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How does peer tutoring contribute to the development of reading comprehension? Evidence from ten years of practice

Marta Flores*, Jesús Ribosa, and David Duran

Departamento de Psicología Básica, Evolutiva y de la Educación, Universitat Autònoma de Barcelona, Edifici G6-despatx 254, 08193 Bellaterra, Cataluña, Spain

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ABSTRACT

This study investigates the development of reading comprehension in primary school students who took part in a peer tutoring programme. Data were collected from 8,128 students (aged 6–12) from 58 schools that participated in the programme between 2012 and 2022. Adopting a mixed-methods sequential explanatory design, two research aims are addressed: (1) to detect changes in reading comprehension in a pretest-posttest, and (2) to analyse the interaction of a subsample of pairs to explain these changes. Pretest-posttest subgroup analyses show a significant improvement in reading comprehension for all levels, tutoring options, and roles (i.e., same-age tutors and tutees, same-age reciprocal role, cross-age tutors and tutees) ($.43 \leq ES \leq .97$). A linear mixed model shows that grade level and the interaction between this variable and tutoring option may moderate the increase in reading comprehension, after controlling for initial score. Interaction analysis points to key elements that can explain this improvement, mainly students' explicit use of strategies for reading comprehension, repeated episodes of reading the text aloud, and joint construction of answers. Overall, these findings support the use of peer tutoring for the development of reading comprehension throughout primary education. Limitations of the study as well as implications for research and practice are discussed.

¿Cómo contribuye la tutoría entre iguales al desarrollo de la comprensión lectora? Evidencias de diez años de práctica

Palabras clave:
Tutoría entre iguales
Aprendizaje cooperativo
Comprensión lectora
Lectura en parejas
Educación primaria

RESUMEN

Este estudio investiga el desarrollo de la comprensión lectora en estudiantes de primaria que participan en un programa de tutoría entre iguales. Se recogen datos de 8128 estudiantes de primaria (6–12 años) de 58 escuelas que participan en el programa entre 2012 y 2022. Se plantean dos objetivos de investigación: (1) identificar los cambios que se producen en comprensión lectora a partir de un pretest-posttest y (2) analizar la interacción de una submuestra de parejas para poder explicar los cambios detectados. Los análisis de subgrupos del pretest-posttest muestran una mejora en la comprensión lectora para todos los niveles, formatos de tutoría y roles desarrollados ($.43 < ES < .97$). Un modelo lineal mixto muestra que el curso y la interacción entre esta variable y la opción de tutoría pueden moderar la mejora en comprensión lectora, después de controlar el efecto de la puntuación inicial. El análisis de la interacción señala elementos clave que pueden explicar esta mejora, principalmente el uso explícito de estrategias para la comprensión lectora, la realización de lecturas repetidas en voz alta y la construcción conjunta de respuestas. En general, los resultados apoyan el uso de la tutoría entre iguales para el desarrollo de la comprensión lectora a lo largo de la educación primaria. Se discuten las limitaciones del estudio, así como las implicaciones para la investigación y la práctica.

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* Corresponding author.
E-mail addresses: marta.flores@uab.cat (M. Flores), jesus.ribosa@uab.cat (J. Ribosa), david.duran@uab.cat (D. Duran).

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Introduction

Reading competence, and especially reading comprehension, is key for lifelong personal and social development, providing essential tools for thinking and learning within the literate culture we live in. In 2021, the latest Progress in International Reading Literacy Study (PIRLS) has shown an alarming decrease in reading comprehension levels (INEE, 2023). In Spain, and especially in Catalonia, the scores go down to 521 and 507 points respectively, which are below the mean scores in OECD-28 and the European Union. This drop has raised concern amongst educational researchers, policymakers, practitioners, and society as a whole. The current challenge has to do with educational policies that reverse the situation in the coming years. This study provides evidence of the use of peer tutoring for the development of reading comprehension, based on ten years of implementation of the programme *Reading in Pairs* in Catalonia (Duran et al., 2018).

Reading comprehension

According to OECD (2021), reading comprehension consists in "understanding, using, reflecting on and engaging with written texts, in order to achieve one's goals, develop one's knowledge and potential, and participate in society" (p. 23). Reading is an interactive process between the reader, the text, and the reading activity (Solé, 2001), situated within a sociocultural context (Butterfuss et al., 2020) and with a specific purpose (Britt & Rouet, 2012). Thus, it is a complex and multidimensional skill that requires coordinating multiple cognitive and linguistic processes (Elleman & Oslund, 2019; Kendeou et al., 2020) to build a global and coherent mental representation of the information from the text (Butterfuss et al., 2020; Elleman & Oslund, 2019).

