# *THE IMPACT OF CROSS-AGE PEER TUTORING ON THIRD AND SIXTH GRADERS' READING STRATEGY AWARENESS, READING STRATEGY USE, AND READING COMPREHENSION*

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The present study explores the impact of an experimental reading intervention focusing on explicit reading strategy instruction and cross-age peer tutoring on third and sixth graders' reading strategy awareness, cognitive and metacognitive reading strategy use, and reading comprehension achievement. A quasi-experimental pretest-posttest design was used. In total, 39 teachers and 762 elementary school students participated in the study. The experimental intervention was implemented during an entire school year. Standardized tests were used to measure pupils' reading comprehension (Staphorsius & Krom, 1996). Further, students completed 2 questionnaires: the index of reading awareness (Jacobs & Paris, 1987) and the reading strategy use scale (Pereira-Laird & Deane, 1997). Significant intervention effects were found for third graders' overall awareness of reading strategies, their awareness of the importance of regulating the reading process, and sixth graders' awareness of the added value of evaluation of tasks, goals, and personal skills. Further, significant intervention effects were found for both third and sixth graders' overall reading strategy use. For sixth graders a significant impact on metacognitive reading strategy use was found as well.

## *INTRODUCTION*

It is widely recognized that learning to read is one of the most crucial learning processes children are involved in at school (Mastropieri & Scruggs, 1997). However, becoming a proficient reader is not a trouble-free process for everyone. Especially with regard to the ultimate goal of reading comprehension, many children appear to have persistent problems.

Cognitively based views of reading emphasize that proficient readers are typified by the mastery and use of both metacognitive and cognitive strategies that facilitate text comprehension (Bimmel & van Schoten, 2004; Guthrie, 2003; Pressley & Harris, 2006). Cognitive

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strategies can be defined as mental and behavioral activities used to increase the likelihood of comprehending, such as rereading, activating background knowledge, and adjusting reading speed (Van Den Broek & Kremer, 2000; Vellutino, 2003). Metacognitive strategies are self-monitoring and self-regulating activities, focusing on the process and product of reading. They include readers' awareness of whether or not they comprehend what they read, their ability to judge the cognitive demands of a task, and their knowledge of when and how to employ specific cognitive strategies as a function of text difficulty, situational constraints, and one's own cognitive abilities (e.g., Baker & Brown, 1984; Dole, 2000; Ehrlich, Kurtzcostes, & Loridant, 1993; Pressley & Harris, 2006).

Notwithstanding the importance of cognitive and metacognitive strategies as tools for enhancing reading comprehension, there is no reason to assume that all elementary students spontaneously discover them and appeal to strategic processes when confronting texts that are challenging to comprehend (Aarnoutse & Verhoeven, 2003; Hartman, 2001; Pressley & Allington, 1999). Research results, however, reveal that when children do not use effective comprehension strategies on their own, explicit strategies instruction is a feasible tool for stimulating reading strategies awareness and for teaching students to apply the strategies successfully (e.g., Alvermann, Fitzgerald & Simpson, 2006; Mason, 2004; Mastropieri, Scruggs, & Graetz, 2003; Pressley, 2000; Van Keer, 2004; Van Keer & Verhaeghe, 2005). Unfortunately, research shows that teaching of reading strategies for developing comprehension still remains the exception rather than the rule (Aarnoutse & Schellings, 2003; Dole, 2000; Pressley, Wharton-McDonald, Hampston, & Echevarria, 1998).

