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ABSTRACT

A quasi-experimental, treatment-control group investigation was designed to test the effects of a preservice training course on effective instruction. Research findings from teacher effects research and cognitive strategy instruction were translated into two direct instructional models: one model for explicit or well-structured skills and one model for implicit skills or higher-level thinking strategies. Following a course on effective instruction from their teacher educators, student teachers implemented standardized lessons to apply selected research-derived teaching behaviors and to increase pupil engagement rates. Based on trained observers' pre- and post-training classroom observations, a significant treatment effect was found for student teachers' teaching behaviors regarding effective instruction and for pupil engagement rates. Ratings from supervising teachers also showed that the student teachers who participated in the course on effective instruction used the recommended instructional skills after completion of the course significantly better than prior to the course. (Contains 22 references.) (Author)

EVALUATION OF A PRE-SERVICE TRAINING PROGRAMME BASED ON DIRECT INSTRUCTION

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Introduction

One of the key tasks of colleges of education is to teach pre-service teachers how to teach effectively. Research on effective teaching has identified teacher behaviours and patterns of teacher-pupil interaction associated with pupil gains (Brophy & Good, 1986; Rosenshine & Stevens, 1986). 'Research on teaching, if interpreted appropriately, is a significant resource to teachers: it both validates good practice and suggests directions for improvement' (Brophy, 1992, p. 4). Although we have much knowledge about effective teaching practices that can be used to improve pupil learning, too little of that research has been used in teacher preparation programmes. Because we are facing a crisis of confidence in teacher education, improving teacher education is of vital importance. Based on the recognition that there is now a teaching effectiveness knowledge base of considerable range and depth that can be used for teacher education programmes and as a reaction to heightened concern about the quality of existing teacher education programmes, the Protestant Educational Advisory Center and the Department of Educational Sciences of the University of Nijmegen, took the initiative to aid colleges of education in considering and assimilating relevant research on effective instruction in their attempts to improve (cf. Vaughan, 1984). This study was partly based on the positive findings of the staff development programme 'Dealing with mixed-age classes' (Veenman, Lem & Roelofs, 1989; Roelofs, Raemaekers & Veenman, 1991). This staff development programme was inspired by the research on teacher and school effectiveness. In one of the components of that programme teachers were informed of the findings of research on effective instruction. It was decided to develop a new and more extended course on effective instruction for student teachers.

Direct instruction

In examining ways to provide more effective instruction for pre-service teachers the direct instruction model was chosen. Although the term direct instruction has a number of different meanings (cf. Carnine, 1989), the concept direct instruction as used in this study is a label for the constellation of effective teacher behaviours as synthesized by

Rosenshine & Stevens (1986) from correlational and experimental studies. Recent findings of research on effective teaching have yielded a pattern of instruction that is particularly useful for teaching a body of content or well-defined skills. This pattern is a systematic method for presenting material in small steps, pausing to check for pupil understanding, and eliciting active and successful participation from all pupils (Rosenshine, 1986, 1987). The core of this instructional model, as advocated by Rosenshine & Stevens (1986) and Good, Grouws & Ebmeier (1983) consists of six teaching steps or functions: 1) daily review, 2) presenting new material, 3) guided practice, 4) independent practice, 5) weekly and monthly review, and 6) providing feedback and correctives. This instructional model is most applicable to the teaching of performance skills or to the teaching of well-structured learning-material (reading decoding skills, mathematical procedures, explicit reading procedures, grammatical concepts and rules, grammar, science facts, social studies facts). In our study this instructional model is called the direct instruction model for explicit skills.

The instructional model for explicit skills is less relevant for teaching in areas that are less well-structured, that is, where the skills do not follow explicit steps, and where more than one answer is acceptable. Therefore, this model is less useful for teaching composition, writing different types of essays, finding the main ideas in texts, and analyzing poems or historical trends. Because the teacher-effectiveness research has not clearly yielded a pattern of instruction that is particularly useful to the teaching of implicit or higher-order skills, Rosenhine & Edmonds (1990) reviewed the existing literature on the teaching of less structured skills: experimental studies which were successful in teaching pupils higher level skills such as summarizing a paragraph, generating questions after reading a paragraph, organizing the writing process, and solving mathematical problems.

