



Linguistically responsive reciprocal teaching in primary school: effectiveness of an intervention study on students' Reading competence

Jasmin Decristan^a, Victoria Bertram^{b,c}, Valentina Reitenbach^a, Katharina Maria Schneider^d, Carmen Köhler^c and Dominique Patricia Rauch^d

^aInstitute for Educational Research in the School of Education, University of Wuppertal, Wuppertal, Germany;

^bDepartment of Educational Psychology, Goethe University Frankfurt, Frankfurt, Germany; ^cDepartment of Teacher and Teaching Quality, DIPF | Leibniz Institute for Research and Information Education, Frankfurt am Main, Germany;

^dFaculty of Education and Humanities, Department of Psychology, PH Ludwigsburg University of Education, Ludwigsburg, Germany

ABSTRACT

One shared goal of classroom instruction is to support students' reading competence as a key skill of school success and participation in daily life. Yet, teaching that addresses multilingual students' language-related resources to support reading is rare. In this study, we enriched reciprocal teaching with elements of linguistically responsive teaching (labelled LRRT) and conducted an intervention study in German primary schools (38 classes and 684 students) to examine its effects on reading competence. To assess reading competence, we used reading comprehension and reading strategy tests. Findings demonstrate the feasibility of our approach in regular primary school classes. Teachers and students highly valued the teaching unit as well. Results of latent mean difference score analysis confirmed the effectiveness of LRRT with respect to students' reading strategy use but not with respect to their reading comprehension. Moreover, multilingual and monolingual students did not differ in their gains in reading competence. However, multilingual students' different language use was of particular importance for gains in reading comprehension. The study thus provides further research on multilingualism as well as various stimuli for teachers of today's heterogenous primary school classes.

ARTICLE HISTORY

Received 14 April 2022

Accepted 21 October 2022

KEYWORDS

Multilingualism; intervention study; reciprocal teaching; linguistically responsive teaching

Introduction

Reading competence is considered as key to scholastic achievement and fundamental to participation in daily life, particularly in today's information society with increasing availability of written information (e.g. Alexander 2012). However, international large-scale studies show that a substantial amount of fourth graders in most European countries and the U.S. do not reach the international intermediate benchmark of reading achievement (e.g. Mullis et al. 2017). Moreover, students with home languages other than the language of instruction show lower reading achievement than their peers, and this holds particularly true for students in Germany (Mullis et al. 2017; Hußmann et al. 2017). To support students' learning, Tharp et al. (2000) build on constructivist

CONTACT Jasmin Decristan ✉ decristan@uni-wuppertal.de  University of Wuppertal, Gaußstr. 20, 42119 Wuppertal, Germany
This article has been corrected with minor changes. These changes do not impact the academic content of the article.

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views of learning and sociocultural theory and suggested that effective teaching (a) focuses on reading, writing, and speaking, (b) uses joint learning activities and classroom discourse, and (c) connects instruction with students' lives and prior experiences. Perumal et al. (2020) have shown that primary school teachers who were considered to be competent in culturally and linguistically diverse classrooms used these teaching practices in their classes.

In the current study in German primary school classes, we drew on Tharp et al.'s (2000) assumptions and developed a teaching unit that enriched reciprocal teaching with elements of linguistically responsive teaching. Students practiced reading strategies using small-group learning, guided by the teachers. Moreover, the teachers established a positive classroom climate towards linguistic diversity and encouraged the students to use their full linguistic repertoire for learning. Teachers' encouragement was supported by material for reading strategy use in different languages. We then examined the effects of this approach on reading competence for students in general, for multilingual students, and depending on multilingual students' different language use.

Reading competence and its support using reciprocal teaching

Reading competence 'represents the ability to modulate and tune the interaction of one's reading knowledge, beliefs, abilities, and processes appropriately given the sociocontextual conditions confronted, along with one's own intentions.' (Alexander 2012, 263). Reading competence is thus characterised by reading comprehension, reading motivation, and the use of reading strategies. Consistently with this view, best-evidence syntheses on effective reading instruction in primary school highlight structured and cooperative reading programs with explicit reading strategy instructions (e.g. Slavin 2013; Slavin et al. 2009). One of the most promising and well-examined approaches is reciprocal teaching (e.g. Hattie 2009; Rosenshine and Meister 1994) developed by Palincsar and Brown (1984). Hacker and Tenent (2002, 699) define reciprocal teaching as an 'instructional procedure in which small-groups of students learn to improve their reading comprehension through 'scaffolded instruction' of comprehension-fostering and comprehension-monitoring strategies'. Thus, reciprocal teaching can be characterised by three principles (i.e. instruction of reading strategies, small-group learning, and teacher guidance; e.g. Palincsar and Brown 1984) which are described in the following.