Elleman and Oslund (2019) indicate that the different explanatory frameworks for reading comprehension agree on four essential elements: inference, background knowledge, vocabulary, and comprehension monitoring. In this line, Kendeou et al. (2020) emphasise the role of inference making as a key strategy for reading, and they claim that scaffolded questions with immediate feedback can foster such inferential processes. Moreover, it is necessary to teach how to use specific reading strategies before, during, and after reading (Boardman et al., 2018; Shanahan et al., 2010).

Peer tutoring

Peer tutoring is recognised as a highly effective instructional practice to achieve quality education. Recommended by the European Agency for Development in Special Needs Education (Meijer, 2001) and UNESCO (Topping, 2000), the benefits of peer tutoring have also been documented in different educational areas and levels for more than 40 years, especially in primary school (Alegre et al., 2018; Bowman-Perrott et al., 2013; Okilwa & Shelby, 2010; Roma et al., 2019; Thurston et al., 2020). Benefits are reported not only for competent students but also for at-risk students (Huber & Carter, 2019; Mahoney, 2019; Sarid et al., 2020; Toulia et al., 2023). In a meta-analysis, Hattie (2009) highlights peer tutoring as an effective practice ($d = 0.55$). The distinctive feature based on taking advantage of differences between students within the class to boost all students' learning places it as a first-rate inclusive practice (Alzahrani & Leko, 2017).

Peer tutoring is a cooperative learning method based on the creation of pairs of students who have different levels of knowledge in terms of the competency that is aimed to be developed. The more competent student takes on the role of tutor, and the less competent student becomes the tutee. An asymmetric relationship is thus established in which both need each other to learn. The tutor can learn because helping the partner learn something may involve elaborating the information (i.e., providing examples), which offers themselves opportunities for learning by teaching (Duran, 2017, 2023; Roscoe & Chi, 2007). The tutee can learn because the tutor constantly monitors and supports their learning process, benefitting from the adjusted and personalised help which is facilitated by the asymmetric one-to-one interaction (Alzate-Medina & Peña-Borrero, 2010; Robinson et al., 2005). For the practice to be successful, teachers should structure the interaction between tutor and tutee according to the learning aims. In other words, the two students share a common learning goal (e.g., improving reading comprehension) through an interaction framework that has been previously designed and structured by the teacher (Topping et al., 2017).

Different options of peer tutoring may be implemented. Based on the age of participants, Topping et al. (2015) distinguish between cross-age and same-age tutoring. Based on role continuity, there is a distinction between reciprocal role and fixed role, depending on whether roles are exchanged or not between the two students (Topping et al., 2017). In reciprocal-role peer tutoring, the difference in terms of level of competency between the two students is reduced so that both of them can successfully carry out the two roles. Here, the thorough preparation of the material by the tutor before the session becomes especially important for an asymmetric interaction in the session.

Peer tutoring is a form of peer learning. There are three generations of research on peer learning (Duran et al., 2018). A first generation of studies focused on comparing cooperative situations to individual and competitive situations as control groups. A second generation focused on analysing the effectiveness of the different cooperative learning methods. Currently, a third generation is focusing on explaining why learning happens in peer learning situations through interaction analysis (e.g., De Backer et al., 2012).

Within the third generation, Chi and Menekse (2015) add a fourth interactive (i.e., co-constructive) pattern to the three individual learning patterns (i.e., constructive, active, and passive). According to the authors, this co-constructive pattern would involve the highest degree of learning in the interaction between peers. It occurs when peers interact to elaborate a joint answer to the task. In the case of peer tutoring, in this fourth pattern the tutor is involved in higher-order thinking processes than in the other patterns, because they provide ideas, examples, or hints to help the tutee, as well as receive ideas from them. Thus, sharing knowledge and experiences between tutor and tutee may lead them to generate a joint answer that is more elaborate than their individual answers alone.

Peer tutoring and reading comprehension

The use of peer tutoring for the development of reading and reading comprehension is not new and has generated interest both in research and practice (Gubalani et al., 2023; Topping et al., 2015). When sharing the reading activity with peers, the interactive process involved can contribute to learning to read more effectively (Gutiérrez, 2016). Multiple interventions based on peer tutoring for reading can be found in extant literature, with positive findings in reading comprehension, fluency, motivation, and attitudes (Gubalani et al., 2023; Jones et al., 2017; Miller et al., 2010; Rahmasari, 2017; Robison, 2022; Topping et al., 2015).