In a recent review Rosenshine & Meister (1992) use the term 'higher-level cognitive strategies' instead of implicit skills. 'A strategy is not a direct procedure; it is not an algorithm. Rather a strategy is a heuristic that supports or facilitates the learner as he or she learns to perform the higher-level operations' (Rosenshine & Meister, 199 p. 26). The teaching of higher-level thinking operations is based on the research on cognitive strategy instruction (Pressley, Johnson, Fleet & Zajchowski, 1989) or on 'cognitive apprenticeship' (Collins, Brown & Newman, 1989).

A major organizing concept for the teaching of implicit skills or higher-level thinking

strategies is that of scaffolding. Scaffolding refers to the instructional support which pupils receive from the teacher in order to help pupils bridge the gap between their current abilities and the goal. A scaffold or support is temporary and adjustable, it is used to assist the learners, and it is gradually withdrawn as the learners become more independent (Palinscar & Brown, 1989; Rosenshine & Edmonds, 1990; Rosenshine & Meister, 1992). Scaffolds may include: modeling the skills or strategies by the teacher, thinking aloud as an expert to make mental processes 'visible' (cf. Schoenfeld, 1985), providing procedural facilitators (cf. Bereiter & Scardamalia, 1987), reciprocal teaching (cf. Palincsar & Brown, 1984), prompts, aids, guidance from the teacher, providing pupils with models of finished work to allow pupils to compare their work with that of an expert, checklists to assist pupils in developing a critical eye towards their work. Although the concept of instructional support and scaffolding can also apply to the teaching of explicit skills, it has its most meaningful impact in the area of the teaching of implicit or higher-level cognitive skills (Rosenshine & Edmonds, 1990; Rosenshine & Meister, 1992).

The core of the instructional model for teaching implicit skills or higher-level thinking strategies is largely identical with that of the model for teaching explicit skills: review, presenting new material in small steps, guiding initial pupil practice, providing extensive independent practice, feedback and correctives. Based on the reviews of Rosenshine & Edmonds (1990) and Rosenshine & Meister (1992) the instructional model for explicit skills was extended with the instructional elements that emerged from the implicit skill or cognitive strategy instruction literature. For example, the teaching function 'guided practice' was entended with teaching behaviours like: think aloud as choices are made, provide prompts or cue cards, provide half-done examples, gradually increase task complexity, engage in reciprocal teaching, provide procedural facilitators, have pupils work in small groups or pairs, facilitate application to new examples. In our study the extension of the model for explicit skills with these new instructional variables from the literature on implicit skills or cognitive strategy research is called the direct instruction model for implicit skills. Both models are used and explained in the course on effective instruction for pre-service teachers.

Research questions

The study examined the effects of a course on effective instruction containing a model for teaching explicit skills and a model for teaching implicit skills or higher-level thinking strategies. The research questions that guided the study were: 1) Do student teachers who participated in the course on effective instruction implement the desired teaching behaviours as presented in the two instructional models? 2) Is there a positive effect on pupil engagement rates in classes of student teachers who participated in the course? 3) Do co-operating or supervising teachers of student teachers who participated in the course on effective instruction observe changes in desired teaching behaviours? 4) How do student teachers and teacher educators value the new course on effective instruction?

Method and instrumentation

Design

The study comprised three sub-studies: 1) an observational study using ratings of trained observers, 2) an observational study using ratings of supervising teachers, and 3) a questionnaire and interview study focusing on participants' reactions to the course on effective instruction. Both observational studies were focused on the degree of implementation of the desired teaching behaviours.

The first observational sub-study, using trained observers, was set up as a field quasi-experimental pretest-posttest design with treatment (N = 27) and control (N = 14) groups of student teachers, and pupils associated with each student teacher.