Reading strategy instruction

Reading strategies are considered as 'deliberate, goal-directed attempts to control and modify the reader's efforts to decode text, understand words, and construct meanings of text' (Afflerbach, Pearson, and Paris 2008, 368). For reciprocal teaching, four reading strategies in particular have been emphasised and examined (e.g. Hacker and Tenent 2002; Palincsar and Brown 1984; Rosenshine and Meister 1994; Spörer, Brunstein, and Kieschke 2009): (a) summarising a text, (b) generating questions related to the main messages of the text, (c) predicting what might happen in the next paragraph, and (d) clarifying word meanings. Reciprocal teaching can successfully enhance these strategies (e.g. Fung, Wilkinson, and Moore 2003; Rosenshine and Meister 1994; Spörer, Brunstein, and Kieschke 2009). However, the study of Hacker and Tenent (2002) showed that particularly for younger students, predicting the next paragraph seems to be rather challenging, and clarifying word meanings was rarely used. Furthermore, research suggests that strategy learning is a rather complex and effortful activity (e.g. Afflerbach, Pearson, and Paris 2008), and, in earlier school grades, implementing only a few strategies seems to be more promising (e.g. Koch and Spörer 2016). In summary, questioning and summarising are considered the most promising approaches for reading strategy instruction in primary school classes.

Small-group learning

Small-group learning is another key component of reciprocal teaching. Sociocultural as well as constructivist views of learning (e.g. Slavin 2015; Webb 2011) have been used to explain cognitive

benefits of small-group learning. Students thus learn best when operating in the so-called zone of proximal development, where new knowledge is neither already known to the learner nor too complex to understand. Students are likely to support each other in the zone of proximal development because they have similar but not identical knowledge. Students who are learning together can co-construct knowledge and revise cognitive structures by discussing content and different understandings. Peer discourse analysis emphasises the relevance of elaborated discussion for student learning (e.g. Denessen et al. 2008; Howe et al. 2007). Moreover, group dynamics and motivation have been considered to explain the effectiveness of small-group learning as well (e.g. Dörnyei 1997; Gillies 2016). Finally, for teachers, small-group learning provides opportunities for differentiated instruction with the aim to fit the needs of a particular group (e.g. Lou et al. 1996).

Teacher guidance

Scaffolded instruction can provide additional guidance during reciprocal teaching (e.g. Hacker and Tenent 2002). Teacher scaffolding (e.g. van de Pol, Volman, and Beishuizen 2010) refers to techniques of modelling, structuring, and monitoring students' learning. Johnson (2021) showed that exemplary teachers often displayed and structured information, organised small-group work, and encouraged students' oral participation in order to provide opportunities for language production and to support students' reading development. To further reduce the complexity of reading strategy learning, Rosenshine and Meister (1994) suggest 'explicit teaching before reciprocal teaching' (482). Reciprocal teaching thus starts with teachers' explicit instruction and scaffolding of strategy use. Afterwards, students further practice the reading strategies in small groups guided by the teacher. Salehi and Vafakhah (2013) showed the benefits of this approach compared to reciprocal teaching without explicit strategy instruction before small-group learning. Furthermore, without explicit instruction and teacher scaffolding, students' strategy use was often incorrect (e.g. Hacker and Tenent 2002). However, while reciprocal teaching has been successfully implemented in primary school classes, its enrichment with elements of linguistically responsive teaching and corresponding benefits in today's linguistically diverse classes have not been examined yet.

Responsive teaching in linguistically diverse classrooms

In many European countries the overwhelming majority of subjects is taught in the majority language only (e.g. Aarts and Verhoeven 1999 in the Netherlands; Lorenz, Krulatz, and Torgersen 2021 in Norway; Ellis, Gogolin, and Clyne 2010 in Germany and Austria). Principals, teachers, students, and parents conceptualise schools as monolingual places – Gogolin (1997, 38) described this as a 'monolingual habitus'. This corresponds with findings that teachers in many European countries do not feel well prepared for implementing pedagogical approaches aiming to deal with linguistically diverse classrooms (e.g. Alisaari et al. 2019; Bredthauer and Engfer 2016; Lorenz, Krulatz, and Torgersen 2021). Teachers often argue that using different languages may interfere with learning and that the frequent use of home languages of immigrant students hinders learning the language of instruction (e.g. Alisaari et al. 2019 in Finland; De Angelis 2011 in Italy, Austria, and Great Britain; Bredthauer and Engfer 2016 in Germany; Putjata and Koster 2021 in Germany). However, research suggests several pedagogical approaches to instruction in linguistically diverse classrooms (e.g. García 2009; García and Sylvan 2011; Lorenz, Krulatz, and Torgersen 2021). Linguistically responsive teaching (e.g. Haan and Gallagher 2022; Lucas and Villegas 2013; Prediger and Neugebauer 2021) refers to two main principles evident in most approaches including positive attitudes towards all languages and possibilities for students to use their full linguistic repertoire for learning. The corresponding theoretical assumptions and empirical studies are described in the following.

Positive classroom climate for linguistic diversity

The appreciation of linguistic differences is connected with a large body of research showing the benefits of a positive classroom climate for students' academic and psychological wellbeing (e.g.

