results shown in Table 2.3 indicate an average effect size, across meta-analyses of $d = 0.16$; when removing the outlying value of 0.028 from Zief et al. (2006) meta-analyses this would become $d = 0.18$.

According to conventional norms this would qualify as a small effect, but various kinds of reasoning presented in the above would suggest that it is not so small, when compared to the effects of other educational interventions.

Discussion

Valentine et al. (2010) present a critical analysis of 12 research syntheses of After School Programs, including most of the ones shown in Table 2.3. They observe great heterogeneity in the coding of what counted as an eligible program to be included in the meta-analyses. This means that the kind of after school programs and extended learning time is much diversified and combining syntheses is only possible at a high level of abstraction.

Valentine et al. also observe a similar kind of heterogeneity in the application of methodological criteria for including studies, and the methods that were applied to synthesize information from the underlying studies. Last but not least they say that methodological limitations call for the utmost prudence in drawing causal conclusions. They conclude that in fact “we know very little” about the causal impact of after school programs. One of the major shortcomings is lack of insight in the mechanisms through which after school programs bring about the desired outcomes. More recent meta-analyses that include study characteristics as moderators are a step forward in this direction. An example is the approach followed by Durlak et al. (2010) who included the presence or absence of a preferred methodology for skill development as a moderator variable and concluded that the business of extended learning time could benefit from an evidence-based approach.

Features of effective after school programs that have been mentioned in this section are:

- alignment of the contents of the program with the regular school curriculum;
- professional educators and counselors delivering the program;
- a structured approach;
- sufficient duration of the program (over 45 hours, was mentioned in one of the studies).

The literature that was reviewed indicates that after school programs have different missions. The most important ones are:

- a caretaking function that addresses the problem that young children are left unmonitored for a sizeable amount of time;
- an educational achievement oriented emphasis, which may have either a remedial or an enrichment emphasis, with the former particularly aimed at students from disadvantaged backgrounds;
- a broad approach where social emotional development, involvement with the local community and “life skills” are added to caretaking and educational achievement.

As an illustration of a broad orientation in after school programs the “principles of effective out-of-school time programs and summer schools” mentioned by Terzian et al. (2009, p. 27), are cited below.

- Form collaborative partnerships with key stakeholders
- Involve families and communities
- Utilize well-trained, experienced staff
- Offer ongoing staff development
- Plan programs deliberately
- Make programs affordable and accessible
- Promote positive relationships with caring adults
- Provide positive role models
- Reward good behavior
- Teach school cognitive skills, life skills, and character development
- Make learning fun and hands on
- Intervene more intensively with at-risk students
- Evaluate programs continually to inform design and implementation.

Conclusions

Effective use of regular school time, homework, and extra out-of-school time appears to have small to moderate positive effects on educational achievement in basic subjects, mathematics and reading. The average effect sizes for these three “arena’s” for optimizing learning time are 0.37, 0.29, and 0.18, respectively.

These coefficients should be interpreted with some caution, however. Meta-analyses that have investigated the effects of regular school time usually throw together a range of different “treatments”, varying from increments in “statutory”, official school or teaching hours, to more efficient use of teaching time, time on task, and “quality time”. Moreover, in order to be effective it is obvious that time should be “filled” with relevant educational exposure, particularly in terms of content covered and also in term of effective teaching processes. In empirical studies these variables are not always controlled for, so that it should be assumed that “time” effects pick up the effects of content covered and teaching quality. Studies on the effects of homework seem to underline this point. On the few occasions that pure time effects, in terms of frequency and duration of homework assignments could be separated from content covered, it was the latter facet, indicated as “amount” of homework, which appeared to be the most important (De Jong et al. 2000). Of the three major strategies to manipulate time in education the third one, out-of-school learning is the most heterogeneous one. This is

particularly the case because after school programs often have broader pedagogical and caretaking objectives than just enhancing student achievement. The cited meta-analyses reflect this heterogeneity, and it is therefore understandable that the average effect size is more modest, as compared to the effects of time at school and homework, because not all of the available time is dedicated to academic objectives.