The second observational sub-study, using supervising teachers (N = 41) was set up as a 'then-post' design, an adaptation of the 'pre, then, post' design (Mezoff, 1981).

To get information on the student teachers' (N = 130) and teacher educators'(N = 4) perceptions of the course on effective instruction questionnaires and interviews were used.

Subjects

Participants in the study were student teachers from three colleges of education for primary teachers enrolled in their second year of courses. Colleges A and B were located in the middle-east of the country, college C was located in the north-west of the country and comprised two buildings in two different places. In college A four classes were selected into the effective instruction course section, in college B one class, and in college C three classes. All student teachers in these 8 classes (N = 205) were instructed in the direct instruction models: the treatment group. In colleges A and B the course was conducted by one teacher educator, in college C by two different teacher educators. In each college, student teachers from parallel classes, taught by the same teacher educators, did not follow the course on effective instruction. Student teachers from these 6 parallel classes (N = 145) constituted the control group. All student teachers took their education courses along with field experience in which they spent one day each week in a primary classroom at the cooperating school. For logistical reasons (budget, time contraints and available observers), a restricted number of student teachers in the treatment classes were randomly selected for the observational study using trained observers. From colleges A and B 27 student teachers participated in the treatment observational group (18 from college A and 9 from college B). From the control classes 14 student teachers were assigned to the control observational group (7 from college A and 7 from college B). Student teachers from college C were also selected for the observational study (18 for the treatment group and 9 for the control group). By mistake the teacher educators did not inform the observers in which period they intended to start the course on effective instruction. When the observers contacted the teacher educators of college C, having finished the pre-observations in locations A and B, they were informed that the course had been completed. Based on this misunderstanding and because no pre-observational data existed for college C student teachers against which to compare change, the observational study for this college was dropped.

After the student teachers completed the course on effective instruction the supervising teachers were asked to rate the performance of their student teachers. Only 61 of the 150 mailed supervising teachers returned the rating scale with some supplementary questions

(response rate 41%). Of these 61 returned questionnaires, 41 were useful for further analysis (total response rate 27%).

Questionnaires were used to get information on the student teachers' perceptions of the content of the course (primarily the textbook), and their reports on their experiences with the implementation of the two models of direct instruction. These questionnaires on participants' reactions were submitted to all 205 student teachers who participated in the effective instruction course. Of these student teachers 130 returned the questionnaire (response rate 63%). Interviews were conducted with four classes of student teachers and their teacher educators to collect information on the implementation of the course and suggestions for improvement.

Direct Instruction Scale

After each observation, the Direct Instruction Scale (DIS) was used by the observers to assess student teacher's behaviour on a number of variables. These ratings consisted of four-point scales that focused on the instructional skills in the models for teaching explicit skills and implicit or higher-level thinking skills. The 20 variables of the DIS, listed in Table I, were based on the research of Rosenshine & Stevens (1986), Rosenshine & Edmonds (1990), and on the Management and Instruction Scale (MIS) that was used in our earlier research (Veenman, Lem & Roelofs, 1989; Roelofs, Raemaekers & Veenman, 1991).

Prior to collecting observational data, the three observers went through a training programme of about 35 hours, which involved the coding of videotapes as well as live coding of 15 lessons.

Inter-observer reliability checks based on live coding of 5 lessons for the separate instructional variables, estimated through analysis of variance, ranged from 0.72 to 1.00 (median 0.96), with the exception of one variable: 'providing varying contexts for pupil practice' (0.52).

On conceptual grounds, the 20-item scale was broken into two subscales: presentation skills and practice (guided and independent) skills. Measures of internal consistency (Cronbach's alpha) were computed for the whole scale and for each subscale, both for the

data obtained by trained observers and for the data obtained by supervising teachers. The alpha-coefficients are reported in Table I and II. Scores were computed for the whole scale, for each subscale and for each item of the DIS.

The observers had no knowledge of the group to which student teachers were assigned at the time of the observation.