López, Salgado, and Berkowitz 2022; Wang et al. 2020). Moreover, multilingual students, particularly those of minority languages from sociocultural contexts rather different from the local context, often show more negative attitudes toward their minority languages compared to the majority language of instruction (e.g. Broermann 2007; Setati 2008). Anxiety or fear to be embarrassed about speaking a non-mainstream language can be seen as an affective filter which hinders social interaction and classroom learning (Pappamihel 2002). Hence, a warm and appreciative climate towards linguistic diversity reduces students' anxiety of speaking different languages in class (e.g. Cenoz, Santos, and Gorter 2022; Pappamihel 2002). Low anxiety and positive emotions towards the minority language are also connected with multilingual students' use of different languages during learning (e.g. Schastak et al. 2017 in Germany; Pappamihel 2002 in Mexico).

Translanguaging and pedagogical translanguaging

The term translanguaging was initially used within the context of bilingual education and referred to alternating between two languages. However, the initial view of translanguaging was broadened by emphasising multilingual resources as a joint linguistic repertoire instead of separated language systems (e.g. Cenoz and Gorter 2017; Cook 1995). Canagarajah (2011, 40) thus defined translanguaging as 'the ability of multilingual speakers to shuttle between languages, treating the diverse languages that form their repertoire as an integrated system'. Using the full linguistic repertoire is supposed to help multilingual students to organise, elaborate, and embed new knowledge, and thus to support learning (e.g. García 2009; Lewis, Jones, and Baker 2012).

Teachers' planned instructional support of students' translanguaging is labelled as 'pedagogical translanguaging' (Cenoz and Gorter 2021). These planned activities and strategies refer to enhancing students' meta-linguistic awareness and encouraging students' use of their full linguistic repertoire by, for instance, providing multilingual material or verbally encouraging multilingual interaction (Cenoz and Gorter 2021; Kirsch 2020). Empirically, pedagogical translanguaging has been connected with positive student outcomes such as expanding their linguistic repertoire (review by Bosma et al. 2022) and larger confidence in using all linguistic resources (Cenoz, Santos, and Gorter 2022).

However, studies show that it is rather difficult to stimulate students' use of different languages in countries with traditional monolingual instruction, such as in Germany (e.g. Schastak et al. 2020; Schüler-Meyer et al. 2017). According to cognitive views of learning, students' active use of language is considered to be an indicator for deeper processing of content (Chi and Wylie 2014) and thus learning (e.g. Sedova et al. 2019). Expanding this view to multilingual students, the use of their full linguistic repertoire for interaction and learning is considered to be particularly important. However, following Grosjean (2020), multilingual students' access to their full linguistic repertoire depends on their language mode. Grosjean (2020) assumes a continuum ranging from a monolingual mode to a multilingual mode. If a multilingual person is in monolingual mode, only one language is activated and all other languages are deactivated. Instead, in a multilingual mode, all interaction-relevant languages are activated. Thus, the multilingual language mode enables multilingual students to use multilingual discursive practices (code switching, language mixing) and thus their full linguistic repertoire.

Aims of the study and research questions

Studies on linguistically responsive tutoring of bilingual students outside of the regular classroom setting suggest that reciprocal teaching provides an optimal setting for using elements of linguistically responsive teaching (e.g. Decristan et al. 2021; Fung, Wilkinson, and Moore 2003). First, and generally, teachers can support a climate which appreciates linguistic diversity and encourages students to make use of their full linguistic repertoire. Second, small-group learning provides a safe environment where peers with the same home languages can use their full linguistic repertoire to explain and discuss content and reading strategies. Third, teachers can provide teaching material

in different languages according to the language-related composition of the small groups. However, its implementation in today's multilingual classes and its effectiveness for the support of students' reading competence have not been examined yet. We thus conducted an intervention study with treatment group and control group classes in German primary schools. In the treatment group classes, we enriched reciprocal teaching with elements of linguistically responsive teaching and labelled this approach 'linguistically responsive reciprocal teaching' (LRRT). We then examined the benefits of LRRT on reading competence for students in general, for multilingual students, and depending on multilingual students' different language use. To assess reading competence, we used reading comprehension and reading strategy tests. We then addressed the following research questions (RQ) and hypotheses (H):

- (1) Is LRRT effective in supporting primary school students' reading competence? Based on empirical studies on reciprocal teaching (e.g. Hattie 2009; Spörer, Brunstein, and Kieschke 2009) as well as on research on linguistically responsive teaching (e.g. Prediger and Neugebauer 2021) with its benefits of a positive classroom climate (e.g. López, Salgado, and Berkowitz 2022; Wang et al. 2020), we assumed that LRRT supported primary school students' reading competence (i.e. reading comprehension) (H1a) and correct use of reading strategies (H1b) compared to control group students.
- (2) Is LRRT particularly effective in supporting multilingual students' reading competence compared to monolingual students' reading competence? Assumptions about the particular importance of linguistically responsive teaching for multilingual students support this differential effectiveness (e.g. García 2009; Lewis, Jones, and Baker 2012; Pappamihiel 2002; Setati 2008). However, recent intervention studies on linguistically responsive teaching in German classes could not confirm such differential effects favouring multilingual students (Hopp and Thoma 2021; Prediger and Neugebauer 2021). We thus examined (RQ2.1) whether multilingual students particularly benefited from LRRT in reading competence (i.e. reading comprehension (RQ2.1a) and correct use of reading strategies (RQ2.1b)) compared to monolingual students. To provide specific results for multilingual students, we additionally addressed only multilingual students when examining the effectiveness of LRRT. We assumed (H2.2) that LRRT supported primary school multilingual students' reading competence (i.e. reading comprehension (H2.2a) and correct use of reading strategies (H2.2b)) compared to multilingual control group students.
- (3) Do multilingual students who use their home languages during LRRT particularly benefit in reading competence compared to multilingual students who use German language only? Referring to the close relationship between language and learning (e.g. Chi and Wylie 2014; Sedova et al. 2019) and on Grosjean's (2020) assumptions about different language modes, we assumed (H3) that multilingual learners who used different languages during LRRT benefited more in reading competence (i.e. reading comprehension (H3a) and correct use of reading strategies (H3b)) than their multilingual peers who used German language only.