In addition to the importance of explicit reading strategies instruction, there is evidence that opportunities to participate in peer-led interaction on structured reading activities also make up an important part of reading instruction that aims at an actual increase in comprehension and the application of self-regulation strategies (e.g., Almasi, 1996; Alvermann et al., 2006; Duke & Pearson, 2002; Fuchs & Fuchs, 2000). With respect to reading comprehension, the traditional classroom interaction pattern of *teacher question-student response-teacher evaluation* seems insufficient for the development of the deeper meaning of texts (Cazden, 1986). Relying on the teacher to serve as the interpretive authority may cause students to become passive learners. Conversely, in order for children to become self-regulated readers and thinkers, they need to take an active role and to recognize and resolve their own discrepancies with texts (Almasi, 1996; Gourgey, 2001). Research demonstrates that this active behavior is promoted by providing students opportunities to engage in peer-led interaction about texts. Through discussions, peer conferences, peer tutoring, and cooperative activities students implement, evaluate, and modify strategy acquisition and use and discuss strategy application (e.g., Klingner & Vaughn, 1996; Mastropieri et al., 2003; Palincsar & Brown, 1984). Moreover, discussions between peers provide opportunities for metacognitive exchanges and modeling (Palincsar, David, Winn, & Stevens, 1991). Given the important relation between peer interaction about text on the one hand and improved reading comprehension, developing strategies for comprehending text, as well as applying self-regulation strategies on the other hand, one might expect to find teachers using a fair amount of peer interaction and discussion within the framework of reading comprehension activities. In reality however, this does not seem to be the case. According to Alvermann (2000) student-centered discussion is anything but common practice in most classrooms.

The starting point of the present study is the existing contradiction between educational research, indicating that explicit reading strategies instruction and engaging students in interaction about texts promote students' reading comprehension ability, and the instructional practice on reading comprehension in schools, which is still traditional, characterized by a

great deal of classwide comprehension "testing" and hardly any student-centered discussion or explicit instruction aiming at making students astute in strategy selection, use, and evaluation. In this respect, the present study intends to bridge the gap between instructional practice and research evidence indicating the possibilities of explicit strategies instruction and peer interaction about texts. Therefore, the study was conceived as a "design experiment," which aims to be both educational and scientific (Kelly, 2003), meeting the twofold goal of advancing theory building and optimizing classroom education by creating and evaluating complex instructional interventions, which embody the present understanding of effective learning processes and powerful learning environments, in real classrooms and in partnership between researchers and practitioners (De Corte, 2000; Vanderlinde & van Braak, 2009). In order to stimulate more student-centered interaction about texts, the present study more specifically takes an interest in "peer tutoring" in dyads. Peer tutoring can be defined as "people from similar social groupings who are not professional teachers helping each other to learn, and learning themselves by teaching" (Topping, 1996, p. 322). Cross-age peer tutoring more particularly refers to older and more knowledgeable students tutoring younger students (Gumpel & Frank, 1999).

More specifically, the present study explores the educational benefits of explicit strategies instruction followed by practice in cross-age peer tutoring activities for third and sixth graders. In this respect, the following research questions are put forward:

1. What is the impact of blending explicit reading strategy instruction and cross-age peer tutoring on third and sixth graders' reading strategy awareness?
2. What is the impact of blending explicit reading strategy instruction and cross-age peer tutoring on third and sixth graders' reading strategy use?
3. What is the impact of blending explicit reading strategy instruction and cross-age peer tutoring on third and sixth graders' reading comprehension achievement?
4. Is the impact of explicit reading strategy instruction and cross-age peer tutoring on third and sixth graders' reading strategy awareness, reading strategy use, and reading comprehension differential for high and low achievers.

## *METHOD*

### *Design*

A quasi-experimental pretest-posttest design was used contrasting an experimental condition to a matched control group. Because complete naturally constituted classes were assigned to the conditions, the research took place in an ecologically valid setting and the design can be referred to as quasi-experimental. This setting provides a more stringent test of the successful implementation of the interventions than studies in tightly controlled laboratory settings, whose results cannot be transferred to the context of real-life classrooms.

### *Intervention*

The experimental condition is characterized by (1) explicit strategies instruction, (2) a sound tutor preparation, and (3) practice of the reading strategies in weekly peer tutoring sessions. The experimental interventions were implemented during an entire school year.