After the student teachers completed the course on direct instruction, their supervising teachers were asked to complete a rating scale that was also used by the observers (the DIS). The supervising teachers were first asked to think back to the beginning of the course, and to rate the skills the student teachers demonstrated prior to the course (the 'then' score, since supervising teachers were thinking back to 'then' when they responded). Second, they were asked to rate the same teaching behaviours of the student teachers after completion of the course (post scores). The difference between 'post' scores and 'then' scores was used as an index for change in desired teaching behaviours.

Pupil engagement rates

Every 8 minutes during the lesson taught by the student teacher, the observer stopped notetaking and recorded the number of pupils in the class who were engaged in academic activities (on-task). An on-task score for the class was obtained by dividing the number of pupils engaged in the task at hand as defined by the teacher by the total number of pupils present, yielding a percentage of pupils classified as on-task. Each observation period lasted approximately 30 minutes and resulted in 3 on-task estimates.

The inter-observer reliability for on-task checks, estimated by analysis of variance (Winer, 1971), revealed a coefficient of 0.94.

Standardized lesson formats

To control for the influence of the lesson contents taught by the student teachers two types of lessons were designed: lessons for reading/language instruction and lessons for mathematics instruction. The mathematics lessons aimed at inviting the student teacher to the use of the direct instruction model for explicit skills. Topics in these lessons were addition problems and fractions. The reading/language lessons aimed at provoking the use

of the direct instruction model for implicit or higher-level cognitive skills. In these lessons student teachers were asked to teach their pupils a reading comprehension skill. The lessons contained a short introduction concerning the objectives of the lesson, its duration (approximately 30 minutes), the content and some examples for practice. No directives were given as to didactic or instructional procedures.

These two types of lessons were randomly distributed among the student teachers. Each student teacher taught one lesson in the cooperating school before the start of the instructional course (pretest), and one lesson after completion of the course (posttest). These lessons were developed for grades 3/4, 5/6 and 7/8. For each grade level one reading/language lesson and one mathematics lesson were designed (a total of 12 lessons, 6 for the pretest and 6 for the posttest). Student teachers who received a reading/language lesson for the pretest also got a reading/language lesson for the posttest. The same procedure was used for the mathematics lessons.

The instructional course

In the course 'Effective instruction: learning to teach by means of the direct instruction model' (Veenman (Ed.), Leenders, Meyer & Sanders, 1991) two versions of the direct instruction model were presented: one model for teaching explicit skills and one model for teaching implicit skills or higher-level thinking strategies. Student teachers were instructed to use these models in the cooperating school. The course consisted of three sections. In section one, student teachers were informed of the importance of pupil's cognitive development, pupil's motivation to learn, classroom rules, lesson planning. These elements are important in the pre-phase of the instructional process.

In section two, the two instructional models were presented: the direct instruction model for explicit skills and the direct instruction model for implicit or higher-level cognitive skills. Their use was illustrated for teaching subjects like reading/language, mathematics and social studies. This section provided concrete illustrations of how the instructional models might be used.

In section three some preconditions for effective instruction were discussed: effective classroom management skills, preventing disorderly situations, and self assessment of teachers. Sections one and three were partly based on the staff development programme

Dealing with Mixed-age Classes (Veenman, Lem & Roelofs, 1989; Roelofs, Raemaekers & Veenman, 1991).

The course on effective instruction was implemented by four teacher educators at three different colleges. Prior to the actual start of the course these teacher educators received a pre-training. During a one-day workshop attention was paid to the contents of the course, the short guide for the teacher educator, the teacher educator's role during the student teachers' training period, and the evaluation study.

The course on effective instruction was given by experienced teacher educators. The number of classes devoted to the course varied from 6 to 9, each class lasted 90 minutes. Most time was spent on the use of the two direct instruction models. The four teacher educators implemented the course in different ways. Two teacher educators (College A and C) transmitted the knowledge to the student teachers without modeling the strategic application of the instructional skills and without using the structure of the direct instruction model. One teacher educator (College B) relied on the self-study skills of the student teachers. One teacher educator (College C) modeled the concepts of the direct instruction model for the student teachers in his own lessons.