Table 1
Number of participants per grade and academic year

Academic year	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Row total
2012–2013	102	320	269	237	323	30	1281
2013–2014	133	404	618	462	487	180	2284
2014–2015	55	101	337	39	294	86	912
2015–2016	0	147	352	158	188	33	878
2016–2017	25	125	356	46	172	18	742
2017–2018	0	39	337	88	386	90	940
2018–2019	0	76	167	140	197	23	603
2019–2020	0	0	87	55	33	8	183
2020–2021	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2021–2022	42	30	92	41	61	39	305
Column total	357	1242	2615	1266	2141	507	8128

Reading in pairs

This programme (Duran et al., 2018) aims at improving reading comprehension through peer tutoring. Activity sheets are used to structure pair interaction in 30-minute sessions. Each session consists of three stages: before reading, reading, and after reading. Firstly, before-reading activities deal with the exploration of the text, activation of prior knowledge, and formulation of hypotheses. Secondly, while-reading activities involve three tasks: tutor's modelled reading, joint reading (i.e., where the tutor starts reading aloud and the tutee follows some seconds later), and tutee's reading monitored by the tutor. In the latter, the tutor makes use of the pause-prompt-praise technique (Wheldall & Colmar, 1990): they stop the tutee's reading when they detect a mistake and invite the tutee to revise and correct it; if the tutee is not able to do so, the tutor provides hints; when the mistake is corrected, the tutor encourages the tutee to continue reading. Thirdly, after-reading activities involve checking hypotheses, identifying the main ideas of the text, and answering literal, inferential, and evaluative questions. Thus, an activity sheet contains an authentic text preceded by some previous questions and followed by literal, inferential, and deep comprehension questions (Basaraba et al., 2013).

The intervention is planned to take place for 12 weeks, with two weekly sessions. The teachers who develop the programme in the classrooms participate in a teacher training course based on the network of schools involved (Duran, 2017). It helps them adjust the programme to their specific context and make decisions regarding the type of tutoring, grades involved, initial student training, development of the sessions in class, and assessment.

Prior studies on the programme implemented in Catalan, Spanish, and English as a foreign language show positive outcomes in terms of reading comprehension, self-concept, and fluency, as well as oral skills (Duran et al., 2019; Flores & Duran, 2016; Valdebenito & Duran, 2019). This study focuses on ten years of implementation of the programme (2012–2022) for the development of reading comprehension in Catalan. The following research aims are addressed:

1 To detect changes in terms of reading comprehension after participating in the peer tutoring programme.
2 To analyse the interaction between tutor and tutee throughout the peer tutoring sessions.

Method

This study lies within the third research generation on peer learning, with the aim of explaining the quantitative changes in reading comprehension based on the analysis of the interaction between students. No control groups are used in this generation of studies, given that prior generations had already assessed the effectiveness of these interventions when compared to control groups, including the peer tutoring programme *Reading in Pairs* (Duran et al., 2019; Flores & Duran, 2016; Valdebenito & Duran, 2019).

A mixed-methods sequential explanatory design was adopted (Creswell, 2015). It consisted of a quantitative analysis of reading comprehension scores (i.e., first research aim), followed by the qualitative analysis of student interaction to help interpret quantitative findings (i.e., second research aim).

Participants

A total of 8128 students from 58 primary education schools in Catalonia took part in the peer tutoring programme *Reading in Pairs* between 2012 and 2022, from grades 1 to 6 (Table 1). No data are available from the academic year 2020–2021, because pandemic lockdowns hindered the implementation of the programme and data could not be collected.

Instruments

Reading comprehension test

A standardised test measuring reading comprehension was administered before and after the intervention, as a pretest-posttest. *Reading Comprehension Assessment* (ACL, for its acronym in Catalan) tests were used (Català et al., 2004, 2007), which offer an adjusted test for each grade to measure reading comprehension in Catalan. Català et al. (2004, 2007) report a high reliability in the different grades according to Kuder-Richardson Formula 20 ($.76 \leq KR\text{-}20 \leq .83$). Given that the maximum score of the tests is different depending on the grade, individual scores were transformed out of 100 points.

Videotaped sessions

Sixty peer tutoring sessions were videotaped, resulting in 30 hours of videos. Convenience sampling was used at the school level, and random sampling was used at the pair level. The recordings took place in four schools, trying to obtain a representative sample in terms of grade and tutoring option. The 20 pairs of students were randomly selected. Three sessions from each pair were recorded: one at the beginning of the intervention, one in the middle, and one at the end.

Procedure

The schools voluntarily took part in the programme, in the form of a year-long training course in a network of schools. At the beginning of the school year, the school management teams and the teachers who were to take part in the programme signed a commitment form. All participants received information about the study and gave their consent to participate according to the ethics compliance procedures.