As to the *explicit instruction in reading strategies*, seven essential strategies were selected inspired by contemporary reading research and recurrent strategies in explicit strategy instruction programs (e.g., Block & Israel, 2002; Brown, Pressley, Van Meter, & Schuder, 1996; Fuchs, Fuchs, Mathes, & Simmons, 1997; Vaughn, Klingner, & Bryant, 2001): activating prior knowledge, predictive reading, distinguishing main issues from side-issues, monitoring and regulating the understanding of words and expressions, monitoring

and regulating general text comprehension, classifying types of text, and representing texts schematically. Taken into account the relevant research literature with regard to the explicit reading strategies instruction, it can be summarized that the instruction and practice of a repertoire of reading strategies was opted for instead of focusing on one strategy; the instruction and practice was phased in gradually throughout the school year; and each strategy was introduced and practiced in isolation in three steps, representing a transfer from teacher regulation to students' self-regulation (explicit teacher explanations and modeling by thinking aloud; practice characterized by teachers' scaffolding and coaching; more independent practice to internalize strategy use) (Alvermann & Eakle, 2003; Duke & Pearson, 2002; Palincsar, 2003).

There is widespread agreement in the literature that students must be trained in order to become a proficient tutor (e.g., Mastropieri et al., 2003; Nath & Ross, 2001; Parr & Townsend, 2002). As to the *preparation of the tutors* in the present study, seven 50-minute sessions were scheduled at the start of the intervention. Tutors got acquainted with their tasks and responsibilities and learned how to show interest, how to initiate and finish a session, how to give corrective feedback, how to provide praise, and how to offer explanations and assistance.

In the weekly *peer tutoring sessions*, sixth-grade tutors were paired with third-grade tutees. Peer tutoring was organized once (50 minutes) or twice (two times 25 minutes) a week, depending on the task and the scheduling. Based on previous research indicating that cross-age peer tutoring is to be preferred over same-age tutoring (Van Keer, 2004; Van Keer & Verhaeghe, 2005), cross-age peer tutoring was opted for.

Control group teachers conducted reading instruction in their own traditional way, which does not include explicit instruction in reading strategies, peer tutoring or other forms of peer to peer interaction on texts. Interviews with the control group teachers revealed that the lessons typically involved teacher-led whole-class activities, including comprehension-check questions after reading a text, teacher evaluation of students' answers, and presentation of correct answers.

## *Participants*

In total, 21 and 18 teachers of respectively third and sixth grade and their 405 and 357 students from 15 different schools throughout Flanders (Belgium) participated in the study. Table 1 presents the division of the participants in the experimental and control group.

## *Instruments*

Questionnaires with respect to reading strategy awareness and reading strategy use were presented to all students: the index of reading awareness (IRA; Jacobs & Paris, 1987) and the reading strategy use scale (RSU; Pereira-Laird & Deane, 1997).

The IRA is a multiple-choice questionnaire providing information about students' awareness and knowledge of different reading strategies. The IRA more specifically comprises the subscales "conditional knowledge" (i.e., children's understanding of when and why particular reading strategies should be applied), "planning" ahead for specific purposes, "regulation" of the reading process by monitoring

Table 1. Number of Participants Per Grade and Research Condition

| *3rd Grade* | | *6th Grade* | |
|---|---|---|---|
| *Experimental Condition* | *Control Condition* | *Experimental Condition* | *Control Condition* |
| $N = 308$ | $N = 97$ | $N = 277$ | $N = 80$ |

progress while reading and by recruiting fix-up strategies as needed, and "evaluation" of task, goals, and personal skills. The IRA includes 20 questions, each with three alternatives representing an inappropriate response (0 points), a partially adequate answer (1 point), and a strategic response (2 points). For each subscale 5 questions are included, yielding a total score ranging between 0 and 20 and subscale scores ranging between 0 and 5. Cronbach's α-coefficients for the IRA-scales were low for both third and sixth-grade total (between .06 and .36) and subscale scores (between .28 and .48), indicating low internal consistency and implying that awareness of a specific strategy does not necessarily indicate awareness of another strategy.