On average, student teachers conducted 5 lessons according to the direct instruction model at their cooperating schools. The supervising teachers were not well informed by the teacher educators about the goals and the contents of the experimental course on effective instruction. The guide for supervising teachers that explained the two instructional models was hardly used. Only a small part of the supervising teachers provided their student teachers with guided practice as they practiced the teaching of the instructional skills.

Data collection

Before the start of the course, each student teacher was observed during one reading/language or mathematics lesson (October - November 1991). After the course was provided each student teacher was again observed for one lesson (January - February 1992). Supervising teachers rated their student teachers after completion of the course (college A in December 1991; college B and C in February 1992). In the same period the evaluation questionnaires were submitted to all student teachers who participated in the course on effective instruction. The interviews with the teacher educators and the four

treatment classes also took place in this period.

The three scores for pupil engagement rates for each lesson were averaged to produce means for each class and student teacher. For the observational data, collected by the rating procedure, scale scores were computed by adding the values of the item responses. In testing the differences between treatment student teachers and control student teachers, and supervising teachers' pre- and posttest scores, a level of significance of 5% was used (one-tailed). The unit of analysis was the student teacher (and her/his class of pupils).

For a complete description of the design, the instrumentation, and data collection procedures see Leenders, Meyer & Sanders (1992).

Results

When comparing the treatment group with the control group before training significant differences were apparent for the mean total score of the DIS, for the subscale 'presentation', and for the observational variable 'daily review'. Treatment student teachers were rated higher by trained observers than control student teachers. The difference on the DIS was largely due to the observational variable 'daily review'. Treatment student teachers opened their lessons significantly more with a short review of previous learning. Analysis of covariance was considered to test the differences between treatment and control group, but not applied because of the selection of the treatment classes by the teacher educators (this form of self-selection may correlate with pre-test scores), the significant differences found between the two groups in the pre-test, and the small number of student teachers that would cause a decrease in statistical power. No significant pre-test differences between treatment group and control group were apparent for pupil engagement rates.

An one-tailed *t*-test for paired samples was used to examine the difference between the pre- and post-treatment data of the treatment group to determine if the treatment student teachers made better use of the desired behaviours called for in the course on effective instruction on the post-test than on the pre-test. Paired *t*-tests were performed because the repeated measurements are dependent (pre-test/post-test) and hence yield correlated sample means. Independent one-tailed *t*-tests (based on gain scores: post-test scores minus pre-test

scores) were used to examine the difference between the treatment and the control group. A summary of the descriptive statistics for each dependent variable on the Direct Instruction Scale (DIS) as used by the trained observers, and the results of these tests are presented in Table I.

The data displayed in Table I indicate that the course on effective instruction had a marked effect on student teachers' instructional behaviours. Significant differences between pre- and post-test scores for treatment student teachers were found on the mean total score of the DIS and on the two subscales of the DIS: presentation and practice ($p < 0.01$). No significant differences between pre- and post-test scores for control student teachers were found on the mean total score of the DIS. A significant positive implementation effect for control student teachers was found on the subscale 'presentation' ($p < 0.05$). A significant negative implementation effect was found on the subscale 'practice' ($p < 0.01$). Control student teachers used the instructional behaviours during the practice phase of the lesson in the post-test less effectively than in the pre-test. Post-measures of treatment student teachers' performance after the course on effective instruction on 14 of the 20 ratings (70%) were significant compared to pre-measures of treatment student teachers' performance before the course ($p < 0.05$). For control student teachers three ratings were found significant, one in the opposite direction ('effective monitoring: pupils begin work quickly without dawdling').

When comparing treatment student teachers with control student teachers by using gain scores (see Table I), significant differences were found for the mean total score of the DIS and for the subscale 'practice' ($p < 0.01$). No significant implementation effect was found for the subscale 'presentation'. Compared with control student teachers, treatment student teachers were rated more effectively on three of the presentation skills (assess whether prerequisite skills are mastered, begin a lesson with a short statement of goals, provide summaries of mean points), and on five of the practice skills (engage in reciprocal teaching, effective monitoring: pupils begin work quickly, have pupils work in small groups, provide varying contexts for pupil practice, keeping pupils accountable for work).