Materials and methods

Study design

We conducted an intervention study in German primary school classes to examine the effectiveness of LRRT. Regular primary school teachers and classes were recruited via telephone and letters of inquiry of supervisory school authority to local schools. For organisational reasons, classes in the federal state North Rhine-Westphalia were assigned to the treatment group condition, and classes in the federal state Hessen were assigned to the control group condition. Participation was voluntary and a local ethics committee approved the study (approval number MS/BB 180320). Treatment group teachers participated in professional development workshops on a teaching unit using LRRT

and then implemented the unit in their 4th grade classes. Control group teachers used regular German language arts classroom instruction during this time period. Before and after the intervention, students participated in assessments consisting of questionnaires and tests. The mean difference between both assessments was 53.2 days ($SD = 7.6$ days, ranging from 39 to 65 days).

Professional development workshops and teaching unit

A multi-professional team with three expert teachers (expertise in primary school education, special needs education, and foreign language education) and the research staff developed a teaching unit on LRRT. Key elements of LRRT were field-tested in a workshop in 2018 with about 20 teachers and were revised afterwards.

Professional development workshops

The professional development workshops comprised 3 days of 3.5 h each. They took place in two universities (in each federal state of the treatment group and the control group) and were led by multi-professional teams of the experts that had developed the teaching unit. In the workshops, teachers received a manual on the teaching unit free of charge including detailed lesson plans, reading texts, bilingual prompt cards for strategy instruction, a language-learning pen, and work sheets for using the reading strategies in small groups. Then, the teachers jointly discussed the implementation (e.g. composition of the small groups and introduction of the prompt cards) of the teaching unit in their classes.

Lesson sequence of the teaching unit

In total, the teaching unit comprised 12 lessons of 45 min each. In the first three lessons, students should work on individual language portraits (Gogolin and Neumann 1991), and teachers should use the language-related information to form small groups. Afterwards, explicit teaching before reciprocal teaching (Palincsar and Brown 1984) should be implemented in class: The lessons four to seven comprised explicit and stepwise strategy instruction of the reading strategies 'questioning' and 'summarising'. Prompt cards on reading strategies were developed according to existing strategy teaching material in German language (Munser-Kiefer 2014; Spörer et al. 2016). Each prompt card pointed to four main steps for using the strategies questioning and summarising, respectively. For instance, the prompt card for 'summarising' started with 'Name the most important who (main character) or what (main thing)'. In the lessons eight to eleven, students should use reciprocal teaching to further apply and practice the strategies in small groups. For each lesson, students could choose between two reading texts in German language that were each segmented into four paragraphs to structure alternate reading in the small group. After alternate reading, students should practice the reading strategies using bilingual prompt cards and should write down their results in German language on work sheets. The last lesson was used for a summary and for completion of the teaching unit. During the entire unit teachers should explicitly encourage students to use their full linguistic repertoire for practicing the reading strategies. Therefore, teachers used several elements of linguistically responsive teaching as described in the following.

Elements of linguistically responsive teaching

We systematically addressed elements of linguistically responsive teaching in the teaching unit: First, students should make their languages visible in hand-colored language portraits (Gogolin and Neumann 1991) to become aware and name the emotional meaning of their languages. Teachers should welcome the different languages and should explicitly value each student's language background. Second, whenever classroom composition made it possible, small groups of four students should be arranged, at best with students having a partner with the same non-German home language. To avoid language-related separation, the small groups should be ideally composed of two German only speaking and two (also) non-German speaking students with the same home

language. This small-group composition aimed to provide possibilities for multilingual students' different language use. Third, the prompt cards were translated by native speakers into 24 different languages (i.e. Albanian, Arabic, Armenian, Bulgarian, Chinese, Croatian, English, French, Greek, Italian, Kiswahili, Kurdish, Mongolian, Persian, Polish, Punjabi, Romanian, Russian, Serbian, Spanish, Tamil, Turkish, Urdu, and Vietnamese) with the aim to fit the home languages of treatment group students. Teachers should explicitly encourage students to use these cards. Students could also use a so-called language-learning pen when they were not proficient in reading the written language. The pen provided read-aloud strategy instruction by pointing it to a specific contact point pasted beneath each main step stated on the prompt card. And fourth, the teaching unit itself covered a frame story with the main character 'Merle' travelling around the world and getting to know different cultures and languages.