The RSU determines students' use of reading strategies, comprising the subscales "cognitive" and "metacognitive reading strategy use". The RSU scale is composed of 25 items, 13 measuring metacognitive strategies and 12 measuring cognitive strategies. The cognitive strategies include rehearsal, organization, and elaboration strategies, while the metacognitive strategies include planning, monitoring, and regulation strategies. Responses were made on a 4-point Likert scale, ranging from *"never," "sometimes," "often,"* to *"always."* Mean total and subscale scores ranging between 1 and 4 were calculated. To determine students' reading strategy use in relation to and following the reading of a specific text, an adapted version of the RSU scale was administered as well. Table 2 presents Cronbach's α-coefficients for the RSU scales, indicating acceptable to good internal consistency.

Standardized tests were used to measure students' reading comprehension achievement (Staphorsius & Krom, 1996). The tests consist of three modules of 25 multiple-choice questions each. All students take the first module of the test. Depending on these results, they further complete an easier or more difficult module. To compare the scores of the students who complete the easier or more difficult part of the test, sum scores are transposed into an IRT-modeled achievement score between 0 and 100. Table 3 presents Cronbach's α coefficients for all comprehension measures, indicating acceptable to good internal consistency.

For third graders decoding fluency was included as an additional variable, for fluency can be considered as a mediating factor on students' reading comprehension achieve-

Table 2. Cronbach's α Coefficients for Third- and Sixth-Grade RSU Scales

| | *3rd Grade* | | *6th Grade* | |
|---|---|---|---|---|
| | *Pretest* | *Posttest* | *Pretest* | *Posttest* |
| Total RSU | .84 ($n$ = 310) | .81 ($n$ = 253) | .79 ($n$ = 302) | .84 ($n$ = 199) |
| Cognitive RSU | .70 ($n$ = 347) | .58 ($n$ = 271) | .56 ($n$ = 323) | .62 ($n$ = 217) |
| Metacognitive RSU | .74 ($n$ = 322) | .73 ($n$ = 264) | .70 ($n$ = 316) | .77 ($n$ = 213) |
| RSU related to a specific test | .83 ($n$ = 309) | .85 ($n$ = 230) | .80 ($n$ = 300) | .85 ($n$ = 192) |

Table 3. Cronbach's α Coefficients for Third- and Sixth-Grade Comprehension Test Modules

| | *3rd Grade* | | *6th Grade* | |
|---|---|---|---|---|
| | *Pretest* | *Posttest* | *Pretest* | *Posttest* |
| Module 1 | .83 ($n$ = 381) | .84 ($n$ = 361) | .77 ($n$ = 354) | .80 ($n$ = 329) |
| Module 2 | .79 ($n$ = 174) | .80 ($n$ = 175) | .83 ($n$ = 191) | .77 ($n$ = 149) |
| Module 3 | .61 ($n$ = 168) | .69 ($n$ = 99) | .74 ($n$ = 146) | .58 ($n$ = 97) |

ment (Mathes & Babyak, 2001; Pressley, 2000). A standardized test (Brus, 1999) was administered individually to all third graders in which students were asked to read unrelated words with an increasing level of difficulty during exactly 1 minute. The score is determined by counting the number of words read correctly.

### *Data Analysis*

Since in this study students are nested within a smaller number of classes, it can be argued that the problem under investigation has a clear multilevel structure. Using the software MlwiN (Rasbash et al., 1999) we verified for each dependent variable (i.e., IRA scales, RSU scales, and reading comprehension) whether variances at both the class and student level are significantly different from zero providing justification for applying multilevel models. This however only appears to be the case for reading comprehension. Therefore multilevel analysis was applied for reading comprehension, while traditional unilevel analysis of covariance was used for the other dependent variables.