The SPSSX program MANOVA was used for conducting a number of univariate analyses of variance to examine differences between the gain scores of the two experimental groups (treatment, control) on the DIS-scale, separately controlling for the following variables: college of education (location A, B), student teacher's sex, observer (1, 2, 3), lesson

observed (reading/language, mathematics), and grade level of the pupils taught at the primary school (grades 3/4, 5/6, 7/8). No significant interaction effects were found between treatment and control variables for the mean total gain score of the DIS and for the subscale score 'practice'. A significant interaction effect was found between treatment and teacher college for the subscale score 'presentation' ($F=4.6$; df 1,37; $p < 0.05$). At locations A and B subjects of the treatment group gained on the subscale 'presentation'. However, at location B subjects of the control group gained even more on this subscale. (Student teachers at location C were not observed by trained observers).

Table II presents the means and standard deviations for scores on the DIS for the treatment student teachers as given by their supervising teachers. (One observational variable (model the skill) was deleted because of misspelling). Results show that the student teachers who participated in the course on effective instruction used the recommended instructional skills after completion of the course significantly better than prior to the course, as rated by their supervising teachers. On all instructional skills of the DIS significant implementation effects were found ($p < 0.01$).

To examine differences between the gain scores of treatment student teachers as rated by their supervising teachers univariate analyses of variance were performed separately controlling for the variables: teacher college (A, B, C), grade level of the pupils taught at the primary school (grades 3/4, 5/6, 7/8), number of pupils in classes taught (less than 10, 10-19, 20 or more), number of lessons conducted according to the direct instruction model (0, 1-2, 3-4, 5-6, 7 or more), frequency of use of the supervising teacher's guide for providing student teachers with feedback (no use, now and than, regularly, after each lesson). Results indicated that teacher college, pupils' grade level, and number of pupils taught had no significant effect on the gain scores of the treatment student teachers. Number of lessons conducted according to the direct instruction model had a significant effect on the subscale 'presentation' ($F=3.3$; df=4; $p < 0.05$). Student teachers who conducted more lessons according to the direct instruction model gained more on the subscale 'presentation', but not on the subscale 'practice' nor for the total DIS-score. Supervising teachers who used more frequently the supervising teacher's guide to present feedback to the student teacher regarding the execution of the lessons, rated their student teachers higher on the subscale 'presentation' ($F=3.0$, df=3; $p < 0.05$) and on the DIS as a whole ($F=3.0$, df= 3; $p < 0.05$). Use of the supervising teacher's guide resulted in more

specific feedback about the successfulness of the implementation of the instructional skills so that student teachers were able to perform these skills at a higher level.

The results in Table III reveal that the course on effective instruction had a significant effect on pupil engagement rates. After completion of the course, treatment student teachers' pupils exhibited significant increases in their on-task scores: 77% of the pupils classified as on-task prior to training and 85% after training ($p < 0.01$). Control student teachers' pupils exhibited decreases in their on-task estimates: from 73% to 68% (not significant). The difference in gain scores between treatment group and control group was significant ($p < 0.01$). This significant effect did not change after controlling for each of the following variables separately: teacher college, student teacher's sex, observer, type of lesson observed, and pupils' grade level. No significant interaction effects were detected.

The results of the questionnaires and the interviews suggest that the course has been studied and used by the student teachers. The interviewed classes and the student teachers who returned the questionnaire reported that the content of the course was very helpful because it provided many concrete, specific and practical suggestions. The examples in the text were rated as particularly valuable because they provided concrete illustrations of how to implement the instructional skills in the content areas of reading, mathematics, and social sciences. These positive ratings of the course may have contributed to implementation of the programme.