Participants

In total, 38 classes (15 control group classes and 23 treatment group classes) with 684 fourth grade students participated in the study. Team-teaching was used in one control group and in one treatment group class. Hence, 40 teachers participated in the study. **Table 1** summarises the sociodemographic characteristics of the participants. Effect sizes for differences between treatment group and control group were small at most, except for teachers' self-reported own multilingual biography. However, significance testing revealed no differences between both groups ($p \geq .286$).

To assess *students' multilingualism*, students were asked in a questionnaire which non-German languages they speak. Their answers were cross-checked with students' further answers in the questionnaire about their language-related biography as well as with information from teachers and, if available, from parents. Students' answers indicating that multilingualism was solely based on having a multilingual friend or schoolmate or based on English as a school subject (English as a foreign language is taught in primary school in North-Rhine Westphalia) were not considered. We thus focused students' home language when coding multilingualism (see Eisenclas and Schalley 2020). Note, that home language neither means that this language is restricted to the use at home nor does it mean that students always use this language at home. Rather, it is considered to be an anchor point from which a person navigates through different contexts (Eisenclas and Schalley 2020). A student was coded as multilingual (= 1) when at least one further language than German was noted, whereas a student was coded as monolingual (= 0) when German only was noted. Thus, in our study a multilingual student was defined by speaking at least one non-German home language. In total, 25.0% of the data was double-coded; interrater agreement was 99.4%. Overall, 486 (72.5%) students were coded as multilingual. However, multilingualism could not be coded for four treatment group students. These students missed the pre-assessment, and teachers or

Table 1. Descriptive statistics of the total sample, the treatment group (TG), and the control group (CG).

	Total	TG	CG	ES Δ TG- CG
<i>Students (N)</i>	684	426	258	
Female (%)	49.8	49.4	50.4	-.009
Age (<i>M, SD</i>)	10.2 (0.6)	10.1 (0.6)	10.3 (0.5)	-.265
Multilingual (%)	71.5	72.5	69.8	.029
Multilingual students regularly or always using a non-German language at home (%)	87.6	88.0	86.9	.016
<i>Teachers (N)</i>	40	24	16	
Female (%)	92.3	91.3	93.8	-.045
Age (<i>M, SD</i>)	45.3 (11.2)	46.1 (11.8)	44.2 (10.6)	.170
Teaching experience (<i>M, SD</i>)	17.5 (12.0)	17.2 (11.6)	17.8 (13.0)	-.046
Multilingual (%)	10.0	4.2	18.8	-.238

Notes. Effect sizes (*ES*) for dichotomously coded variables refer to η , for continuous variables to Cohen's *d*.

parents did not provide the corresponding information as well. For most of the 486 multilingual students, one non-German home language was coded (75.9%), yet, also two (21.0%), three (2.9%), and even four (1 student) non-German home languages were noted. At least one of the coded languages fitted the languages of the bilingual prompt cards (see 3.4.1 Feasibility). $N = 385$ multilingual students reported which language they had learned first. From these students, 50 (13.0%) had learned German as a first language, 200 (51.9%) had learned German and another language simultaneously, and 135 (35.0%) had learned another language than German first.

Classroom implementation of LRRT

Feasibility

Because LRRT was implemented in regular German primary school classes, the feasibility of our approach has to be discussed. Based on teachers' information on small-group composition, 62.9% ($n = 223$) of the multilingual students in the treatment group had a language partner sharing the same non-German language or sharing a non-German language allowing mutual understanding and communication (e.g. Arabic and Moroccan). The bilingual prompt cards (each in German and a non-German language) were labelled with a particular language for teachers' use in class. Teachers used their information about the students' languages (e.g. via contact with parents, the student itself, and the language portraits used in the project) to provide the students with fitting bilingual prompt cards. For a student with a non-German home language that did not exactly match the language of a bilingual prompt card (e.g. Dari), teachers could also use an alternative bilingual prompt card (e.g. Farsi) when both languages were different standard varieties of the same pluricentric language (e.g. Persian).

The different cards then covered 98.4% of at least one of the multilingual students' home languages. However, for five multilingual students' home languages (i.e. Amharic, Armenian, Kotokoli, Macedonian, and Tigrigna) corresponding material could not be developed within the projects' timeline. Multilingual students without a same-language partner or without being proficient in reading the written non-German language on the prompt cards could also use the language pen as described above. Reading texts and teacher instruction were in German language. All students could thus jointly participate in the teaching unit regardless of their language repertoire.

Treatment adherence

Before examining the effectiveness of our intervention, it is essential to check for treatment adherence (e.g. O'Donnell 2008). Therefore, one lesson at the end of the teaching unit (lesson eight, nine, ten, or eleven) was videotaped (7 classes) or visited (16 classes) in case the teacher had not agreed to be videotaped. Adherence was assessed via a checklist with ten dichotomous items (1 = implemented, 0 = not implemented) according to key elements of the teaching unit (e.g. 'students use prompt cards'). In total, 17 classes (73.9%) were double-coded. Interrater agreement was high (98.2%, min: 93.8%, max: 100%¹). Mean treatment adherence in each class was high as well (92.6%, $SD = 11.6$, min: 60%, max: 100%).