In both the multilevel and unilevel analyses pretest measures were included as covariate, since analyses of variance on the pretest data indicated that the research conditions were not completely comparable for some variables. As can be seen in Table 4, no significant pretest differences were found for third graders. In sixth grade, however, significant pretest differences were observed regarding students' overall reading strategy awareness ($F(1, 347) = 4.01$, $p < .05$), overall reading strategy use ($F(1, 341) = 9.54$, $p < .01$), and "metacognitive reading strategy use" ($F(1, 348) = 12.90$, $p < .001$), favoring sixth graders in the experimental condition. Therefore, we opted for analysis of covariance on the posttest data, testing whether the experimental condition affects third and sixth graders' reading strategy awareness, strategy use, and reading comprehension after removing the variance for which the respective pretest predictors (covariates) account. In this respect, the comparisons between the experimental and the control condition at posttest are "adjusted" for the imbalances in the pretest measures between these groups.

Table 4. ANOVA Results on the Pretest Data

| | *3rd Grade* | *6th Grade* |
|---|---|---|
| IRA scales | | |
| Total IRA | $F(1, 378) = 3.24$, $p > .05$ | $F(1, 347) = 4.01$, $p<.05$ |
| Conditional knowledge | $F(1, 376) = 1.00$, $p > .10$ | $F(1, 346) = 0.86$, $p > .10$ |
| Planning | $F(1, 372) = 0.03$, $p > .10$ | $F(1, 347) = 0.00$, $p > .10$ |
| Regulation | $F(1, 376) = 2.50$, $p > .10$ | $F(1, 347) = 3.76$, $p > .05$ |
| Evaluation | $F(1, 373) = 0.02$, $p > .10$ | $F(1, 347) = 3.56$, $p > .05$ |
| RSU scales | | |
| Total RSU | $F(1, 376) = 1.03$, $p > .10$ | $F(1, 341) = 9.54$, $p<.01$ |
| Cognitive RSU | $F(1, 372) = 0.91$, $p > .10$ | $F(1, 339) = 3.24$, $p > .05$ |
| Metacognitive RSU | $F(1, 376) = 1.61$, $p > .10$ | $F(1, 348) = 12.90$, $p<.001$ |
| RSU related to a specific test | $F(1, 345) = 2.62$, $p > .10$ | $F(1, 336) = 3.35$, $p > .05$ |
| Reading comprehension | $F(1, 335) = .40$, $p > .10$ | $F(1, 333) = .06$, $p > .10$ |

## *RESULTS*

### *Impact on Reading Strategy Awareness*

Table 5 presents an overview per research condition of the mean posttest scores and standard deviations of third and sixth graders' reading strategy awareness.

For third graders a significant intervention effect was found with regard to students' overall reading strategy awareness ($F(1, 215) = 4.44$, $p < .05$). This was not the case for sixth-grade tutors ($F(1, 168) = 0.00$, $p > .10$). Further, significant effects were found with regard to the subscale "regulation" ($F(1, 215) = 5.80$, $p < .05$) in third grade and "evaluation" in sixth grade ($F(1, 163) = 4.96$, $p < .05$) favoring the experimental condition. In addition, a marginal significant effect was found for "conditional knowledge" in third grade ($F(1, 215) = 2.57$, $p = .11$).

For third graders no significant posttest differences were found for the subscales "evaluation" ($F(1, 224) = .12$, $p > .10$), and "planning" ($F(1, 225) = .47$, $p > .10$). No significant sixth-grade posttest differences were found for "regulation" ($F(1, 172) = 1.81$, $p > .10$), "conditional knowledge" ($F(1, 172) = 1.11$, $p > .10$), and "planning" ($F(1, 168) = .50$, $p > .10$).

### *Impact on Reading Strategy Use*

Table 6 reports on the mean posttest scores and standard deviations of third and sixth graders' reading strategy use per research condition.