Discussion

The question of whether participation in the course on effective instruction could increase student teachers' application of research-derived teaching behaviours on direct instruction and on pupils' on-task behaviour, seems to have been answered, at least indirectly, by the results of this study. The treatment group differences at the end of the training, as rated by trained observers and supervising teachers, indicate that the training programme enhanced student teachers' skills in teaching lessons at the cooperating school.

The principal component of the treatment was the course on effective instruction based on selected findings from teaching effectiveness research (the direct instruction model for explicit skills) and on recent research on learning and cognitive strategy training (the

direct instruction model for implicit or higher-level thinking skills). Despite the short duration of the course (9 to 12 hours), the inadequate modeling of three of the four teacher educators how to use the instructional skills of the direct instruction model, and the poor mentoring of the supervising teachers (see the above description of the implementation of the course) the course on effective instruction was successful.

However, there are some limitations to the course and its implementation. First, most student teachers found the difference between the direct instruction model for explicit skills and the direct instruction model for implicit or higher-level thinking skills unclear. At one teacher training college only the model for explicit skills was discussed. How to teach higher-order cognitive skills appeared to be difficult. At this point the course on effective instruction is in need for improvement. Scaffolds like procedural facilitators, model the skill, think aloud as choices are made, reciprocal teaching, facilitate application to new tasks to promote transfer (cf. Rosenshine & Meister, 1992) need more elaboration, more concrete examples, and more practice. Second, teacher educators found it difficult to model the application of the instructional skills for their student teachers. To do so effectively teacher educators should be trained in such a way that their training incorporates the same successful instructional procedures for teaching higher-level cognitive strategies. The transmission model of instruction as used in the pre-training for teacher educators in this study is insufficient to put teacher educators in metacognitive control of the principles underlying the teaching of well-structured explicit skills and the teaching of higher-level cognitive strategies.

The low response rate of the supervising teachers deserves some comment. Originally, it was planned to contact the supervising teachers via the student teachers. The questionnaires with the DIS were sent to the teacher training colleges with a request to the teacher educator to distribute the questionnaires among the treatment student teachers, and to ask the student teachers to hand the questionnaires to their supervising teachers for completion. At one teacher training college the questionnaires were not distributed, the request was neglected. At another teacher training college the student teachers wanted to protect their supervising teachers for overload, and refused to hand the questionnaire to their supervising teacher. At the third teacher college the questionnaires were only handed to the observed student teachers and not to all student teachers who followed the course. Because of these communication breakdowns all supervising teachers got the questionnaire

by mail. At the time they received the questionnaire some student teachers were already transferred to other cooperating schools. At that time the supervising teachers of these student teachers found it difficult to remember how the former student teacher performed the instructional skills.

Another explanation for the low response rate for supervising teachers stems from the used 'then-post' design, an adaptation of the 'pre-then-post' design as described by Mezoff (1981). After the course on effective instruction supervising teachers were asked to reflect back on their student teachers' level of functioning prior to the course and to rate the student teachers as to where they thought their student teachers were at the completion of the course. Of the supervising teachers who returned the questionnaire with the DIS 14% returned an incomplete questionnaire: they were unable to remember the student teacher's functioning prior to the course. After a period of three months they could not reliably evaluate the skill level of the student teacher before the training began. This inaccuracy to remember retrospectively their student teachers' instructional skills prior to the course might be the reason that a lot of supervising teachers did not return the questionnaire at all.

The findings nevertheless suggest that a course on effective instruction, based on selected findings from research on effective teaching, similar to that described here is a successful training activity for student teachers.

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Tabel I. Mean rates of trained observers on variables of the Direct Instruction Scale (DIS), results of *t*-test on differences between pre- and posttest data, and on gain scores for treatment and control student teachers.