However, we excluded one treatment group class with low adherence (60%) from further analyses. In this class, the trained teacher was absent from school because of personal reasons after instructing over half of the teaching unit, and a teacher who had not participated in the professional development workshops completed the teaching unit. The remaining sample comprised 667 students with 409 students (292 of them coded as multilingual) in the 22 treatment group classes and 258 students (180 of them coded as multilingual) in the 15 control group classes.

Social validity

After their implementation of the teaching unit in class, the treatment group teachers were asked whether they had perceived the teaching unit as helpful to support students' reading ($M = 3.43$, $SD = 0.79$) and as helpful to sensitise for linguistic diversity ($M = 2.83$, $SD = 0.94$). Both single items

were assessed using a four-point Likert scale (from 1 = disagree to 4 = totally agree). Furthermore, to provide overall feedback on the teaching unit, treatment group teachers and students rated the teaching unit on the in Germany well-known grading scale from (1 = A/very good to 6 = F/inadequate) resulting in good overall feedback (teachers: $M = 2.17$, $SD = 1.11$; students: $M = 1.89$, $SD = 1.18$).

Instruments

Students' *reading comprehension* was measured using the subscale 'text comprehension' of a standardised diagnostic reading test for students ranging from grade 1–7 (Lenhard, Lenhard, and Schneider 2017). The subscale comprised short texts each accompanied by one to three questions with a multiple-choice response format of four answers. The items covered three dimensions of text characteristics, i.e. coherence (local or global), text base (gist or verbatim), and genre (expository or narrative). The instrument was a speed test with a time limit. Multiple-choice answers were coded dichotomously (1 = correct, 0 = not correct, multiple answers, or not reached), and a sum score of the 26 items was computed (pre: ICC = .08; post: ICC = .06).

Students' *correct use of reading strategies* was assessed via coding of students' written strategies of questioning and summarising in an age-appropriate non-fictional text (Spörer, Brunstein, and Kieschke 2009). After reading the text, students were asked to write down two questions about a paragraph of the text and to compose a summary of another paragraph. The material with corresponding reading strategy tasks had been used in previous studies in Germany (e.g. Schünemann, Spörer, and Brunstein 2013; Koch and Spörer 2016). The coding scheme for reading strategy use was adapted to fit the trained strategies presented on the prompt cards (see Munser-Kiefer 2014; Spörer et al. 2016). For questioning, the scheme included four dichotomous items (0 = no, 1 = yes; e.g. 'Can the question be answered with the text?') for each of the two questions. The coding scheme for summarising included six items (four of them coded dichotomously 0 = no, 1 = yes; e.g. 'Is the hedgehog mentioned as the main character of the text?'; and two items on core contents coded with 0 = no core content, 1 = part of the core content, 2 = full core content). University students were trained for about 20 h in scoring students' written answers according to the coding scheme. About 33% of the data was double-coded. Interrater agreement (Cohen's κ) was good (questioning: pre: .91, post: .94; summarising: pre: .77, post: .84). For each strategy, a sum score was computed. Reliability of the scales was good (questioning: pre: $\alpha = .90$, ICC = .07; post: $\alpha = .92$, ICC = .10; summarising: pre: $\alpha = .83$, ICC = .13; post: $\alpha = .88$, ICC = .02).

Regarding *multilingual students' language use*, students were asked in the questionnaire after the intervention if they had used another language than German during the teaching unit. About half of the 292 multilingual students in the 22 treatment group classes (56.2%, $n = 164$) stated that they had used different languages ($= 1$), whereas 36.3% ($n = 106$) used German language only ($= 0$), and 7.5% ($n = 22$) did not answer this question.

Data analyses

Due to organisational reasons, group assignment depended on the federal state affiliation of the participating classes (treatment group: North Rhine-Westphalia; control group: Hessen). Large-scale assessments in Germany show that fourth graders in North Rhine-Westphalia consistently score lower in reading achievement than students in Hessen (e.g. Stanat et al. 2022). In our study, treatment group students showed lower initial reading competence than control group students (see Table 2). Analyses with simulated data show that only change-score models provide unbiased estimates when allocation is not based on pre-tests but on prior other decisions like federal state affiliation (Wright 2020, Figure 1(a), p. 47; Köhler, Hartig, and Naumann 2021). We thus conducted multi-group latent change-score analyses and used manifest scale scores to model latent change scores, allowing for a covariance between initial scores and change scores (McArdle and Nesselroade 2014).



Table 2. Correlations and descriptive statistics of the total sample, the treatment group (TG), and the control group (CG).