A significant positive effect was found on both third and sixth graders' overall reported reading strategy use (respectively $F(1, 291) = 4.62$, $p < .05$ and $F(1, 232) = 5.85$, $p < .05$) favoring the experimental condition. Further, for sixth graders a significant and marginal significant positive intervention effect was found on the subscales "metacognitive" ($F(1, 237) = 6.13$, $p < .05$) and "cognitive reading strategy use" ($F(1, 232) = 3.65$, $p = .057$). With regard to third graders' reported cognitive and metacognitive strategy use, only marginal significant effects in favor of the experimental condition were found (respectively $F(1, 288) = 2.56$, $p = .111$ and $F(1, 293) = 2.61$, $p = .107$).

Table 5. Mean Posttest Scores and Standard Deviations on the IRA Scales Per Research Condition

| | *3rd Grade* | | *6th Grade* | |
|---|---|---|---|---|
| | *Experimental* | *Control* | *Experimental* | *Control* |
| Total IRA | 22.78 (4.17) | 21.86 (4.37) | 26.01 (5.26) | 25.66 (3.77) |
| Conditional knowledge | 5.84 (1.84) | 5.55 (1.76) | 7.24 (1.69) | 6.97 (1.55) |
| Planning | 6.03 (1.75) | 5.87 (1.67) | 6.91 (1.76) | 6.71 (1.68) |
| Regulation | 5.37 (1.44) | 4.84 (1.57) | 5.48 (1.65) | 5.81 (1.36) |
| Evaluation | 5.67 (1.61) | 5.60 (1.72) | 6.91 (1.72) | 6.17 (1.81) |

Table 6. Mean Posttest Scores and Standard Deviations on the RSU Scales Per Research Condition

| | *3rd Grade* | | *6th Grade* | |
|---|---|---|---|---|
| | *Experimental* | *Control* | *Experimental* | *Control* |
| Total RSU | 2.29 (0.56) | 2.13 (0.53) | 2.28 (0.46) | 2.10 (0.47) |
| Cognitive RSU | 2.04 (0.60) | 1.92 (0.54) | 2.07 (0.50) | 1.93 (0.61) |
| Metacognitive RSU | 2.22 (0.55) | 2.11 (0.53) | 2.26 (0.49) | 2.09 (0.54) |
| RSU related to a specific test | 2.35 (0.63) | 2.08 (0.60) | 2.27 (0.51) | 2.00 (0.55) |

As to the reported strategy use following and in relation to a specific reading task, significant positive intervention effects were found for both third and sixth graders (respectively $F(1, 257) = 7.64$, $p < .01$ and $F(1, 219) = 12.508$, $p < .001$).

### *Impact on Reading Comprehension*

Table 7 presents the mean posttest reading comprehension scores and standard deviations per research condition.

As mentioned above, intervention effects for reading comprehension were studied by means of multilevel analyses. The random part of the multilevel null model more specifically indicates that respectively 25.48% and 22.58% of the total variance in third and sixth graders' posttest scores is related to differences between classes, while correspondingly 74.52% and 77.42% of the variance is due to individual student differences. Corrected for reading comprehension pretest scores and reading fluency in third grade, no significant differences were found between experimental and control group students' reading comprehension achievement in third ($\chi^2 = 0.06$; $df = 1$; $p > .10$) or sixth grade ($\chi^2 = 0.97$; $df = 1$; $p > .10$).

### *Differential Effects for Low and High Achievers*

To study the potential differential effect of the experimental intervention on low and high achievers, students were divided in three achievement groups based on their pretest reading comprehension scores. Using analysis of variance, interaction effects between condition and achievement group were studied. The analyses for third and sixth graders reveal no significant interaction effects on reading comprehension (respectively $F(2, 271) = 2.88$, $p > .05$ and $F(2, 226) = 2.21$, $p > .10$), overall reading strategy awareness (respectively $F(2, 212) = 1.32$, $p > .10$ and $F(2, 153) = .52$, $p > .10$), overall reading strategy use (respectively $F(2, 274) = .29$, $p > .10$ and $F(2, 212) = 2.32$, $p > .05$), and reading strategy use in relation to a specific reading task (respectively $F(2, 242) = .42$, $p > .10$ and $F(2, 193) = .14$, $p > .10$).