DIS Subscales/items	Treatment group Pre	Post	Control group Pre	Post	Pre - Post gain Treatment	Control	*t*
DIS-total (20 items, α = .86)	45.7	57.2**	40.7	42.9	11.4	2.2	**
Subscale Presentation (11 items, α = .78)	27.5	34.0**	23.3	26.8*	6.5	3.1	
Daily review	2.0	2.8*	1.1	2.2**	.8	1.1	
Review previous learning	2.2	2.7*	1.8	2.4	.5	.6	
Checking prerequisite skills	1.8	2.6**	1.4	1.6	.8	.1	*
State lesson goals	1.6	3.0**	1.6	1.9	1.4	.3	**
Use clear language	3.9	4.0 *	3.9	3.8	.2	-.1	
Provide procedural facilitators	2.4	2.6	1.9	1.4	.2	-.5	
Teach in small steps	3.5	3.7	3.1	3.4	.2	.3	
Model the skill	2.6	3.2*	1.8	2.7*	.5	.9	
Provide concrete examples	3.3	3.8**	3.0	3.1	.5	.1	
Provide summaries	1.5	2.3**	1.0	1.4	1.2	.4	**
Use of the DI-structure	3.0	3.4*	2.9	3.1	.4	.2	
Subscale Practice (guided and independent) (9 items, α = .75)	22.3	27.0**	21.1	19.52**	4.7	-1.6	**
Checking for understanding	2.8	3.0	2.6	2.3	.2	-.3	
Circulate among pupils	3.3	3.6	3.2	3.0	.3	-.2	
Clear assignments	3.8	3.9	3.5	3.5	.1	.1	
High frequency of questions	3.4	3.7	2.9	2.8	.2	-.2	
Engage in reciprocal teaching	1.7	2.1*	1.3	1.2	.4	-.2	*
Effective monitoring (pupils begin work quickly)	3.0	3.4*	3.3	2.9*	.4	-.5	**
Have pupils work in small groups	1.4	2.1**	1.4	1.4	.7	-.1	**
Provide varying contexts for pupil practice	1.3	2.7**	1.5	1.8	1.4	.3	**
Keeping pupils accountable for work	1.6	2.5**	1.6	1.5	.9	-.1	**

Note: Treatment group N=27; Control group N=14. Means for the ratings are based on a four-point scale: 1 = no application of the skill, 4 = clear application of the skill; * = $p < .05$, ** = $p < .01$.

Table II. Mean rates of supervising teachers on variables of the Direct Instruction Scale (DIS), and results of *t*-tests on differences between pre- and post-test data of the treatment group.

DIS Subscales/items	Treatment group Pre	Post	*t*
DIS-total (20 items, α = .89)	49.7	57.8	**
Subscale Presentation (10 items, α = .83)	25.8	30.4	**
Daily review	2.5	3.1	**
Review previous learning	2.8	3.3	**
Checking prerequisite skills	2.6	2.9	**
State lesson goals	2.7	3.0	**
Use clear language	2.9	3.3	**
Provide procedural facilitators	2.4	2.7	**
Teach in small steps	2.6	3.2	**
Provide concrete examples	2.8	3.2	**
Provide summaries	2.3	2.8	**
Use of the DI-structure	2.4	3.1	**
Subscale Practice (guided and independent) (9 items, α = .79)	23.9	27.4	**
Checking for understanding	2.9	3.2	**
Circulate among pupils	3.2	3.6	**
Clear assignments	2.8	3.3	**
High frequency of questions	2.6	3.0	**
Engage in reciprocal teaching	1.8	2.1	**
Effective monitoring (pupils begin work quickly)	3.0	3.2	**
Have pupils work in small groups	2.7	3.0	**
Provide varying contexts for pupil practice	2.2	2.7	**
Keeping pupils accountable for work	2.7	3.2	**

Note: Treatment group N = 41; ** $p < 0.01$. Means for the ratings are based on a four-point scale: 1 = no application of the skill, 4 = clear application of the skill.

Table III. Average percentages of pupils on-task, results of *t*-tests on differences between pre- and post-test data, and on gain scores for treatment and control student teachers.

Student teachers' classes	Treatment group		Control group		Pre-post gain		
	Pre	Post	Pre	Post	Treatment	Control	*t*
Percentage of pupils on-task	77	85**	73	68	7.5	-5.4	**

Note: Treatment group N = 27; Control group N = 14; ** $p < 0.01$