Each school year, after the first training session of the course, the teachers administered the reading comprehension pretest to the students (in December or January). Then, the teachers decided which kind of peer tutoring to implement (i.e., *same-age or cross-*

Table 2
Subgroup analyses of posttest-pretest comparison of reading comprehension scores

Grade and role	*N*	Posttest *M* (*SD*)	Pretest *M* (*SD*)	*W*	*p* value	Effect size
Grade 1						
Same-age fixed role						
Same-age tutor	97	78.436 (16.796)	61.383 (15.929)	4113.000	<.001	0.923
Same-age tutee	99	55.850 (19.606)	33.796 (12.751)	4386.500	<.001	0.924
Same-age reciprocal role	0	n/a	n/a	n/a	n/a	n/a
Cross-age tutor	0	n/a	n/a	n/a	n/a	n/a
Cross-age tutee	161	62.914 (20.022)	41.848 (21.001)	12345.000	<.001	0.966
Grade 2						
Same-age fixed role						
Same-age tutor	170	69.420 (18.968)	57.083 (16.573)	11296.500	<.001	0.822
Same-age tutee	204	52.655 (20.301)	38.848 (19.098)	16683.500	<.001	0.782
Same-age reciprocal role	185	64.730 (21.321)	51.734 (19.671)	13207.500	<.001	0.861
Cross-age tutor	156	66.613 (19.669)	56.437 (20.221)	9014.500	<.001	0.657
Cross-age tutee	527	65.552 (19.642)	47.873 (19.609)	118607.000	<.001	0.909
Grade 3						
Same-age fixed role						
Same-age tutor	320	62.977 (20.365)	49.721 (19.510)	38902.500	<.001	0.844
Same-age tutee	290	41.110 (18.777)	28.640 (14.879)	30759.500	<.001	0.813
Same-age reciprocal role	328	69.436 (19.679)	57.149 (20.923)	41513.000	<.001	0.779
Cross-age tutor	339	62.006 (21.265)	51.102 (20.815)	39899.500	<.001	0.733
Cross-age tutee	1338	60.025 (21.438)	47.216 (20.731)	680566.500	<.001	0.816
Grade 4						
Same-age fixed role						
Same-age tutor	203	71.675 (14.962)	60.450 (16.378)	16059.500	<.001	0.827
Same-age tutee	176	47.639 (17.263)	32.887 (14.978)	12780.500	<.001	0.866
Same-age reciprocal role	366	64.364 (20.092)	55.636 (20.516)	48533.000	<.001	0.704
Cross-age tutor	286	67.495 (21.047)	56.956 (21.248)	29940.000	<.001	0.778
Cross-age tutee	235	70.867 (18.807)	61.000 (18.706)	22765.000	<.001	0.807
Grade 5						
Same-age fixed role						
Same-age tutor	319	61.433 (18.832)	53.498 (18.217)	34373.500	<.001	0.687
Same-age tutee	313	49.236 (19.808)	39.040 (16.204)	37121.500	<.001	0.747
Same-age reciprocal role	215	54.599 (18.307)	45.714 (18.658)	17019.500	<.001	0.818
Cross-age tutor	1254	55.759 (18.993)	46.329 (17.243)	585091.000	<.001	0.744
Cross-age tutee	40	57.054 (19.663)	46.179 (21.708)	667.500	<.001	0.802
Grade 6						
Same-age fixed role						
Same-age tutor	80	59.271 (16.882)	54.653 (13.947)	1678.000	.002	0.431
Same-age tutee	82	38.884 (15.089)	31.896 (11.905)	2586.000	<.001	0.557
Same-age reciprocal role	113	58.090 (18.865)	48.070 (18.678)	5347.500	<.001	0.784
Cross-age tutor	223	60.853 (18.661)	50.194 (17.252)	17547.000	<.001	0.781
Cross-age tutee	9	46.296 (11.024)	32.099 (12.738)	28.000	.022	1.000

Note. Within *same-age fixed role*, the number of students per role might slightly differ, depending on the availability of pretest and posttest data for each student. As for *cross-age tutoring*, it should be noted that within each grade the students were either tutors or tutees of students from another grade (rather than the same grade).

age; fixed role or reciprocal role) and created the pairs accordingly. Thus, at the class level, there were four tutoring options: *same-age fixed role, same-age reciprocal role, cross-age tutors, cross-age tutees*. The teachers provided students with initial training on the programme materials and the peer tutoring roles. After the training, the schools implemented between 16 and 24 peer tutoring sessions between January and May, depending on each school's planning. The researchers kept in close contact with the teachers throughout the implementation and went to the schools to videotape the sample of peer tutoring sessions: one at the beginning of the intervention, one in the middle, and one at the end. When the intervention was finished, the teachers administered the reading comprehension posttest to the students (in May or June). Teachers were asked to fill in a spreadsheet with the prestest-posttest scores of each student, which was sent to the researchers at the end of the school year. Data from the ten years of implementation (2012–2022) were collated in a single spreadsheet by the first author.