	Total						Total		TG		CG			
	1.	2.	3.	4.	5.	6.	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	ΔM	<i>d</i>
1. Multilingualism (1 = yes)														
<i>Pre-assessment</i>														
2. Reading comprehension	-.28*						12.40	4.34	12.06	4.26	12.98	4.42	-.91	-.211
3. Reading strategy 'questioning'	-.20*	.31*					5.79	2.67	5.60	2.83	6.12	2.35	-.52	-.193
4. Reading strategy 'summarising'	-.17*	.37*	.31*				4.03	2.94	3.68	3.07	4.63	2.61	-.72	-.330
<i>Post-assessment</i>														
5. Reading comprehension	-.20*	.81*	.33*	.35*			14.03	4.42	13.75	4.33	14.47	4.54	-.72	-.164
6. Reading strategy 'questioning'	-.16*	.31*	.42*	.21*	.32*		6.33	2.58	6.50	2.65	6.07	2.45	.43	.168
7. Reading strategy 'summarising'	-.16*	.35*	.28*	.37*	.35*	.27*	4.41	2.64	4.36	2.64	4.50	2.63	<-.01	-.056

Notes. *d* = Cohen's *d*; * = *p* < .05; bold correlations refer to pre-post correlations of the same variable.

First, we examined differences in gains in reading competence between the treatment group (= 1) and the control group (= 0) (H1). Next, we separated each group (i.e. treatment group and control group) into subgroups of multilingual students and monolingual students. We then tested whether multilingual students (= 1) benefited more than their monolingual peers (= 0) in the treatment group when compared to multilingual and monolingual control group students (RQ2.1), and whether multilingual students in the treatment group showed larger improvement in reading competence than multilingual students in the control group (H2.2). Third, we further split multilingual students in the treatment group into two subgroups and examined whether multilingual students who have used different languages (= 1) showed higher gains in reading competence than their multilingual peers having used German language only (= 0) (H3). All analyses were carried out in Mplus 8 (Muthén and Muthén 2012–2021). To account for clustered data (i.e. students nested within classes, see also the ICCs in the instruments section), we used corrected standard errors. One-tailed testing was performed for testing our hypotheses, two-tailed testing was used to examine our research question 2.1.

Results

Table 2 shows the descriptive statistics and correlations between the variables of reading competence and multilingualism. Reading comprehension and correct reading strategy use were positively correlated within and between both times of assessment, and multilingual students showed lower reading competence than their monolingual peers. Moreover, both the treatment group and the control group gained in reading comprehension from pre to post assessment, whereas mean scores of the correct use of reading strategies increased from pre to post assessment only in the treatment group. The descriptive statistics also revealed prior differences in reading competence favouring control group students. Yet, after the intervention, treatment group students outperformed control group students in the correct use of the reading strategy questioning.

Treatment effectiveness on Reading competence

First, in our Hypothesis 1, we assumed that LRRT supports primary school students' reading competence (i.e. reading comprehension (H1a) and correct use of reading strategies (H1b)) compared to control group students. The results showed that reading comprehension did not differ between treatment group and control group (see Table 3). Hence, our Hypothesis (1a) was not confirmed. However, as assumed (H1b), latent change scores of the correct use of each of the two reading strategies were larger in the treatment group than in the control group, and both groups differed significantly from each other.

Differential treatment effectiveness depending on students' multilingualism

Next, we examined whether multilingual students particularly benefited from LRRT when compared to their monolingual peers (RQ2.1). The latent difference scores showed that multilingual

Table 3. Multi-group latent difference score analysis comparing control group students (CG) and treatment group students (TG).

	<i>n</i>	Reading comprehension ΔM (<i>p</i>)	Reading strategy questioning ΔM (<i>p</i>)	Reading strategy summarising ΔM (<i>p</i>)
CG	252	1.72 (<.001)	−0.02 (.915)	−0.10 (.637)
TG	405	1.84 (<.001)	0.89 (<.001)	0.69 (.020)
Wald test		<i>t</i> (<i>p</i>)	<i>t</i> (<i>p</i>)	<i>t</i> (<i>p</i>)
H1: Differences between TG and CG		0.116 (.367)	10.494 (<.001)	4.662 (.016)

Note. One-tailed testing of H1.

Table 4. Multi-group latent difference score analysis comparing monolingual and multilingual students in control group (CG) and treatment group (TG).

	<i>n</i>	Reading comprehension ΔM (<i>p</i>)	Reading strategy questioning ΔM (<i>p</i>)	Reading strategy summarising ΔM (<i>p</i>)
CG: Monolingual students	77	0.91 (.032)	-0.20 (.486)	-0.16 (.637)
CG: Multilingual students	175	2.05 (<.001)	0.05 (.747)	-0.09 (.802)
TG: Monolingual students	113	1.61 (<.001)	0.75 (.001)	0.59 (.174)
TG: Multilingual students	288	1.94 (<.001)	0.96 (.001)	0.77 (.012)
without diff. language use	106	1.63 (<.001)	0.60 (.144)	0.72 (.158)
with diff. language use	164	2.15 (<.001)	1.17 (<.001)	0.73 (.004)
Wald test		<i>t</i> (<i>p</i>)	<i>t</i> (<i>p</i>)	<i>t</i> (<i>p</i>)
RQ2.1: Differences between multilingual and monolingual students in both intervention groups		1.928 (.165)	0.007 (.932)	0.022 (.883)
H2.2: Differences between multilingual students in TG and CG		0.077 (.391)	6.904 (.004)	3.415 (.032)
H3: Differences between multilingual students in TG depending on language use		2.869 (.045)	2.330 (.064)	0.001 (.489)