A second reason to interpret the coefficients carefully has to do with methodological flaws in the original studies as well as the meta-analyses (Kane 2004; Kohn 2006; Trautwein et al. 2006; Canadian Council 2009; Valentine et al. 2010; Redd et al. 2012). Kane (2004) argues that a reasonable expectation for the effect size of After School Programs, is low as between $d = 0.05$ and 0.07 . Kohn provides a “taxonomy of abuses” in studies that have attempted to assess the effect of homework and concludes, after a thorough review of the literature, that there is virtually no evidence that unequivocally supports the expectation that homework has beneficial effects on academic achievement or on attitudes that would be supportive of independent learning. Valentine et al. (2010) critically analyzed 12 meta-analyses on the effects of After School Programs, and lay bare great diversity in the methods applied in these meta-analyses, while concluding that the outcomes reported are divergent to an extent that they do not provide clear messages to policy makers on the potential effects of these programs. Similar cautions are expressed by Redd et al. (2012) when they conclude that After School programs *can* be effective.

Still, also when compared to other educational effectiveness enhancing conditions, extra time should be seen as an important condition to “increase well targeted exposure to content” as a strong mediator of student achievement.

Of the three variations of time use discussed in this chapter optimizing time at school extended, out-of-school learning, are associated with equity oriented policies to enhance the position of disadvantaged learners. This applies to a lesser extent to homework, for which disadvantaged learners might strongly depend on guided, structured, and closely monitored homework.

No studies on the cost effectiveness of these three time-oriented strategies were found. It would seem, however, that the least effective strategy of the three, extended learning time and after school programs, is by far the most expensive one, and therefore also the least cost-effective strategy.

Annex to Chapter 2

Operational interpretations of “time”, from Scheerens et al. (2007)

Factor	Components	Sub-components and exemplary items
9. Effective learning time	9.1 Importance of effective learning	• Emphasis on – Developing better policy and better procedures to enlarge instruction time • Impeding/progressing school effectiveness: – Good registration of presence and absenteeism – Good class management – Give high priority to homework
	9.2 Time	Scale of 6 items measuring: starting lessons on time, prevention of disturbances, rules on student truancy (range 1–18)
	9.3 Monitoring of absenteeism	• % of pupils truanting • The way the school handles absenteeism and lateness • Satisfaction with respect to pupils’ presence now and 5 years ago
	9.4 Time at school	• Number of school days • Number of teaching days/hours – Number of teaching days per school year – Number of full teaching days per school week – Number of semi teaching days per school week – Total number of hours per school week – Length of a school day • % of canceling of lessons • Number of days with no lessons due to structural causes • % of total number of hours indicated on the table • Measures to restrict canceling of lessons as much as possible • Policy with respect to unexpected absenteeism of a teacher • (in school work plan) agreements on substituting teachers
	9.5 Time at classroom level	• Number of lessons on timetable per school year • A lesson consists of how many minutes • Amount of teaching hours for language/arithmetic • Amount of minutes for arithmetic/physics per week • Duration last arithmetic lesson in minutes • Accuracy with respect to starting and finishing lessons in time now and 5 years ago • Number of lessons that are canceled • Satisfaction with respect to available amount of time for working in the classroom

(continued)

(continued)

Factor	Components	Sub-components and exemplary items
	9.6 classroom management	• Attention for classroom management in the school work plan – With respect to lesson preparation – Rules and procedures for the lesson's course • Situation with respect to aiming at work in the classroom (now and 5 years ago) • Average % of teachers spending time on: – Organization of the lesson – Conversation (small talk) – Interaction with respect to the work – Supervision (pupil activities/behavior) – Feedback/acknowledgement • Average time during lesson spent on discussing homework, explaining new subject matter, maintaining order • Sources of loss of time during lessons: – Pupils do not know where to find equipment – Disturbances due to bad behavior of pupils – Frequent interruptions – Loss of time due to lengthy transitions from one activity to the next – Unnecessary alterations in seating arrangements – Frequent temporarily absence of pupils during lessons – Waiting time for individual guidance Many (more than 3) teacher interventions to keep order – Lack of control on pupils' task related work

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