Data analysis

Changes in terms of reading comprehension

To analyse possible differences between pretest and posttest scores, a paired-sample *t*-test was first carried out with all data, after checking the Q-Q plot of residuals. Cohen's *d* was reported as the measure of effect size (*ES*). Subgroup analyses were also carried out, after grouping the students based on *grade level* (i.e., *Grades 1–6*), *tutoring option* (i.e., *same-age* or *cross-age*), and *role* (i.e., *tutor*, *tutee*, or *reciprocal*). Wilcoxon signed-rank test was used for subgroup analyses, after checking the Q-Q plot of residuals of the different subgroups. Rank biserial correlation (r_{rb}) was reported as the measure of effect size in subgroup analyses. Statistical significance was set at $p < .05$.

The increase in reading comprehension was then computed for each student, by calculating the difference between the initial score and the final score. A linear mixed model was carried out with this variable as the dependent variable, initial score as covariate, and *grade level* and *tutoring option* (i.e., *same-age fixed role*, *same-age reciprocal role*, *cross-age tutor*, *cross-age tutee*) as factors. Academic year and school were introduced as cluster variables. Satterthwaite method for degrees of freedom was applied. Main effects and the two-way interaction between *grade level* and *tutoring option* were introduced within the model. Estimated marginal means (*MM*), standard errors (*SE*), and simple effects were reported to help interpret the findings. All analyses were carried out in Jamovi v2.3.21.0.

Interaction between tutor and tutee throughout the peer tutoring sessions

Interaction analysis was carried out. A category system was elaborated to code the students' actions during peer tutoring based

Table 3
Fixed effect omnibus tests of the linear mixed model for the increase in reading comprehension scores

	F	Num *df*	Den *df*	*p*
Initial score	859.69	1	8038.23	<.001
Grade level	18.92	5	3207.71	<.001
Tutoring option	1.04	3	1708.30	0.376
Grade level * Tutoring option	3.48	13	3073.71	<.001

on three approaches: the analysis of interactivity (Colomina et al., 2005), cognitive and metacognitive strategies for the development of reading comprehension (Solé, 2001) within a peer tutoring framework (De Backer et al., 2012), and the structure of the specific peer tutoring programme (Duran et al., 2018).

Atlas.ti v6.2 was used to code the 60 sessions. Each session is analysed based on the three segments of interactivity (i.e., *before reading*, *reading*, *after reading*). Within each segment, four levels of collaboration were usually used to code the interaction between tutor and tutee. The first two levels refer to individual actions (i.e., *only tutor or tutee participates*). The third level refers to situations in which the tutor asks and the tutee answers (i.e., *active interaction pattern*). The fourth level involves the shared elaboration of answers (i.e., *co-constructive interaction pattern*). Some emerging categories were also included in the system after an initial exploration of the recordings. Inter-rater reliability is high (r = .98, p < .01).

Results

Changes in terms of reading comprehension

Overall, results show that there is a significant increase in reading comprehension scores from pretest (M = 48.319, SD = 20.192) to posttest (M = 60.136, SD = 20.963), with a large effect size (d = 0.826). Subgroup analyses confirm the significant increase for students from all *grades*, *peer tutoring options*, and *roles* (Table 2). The effect size is large in every subgroup ($r_{rb} \geq .50$), except for *sixth-grade same-age tutors*, whose effect size is moderate.

A linear mixed model (Marginal R^2 = 0.14; Conditional R^2 = 0.21) shows that *grade level* and the interaction between this variable and *tutoring option* significantly moderate the increase in reading comprehension, after controlling for initial score (Table 3). The estimate (*EST*) for initial score indicates that the lower the initial score, the higher the increase in reading comprehension (*EST* = –0.22).

As for the main effect of *grade level*, marginal means (MM_{grade}) suggest that the increase in reading comprehension might be especially salient in the *first grade* of primary education, and it might diminish as *grade level* advances (MM_2 = 14.19, SE_2 = 0.80; MM_3 = 13.26, SE_3 = 0.66; MM_4 = 11.77, SE_4 = 0.72; MM_5 = 8.38, SE_5 = 0.84, MM_6 = 8.56, SE_6 = 1.35). Estimated marginal means could not be computed for *Grade 1*, because the model includes an interaction between *grade level* and *tutoring option* (and in *Grade 1* no data is available for two of the *tutoring options*, because of the schools' decisions in terms of the students' role). When only main effects are included within the model, *Grade 1* shows the highest increase in reading comprehension (MM_1 = 20.59, SE_1 = 1.08), being significantly higher than all the other *grade levels*.