## *DISCUSSION*

Based on the research evidence indicating explicit reading strategies instruction and peer-led interaction about texts as significant approaches fostering students' reading comprehension skills, the main aim of the present study was to investigate the educational benefits of the blended research-based practices from both these research fields. In this respect, the impact of explicit strategies instruction followed by practice in cross-age peer tutoring activities was studied on third and sixth graders' reading strategy awareness, reading strategy use, and reading comprehension achievement. As to students' reading strategy awareness, the results reveal significant intervention effects for third graders' overall strategy awareness and their awareness of the surplus value of regulating the reading process by monitoring progress while reading and by recruiting fix-up strategies as needed. For sixth-grade tutors only a significant impact was found on students' awareness of the importance of evaluating reading tasks, goals, and personal reading skills. In respect

Table 7. Mean Posttest Reading Comprehension Scores and Standard Deviations per Research Condition

| | *3rd Grade* | | *6th Grade* | |
|---|---|---|---|---|
| | *Experimental* | *Control* | *Experimental* | *Control* |
| Reading comprehension | 18.77 (14.35) | 18.04 (14.09) | 44.14 (15.80) | 43.63 (15.46) |

of the use of reading strategies, the results indicate that at posttest both third and sixth graders in the experimental condition significantly outperform their peers from the control group with regard to the reported overall strategy use and the strategy use reported in relation to a specific reading task. Further, sixth-grade experimental students significantly outrun control group students with regard to the particular use of metacognitive reading strategies. No differential intervention effects were found for high and low-achieving readers, implying that all students—regardless of their different comprehension skills—gain an equivalent advantage from the experimental program.

The positive results on strategy awareness and strategy use lend support to previous research results demonstrating that explicit reading strategies instruction is a feasible tool for teaching students to apply them successfully (e.g., Duffy et al., 1987; Pressley, 2000). In addition, the results corroborate the idea that opportunities to participate in peer-led interaction on reading activities promote the application of reading strategies (e.g., Almasi, 1996; Fuchs & Fuchs, 2000; Mathes & Fuchs, 1994). For sixth grade, the stronger results with regard to reported overall strategy use and the more limited impact on only one subscale of reading strategy awareness lead us to suspect that reading instruction in both the experimental and control group classes enables the awakening of sixth graders' general awareness of the existence and significance of reading strategies, while the application of these strategies appears to be promoted additionally by the experimental intervention. From a theoretical point of view, it can be asserted that the positive results of cross-age peer tutoring on both tutors' and tutees' reported reading strategy use are consistent with Vygotsky's perspective on socially mediated learning, emphasizing the importance of communication between learners and arguing that the process of internalization begins in a social context and then develops within the individual (Vygotsky, 1978). More particularly, in analogy with Palincsar and Brown (1984) and Brown et al. (1996) it can be argued that participation in the reading dyads' interaction and discussions that involve reading strategy use leads to internalization and consistently adaptive use of strategic processing by the team members.

Contrary to prior research on the combination of explicit reading strategy instruction and peer tutoring with second and fifth graders (Van Keer, 2004; Van Keer & Verhaeghe, 2005), no significant intervention effects were found on students' reading comprehension achievement in the current study. It appears that the experimental intervention succeeded in promoting students' reading strategy awareness and use, while improved reading comprehension—as the following step and ultimate goal—was not or not yet achieved. This result fits in with the view of Gaskins (2003) and Pressley and Harris (2006), who argue that it can take years before students become true strategic readers and before the effect on reading comprehension becomes clear. As stated by Brown et al. (1996) "true self-regulation is the product of years of literacy experiences" (p. 34). In this respect, further long-term research is required to study whether the increased strategy awareness and use can act as a steppingstone to realize enhanced reading comprehension in due course, as is suggested by Bimmel and van Schoten (2004).