As for the interaction between this variable and *tutoring option* (Table 4), the omnibus tests suggest that there are significant differences between *tutoring options* in *Grade 2* (p = .012), Grade 3 (p = .022), and *Grade 6* (p = .041), but not in *Grade 1* (p = .080), *Grade 4* (p = .159), and *Grade 5* (p = .353). The three *grade levels* showing significant differences are commented below.

In *Grade 2*, simple effects indicate that the increase in reading comprehension is especially salient in *cross-age tutees*, with significant differences when compared to the two *same-age tutoring options—same-age reciprocal role* (p = .006) and *same-age fixed role* (p = .004)—, but not to *cross-age tutors* (p = .236). None of the other comparisons between *tutoring options* is significant ($.273 \leq p \leq .666$).

In *Grade 3*, simple effects indicate that the increase in reading comprehension is especially salient in *same-age reciprocal role*, with significant differences when compared to *cross-age tutors* (p = .002) and *cross-age tutees* (p = .034), but not to *same-age fixed role* (p = .236). The latter significantly outperforms *cross-age tutors* as well (p = .046). The other comparisons between *tutoring options* are not significant ($.110 \leq p \leq .395$).

In *Grade 6*, simple effects indicate that the increase in reading comprehension is less salient in *same-age fixed role*, being significantly lower than *same-age reciprocal role* (p = .026) and *cross-age tutors* (p = .008). The difference when compared to *cross-age tutees* is not significant (p = .253), given the small sample for this *tutoring option* (n = 9), which contributed to a high standard error (*SE* = 4.51). The other comparisons between *tutoring options* are not significant ($.886 \leq p \leq .943$).

Interaction between tutor and tutee throughout the peer tutoring sessions

The interaction analysis of the sample of pairs provides relevant information on the reading comprehension process, which helps to understand the detected increase in reading comprehension. The three segments represent a different proportion of the interaction: 17.59% of the actions *before reading*, 30.34% *while reading*, and 52.07% *after reading*.

Focusing on *before reading* (Table 5), most actions come from *activating prior knowledge* (33.09%), with both active and co-constructive interaction patterns within this strategy (50% and 47.83%, respectively). The other strategies within the *before-reading* segment show similar patterns. It is worth noting that all pairs carry out at least one of the essential *before-reading* strategies.

Table 4
Estimated marginal means of the increase in reading comprehension score based on grade level and tutoring option

	Grade 1		Grade 2		Grade 3		Grade 4		Grade 5		Grade 6	
	MM	*SE*	*MM*	*SE*	*MM*	*SE*	*MM*	*SE*	*MM*	*SE*	*MM*	*SE*
Same-age fixed role	18.93	1.25	13.10	1.06	13.74	0.97	13.49	1.12	7.95	1.00	4.84	1.46
Same-age reciprocal role	n/a	n/a	12.47	1.37	15.13	1.02	10.29	1.10	7.14	1.18	9.53	1.63
Cross-age tutor	n/a	n/a	14.58	1.58	11.26	1.05	11.84	1.15	9.05	0.75	9.67	1.24
Cross-age tutee	22.06	1.56	16.61	0.96	12.89	0.74	11.43	1.22	9.38	2.30	10.21	4.51

Table 5
Frequency distribution regarding dimensions and categories from segment 1: Before reading

1. Before reading	*f*	%
1.1 Activation of motivation	**38**	**27.34**
1.1.1 Tutor starts the activity.	38	100
1.1.2 Tutee starts the activity.	0	0
1.1.3 Tutor and tutee start the activity.	0	0
Subtotal	38	100
1.2 Text exploration	**33**	**23.74**
1.2.1 Tutor's direct answer.	0	0
1.2.2 Tutee's direct answer.	1	3.04
1.2.3 Tutor asks question and tutee answers.	16	48.48
1.2.4 Tutor and tutee negotiate answer.	16	48.48
Subtotal	33	100
1.3 Activation of prior knowledge	**46**	**33.09**
1.3.1 Tutor's direct answer.	1	2.17
1.3.2 Tutee's direct answer.	0	0
1.3.3 Tutor asks questions and tutee answers.	23	50
1.3.4 Tutor and tutee negotiate answer.	22	47.83
Subtotal	46	100
1.4 Generating hypotheses and predictions	**32**	**15.83**
1.4.1 Tutor's direct answer.	0	0
1.4.2 Tutee's direct answer.	0	0
1.4.3 Tutor asks questions and tutee answers.	17	53.12
1.4.4 Tutor and tutee negotiate answer.	15	46.88
Subtotal	32	100
Total	**149**	**17.59**

Table 6
Frequency distribution regarding the dimensions and categories from segment 2: Reading

2. Reading	*f*	%
2.1 Joint reading	**59**	**22.96**
2.1.1 Tutor and tutee do not listen to each other.	26	44.07
2.1.2 Tutor reads and tutee listens to it.	1	1.69
2.1.3 Tutee reads and tutor listens to it.	0	0
2.1.4 Tutor and tutee read and actively listen to each other.	32	54.24
Subtotal	59	100
2.2 Tutee's reading	**198**	77.04
2.2.1 Tutee reads without making any mistakes.	12	6.06
2.2.2 Tutee corrects himself/herself.	39	19.70
2.2.3 Tutor corrects the mistake directly and tutee incorporates correction.	34	17.17
2.2.4 Use of the pause-prompt-praise technique.	113	57.07
Subtotal	198	100
Total	**257**	**30.34**

As for the *reading* segment, *joint reading* and *tutee's reading* are the two strategies analysed (Table 6). As for *joint reading*, it is worth noting that more than half of the pairs (54.24%) correctly carry out this strategy, which is demanding because it requires high attention to decode the text fluently and coordinate the reading pace with the partner. As for *tutee's reading*, different levels of collaboration emerge, with the *use of the pause-prompt-praise technique* being prominent (57.07%). *Self-corrections by the tutee* also happen often (19.70%), probably thanks to the reading-aloud task before the tutor as an audience.

Focusing on the *after-reading* segment, it involves reading comprehension strategies related to checking initial hypotheses, identifying the main ideas of the text, and answering literal, inferential, and deep reading comprehension questions —also considering mistakes by the tutor and tutee. Moreover, how the pair of students responds to tutee's queries is also analysed (Table 7). In the *after-reading* segment, most actions refer to *answering the reading comprehension questions* (89.34%). Here, students usually *co-construct the answer* (56.85%).

Table 7
Frequency distribution regarding the dimensions and categories from segment 3: After reading

3. After reading	*f*	%
3.1 Hypotheses and predictions verification	**18**	**4.08**
3.1.1 Tutor's direct answer.	0	0
3.1.2 Tutee's direct answer.	1	5.56
3.1.3 Tutor asks questions and tutee answers.	11	61.11
3.1.4 Tutor and tutee negotiate answer.	6	33.33
Subtotal	18	100
3.2 Answering comprehension questions	**394**	**89.34**
3.2.1 Tutor's direct answer.	6	1.52
3.2.2 Tutee's direct answer.	5	1.27
3.2.3 Tutor asks questions and tutee answers.	135	34.26
3.2.4 Tutor and tutee negotiate answer.	224	56.85
3.2.5 Tutor gives some wrong clues or answers.	9	2.28
3.2.6 Tutor does not correct a wrong answer.	15	3.82
Subtotal	394	100
3.3 Identification of main ideas	**18**	**4.08**
3.3.1 Tutor s direct answer.	1	5.55
3.3.2 Tutee's direct answer.	0	0
3.3.3 Tutor asks questions and tutee answers.	2	11.11
3.3.4 Tutor and tutee negotiate answer.	15	83.34
Subtotal	18	100
3.4 Solution of the tutee's comprehension queries	**11**	**2.50**
3.4.1 Tutor does not know the answer.	5	45.45
3.4.2 Tutor's direct answer.	3	27.28
3.4.3 Tutee's direct answer.	0	0
3.4.4 Tutor and tutee negotiate answer.	3	27.27
Subtotal	11	100
Total	**441**	**52.07**

Discussion

The findings show an increase in reading comprehension, with statistically significant differences between pretest and posttest in all grade levels, tutoring roles, and options (i.e., with a large effect size in every subgroup, except for sixth-grade same-age tutors, whose effect size is moderate). These findings are in line with prior studies on the same peer tutoring programme (Flores & Duran, 2016; Valdebenito & Duran, 2019), as well as international research on peer tutoring for the development of reading skills (Gubalani et al., 2023; Robison, 2022; Topping et al., 2015).