The present study exhibits some limitations. A first limitation is the discrepancy between the control and experimental sample size in both third and sixth grade, which might affect the integrity of the analysis. This discrepancy is primarily due to a deliberate initial oversampling of the experimental condition. The oversampling was opted for since participation in the experimental treatment required a quite long intensive investment and maintained engagement of the teachers and dropout was feared. Contrary to some control group classes, however, none of the experimental classes dropped out throughout the study, leading to the incongruity of both conditions. Taken into account the pretest-posttest design of the study it was not possible to recruit more

participants into the underrepresented control groups. Kikvidze and Moya-Laraño (2008) indicate, however, that analysis of (co)variance is quite robust to uneven sample size.

A second shortcoming of the study is closely connected to the fact that the experimental treatments were implemented in ecologically valid settings, making it difficult to exercise complete supervision over the total amount of time teachers spent on reading comprehension instruction and practice. In this respect, no differences between the different research conditions were intended. However, taken into account the scope of the study, it was not possible to assess this time span accurately and control for the total time spent on reading comprehension in the analyses. Subsequent research should try to assess this potential explanatory variable precisely, for example by means of observations or teachers' logs. In addition, it is important to gather information about the extent to which the implementation of the experimental treatments has been carried out correctly and in accordance with the intention as well. Notwithstanding the fact that two meetings with all participating teachers took place, implementation integrity of the experimental program was not collected systematically. In this respect, the use of a structured checklist by a double-blind observer could be useful.

A third comment can be made on the fact that the sixth-grade control and experimental condition were not completely equivalent on three pretest measures, importing a potential threat to the internal validity of the results for this age group regarding these variables (overall reading strategy awareness, overall reading strategy use, and metacognitive reading strategy use). Notwithstanding the fact that it is not easy to overcome this kind of problems in quasi-experimental research designs, the recorded significant pretest differences were however unexpected, since an effort was made to match teachers and classes in the different research conditions, based on data from the school years preceding the experimental treatment. To account for the pretest differences, analysis of covariance was opted for adjusting the posttest measures for the imbalances in the pretest. Further research, avoiding internal validity problems, is however necessary to verify the present results.

A fourth shortcoming has to do with the self-report instruments applied to measure students reading strategy awareness and use. Self-reports carry the risk of social desirable answers and the fact that children's reportage of strategy use is not necessarily consistent with their actual behavior while reading. In this respect, in future research reading strategies tests, thinking-aloud protocols, or stimulated recall techniques will be interesting supplements to the applied questionnaires to shed light on students' actual reading behavior, application of reading strategies, and metacognitive regulation of the reading process (Veenman, 2006).

Finally, future research should explore causal paths between the different outcome variables. More particularly, it can be assumed that reading strategy awareness precedes cognitive and metacognitive reading strategy use, which can promote reading comprehension.

## *CONCLUSION*

Generally, the results of the present study indicate significant intervention effects for third graders' overall awareness of reading strategies, their awareness of the importance of regulating the reading process, and sixth graders' awareness of the added value of evaluation of tasks, goals, and personal skills. Further, significant intervention effects were found for both third and sixth graders' reported reading strategy use. In this respect, it can be concluded that the study documents the feasibility of fostering reading strategy awareness and reading strategy use in third and sixth graders of different ability levels by supplying them with explicit reading strategies instruction and discuss texts in cross-age peer tutoring dyads. Consequently, the implemented experimental treatments may merit a place in the regular cur-

riculum and teaching methods. Based on these results and taken into account that experimental instructional approaches were successfully implemented in naturally constituted classes as part of the overall curriculum, an alternative model of reading comprehension instruction is suggested for daily teaching practice. Herein explicit instruction in a set of reading strategies characterizing proficient readers is emphasized, as well as promoting students' understanding about when and how to use these strategies in a flexible way. In addition, the application of instructional techniques that challenge students to engage actively in negotiating and constructing meaning from texts is stressed. In this way, students are supported in their process of gradually emerging expertise.

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