The results of the linear mixed model suggest that grade level and the interaction between this variable and tutoring option significantly moderate the increase in reading comprehension, after controlling for initial score. The estimate for initial score indicates that the lower the initial score, the higher the increase in reading comprehension. This suggests that the intervention could be especially beneficial for low achievers, in line with prior studies on peer tutoring (Bowman-Perrott et al., 2013; Toulia et al., 2023). As for the main effect of grade level, the increase in reading comprehension might diminish as grade level advances. In other words, younger students may especially benefit from the intervention. In the first grades of primary education, decoding skills explain the variance in terms of reading comprehension to a large extent (Catts, 2018). In the peer tutoring intervention analysed in this study, the different moments of joint reading could have helped to overcome the

barriers in terms of decoding and thus contribute to the increase in reading comprehension. Focusing on the interaction between grade level and tutoring option, the findings suggest that there might be differences between tutoring options in some of the grade levels. According to the model, in Grade 2, students might especially benefit from receiving the help of an older tutor. In Grade 3, same-age reciprocal role may be especially beneficial—probably benefitting from the learning potential of both roles (Thurston et al., 2020)—, while the increase might be slightly less salient for cross-age tutors. In Grade 6, the lower increase in reading comprehension in the case of same-age fixed role may be related to status issues and role theory (Leung, 2019). However, these findings related to the interaction between grade level and tutoring option must be interpreted with caution. There is evidence that variables such as family involvement (e.g., Leung, 2015) and the number of sessions (e.g., Öz, 2023) could affect students' learning outcomes in peer tutoring. Moreover, although gender does not seem to affect learning outcomes in peer tutoring or peer interaction (Leung, 2019; Tenenbaum et al., 2020), it may influence reading comprehension scores (Logan & Johnston, 2010). It may well be the case that these variables that could not be thoroughly collected might better explain the variance and thus help improve the model.

Interaction analysis underlines some actions that may have contributed to the positive findings. It shows how students explicitly and effectively practice evidence-based strategies for reading comprehension at different moments of the process: before, during and after reading (Boardman et al., 2018). Before reading, they activate prior knowledge, which is known to predict reading comprehension (Cano et al., 2014; Tarchi, 2010). During reading, all the analysed pairs carry out two reading aloud moments. Here, two elements are especially relevant for reading comprehension: repeated reading and reading aloud. They both positively affect reading fluency, reading accuracy, and inference-making, which are key factors for reading competency (Gorsuch & Taguchi, 2010; Hwang et al., 2023). Finally, after reading, tutor and tutee take most of the time to answer the reading comprehension questions. In more than half of the occasions, they co-construct the answer. The collaborative framework in peer tutoring (i.e., based on one-to-one continuous interaction between tutor and tutee) provides participants with multiple opportunities to practice strategies that are essential for the development of reading competency—which may not be practiced to such extent in other class formats (Boardman et al., 2018; Gubalani et al., 2023). The joint and reflective construction of answers through negotiation and scaffolding might be responsible for the development of reading comprehension both for tutors and tutees (Chi & Menekse, 2015; Pulles et al., 2022). Tutors may benefit from the opportunities for learning by teaching (Duran, 2023; Roscoe & Chi, 2007). For the tutors, providing the tutees with hints or examples and elaborating on the information to tackle tutees' queries (Cao & Kim, 2021) may have a positive influence on their own reading comprehension. They are also in charge of monitoring reading processes, in order to check the tutees' understanding of the text and help them reflect on progresses and challenges, which fosters the use of metacognitive strategies that may boost their learning (Ain et al., 2023). As for the tutees, they probably benefit from receiving personalised and immediate feedback from the tutor, as well as modelling and constant guidance in the practice of reading comprehension strategies (Topping et al., 2015). The support from the tutor also helps tutees focus on understanding the meaning of the text rather than only decoding, thanks to the techniques used in the moments of joint reading (Downs et al., 2023).

All in all, it seems that the peer tutoring programme analysed in this study fosters reading comprehension of primary students in the different tutoring options and roles ($.43 \leq ES \leq .97$). The evidence comes from ten years of practice in real contexts, based on data from 8,128 students (aged 6–12) from 58 schools. Despite the above-mentioned limitations in terms of collecting information about additional variables and thoroughly controlling for fidelity of implementation, it is worth noting the ecological validity of the findings. The positive findings are probably due to the highly structured interaction that peer tutoring supports, in order to help students co-construct the meaning of the texts based on the explicit practice of key strategies for the development of reading comprehension. It should be noted that for the implementation of the programme to be as successful as possible, schools are asked to make decisions based on their own context and their training-acquired knowledge of the potentials and challenges of the different roles and options. As Elleman and Oslund (2019) said improving reading skills requires the close collaboration between teachers, researchers, and policymakers, to join forces and find medium- and long-term measures that are sustainably developed in schools as a regular practice. In this sense, peer tutoring should be considered as an effective instructional practice for the development of reading comprehension.

Conflict of interest

None.

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