Note. One-tailed testing of H2.2 and H3.

and monolingual students in the treatment group as well as in the control group significantly gained in reading comprehension (see Table 4). Regarding reading strategies, neither multilingual nor monolingual control group students improved. However, in the treatment group, multilingual students gained in the use of reading strategies. And monolingual treatment group students gained in the correct use of questioning as well, whereas the improvement in the correct use of summarising was not significant. This finding might be due to the rather small sample size and corresponding low statistical power. Furthermore, significance testing revealed that the gains in reading competence between multilingual and monolingual students did not differ between treatment and control group. Hence, the effectiveness of LRRT in supporting students’ reading comprehension (RQ2.1a) and correct use of reading strategies (RQ2.1b) did not differ between multilingual and monolingual students.

Additionally, to provide more specific results concerning the particular support of multilingual students, we examined differences between treatment group and control group students by considering multilingual students only. We assumed (H2.2) that LRRT supported multilingual students’ reading competence compared to control group multilingual students. The results revealed gains in reading comprehension for multilingual students in both groups, and the gains did not differ from each other. Hence, we could not confirm our H2.2a. Regarding reading strategies, however, multilingual students in the treatment group showed significant gains, whereas multilingual control group students did not improve. Significance testing showed larger gains of multilingual treatment group students in the correct use of reading strategies when compared to multilingual control group students. Thus, the results confirmed our H2.2b.

Treatment effectiveness depending on multilingual students’ language use

Finally, we assumed (H3) that multilingual learners who used different languages during LRRT benefited more in reading competence (i.e. reading comprehension (H3a) and correct use of reading strategies (H3b)) than their multilingual peers having used German language only (see Table 4). Regarding reading comprehension, both groups of students improved, but the gain of multilingual students who had used different languages was larger than the gain of multilingual students who had used German language only. Results thus confirmed our Hypothesis H3a. Regarding reading strategies, the change scores, particularly those of the reading strategy questioning, indicated that students with different language use outperformed their multilingual peers. However, significance testing revealed no differences in reading strategies between both groups of multilingual students. Our H3b was thus not confirmed.

Discussion

Addressing students' language-related resources in today's linguistically diverse classes is still considered a main challenge in today's diverse primary school classes (e.g. Alisaari et al. 2019; Bredthauer and Engfer 2016; Lorenz, Krulatz, and Torgersen 2021). We thus enriched evidence-based reciprocal teaching (e.g. Hattie 2009; Spörer, Brunstein, and Kieschke 2009) with elements of linguistically responsive teaching (e.g. Haan and Gallagher 2022; Lucas and Villegas 2013) and developed a corresponding teaching unit for implementation in German primary school classes. The results therefore add to research suggesting that linguistically responsive teachers consistently use evidence-based methods for students (Linan-Thompson, Lara-Martinez, and Cavazos 2018). Although bilingual material in different languages cannot be developed in regular teaching practice, our study shows that rather small approaches, such as using language portraits, composing small groups fitting the home languages of the students, and encouraging the students to use different languages for learning, can make a difference. For instance, about one third of the multilingual students in our treatment group sample had a same-language partner in their small groups. Furthermore, teachers perceived the teaching unit as helpful to support students' reading and to sensitise for linguistic diversity. And students highly valued the teaching unit as well. Moreover, and most importantly, these findings counter teachers' concerns regarding possibilities to address students' language-related heterogeneity in today's diverse classrooms (e.g. Alisaari et al. 2019; Bredthauer and Engfer 2016; Putjata and Koster 2021).

Effectiveness of LRRT in supporting students' Reading competence

Consistent with previous research on reciprocal teaching (e.g. Hattie 2009; Spörer, Brunstein, and Kieschke 2009) and with studies on linguistically responsive teaching (e.g. Prediger and Neugebauer 2021), the results of our intervention study confirmed the effectiveness of LRRT on students' correct use of reading strategies. Yet, control group students did not gain in reading strategies at all. This finding confirms prior results that explicit reading strategy instruction in German primary school instruction is rare (e.g. Kistner et al. 2010). Moreover, both treatment group and control group students with regular German instruction gained in reading comprehension. This result corresponds with findings of Rosenshine and Meister's (1994) meta-analysis where effect sizes of reciprocal teaching were lower when standardised tests instead of experimenter-developed instruments were used. This differential effectiveness might also be connected with a different treatment sensitivity of the instruments. Furthermore, reading comprehension was rather stable during the intervention period (see Table 2). Finally, our results might also be an indicator of the 'strategy utilization deficiency' (e.g. Miller 2000). This describes a temporary phase in which a student does not yet benefit from the use of a strategy because the initial strategy use is often erratically and effortful. Consistently, Droop et al. (2016) showed that their intervention immediately fostered primary students' reading strategy knowledge, but positive effects on reading comprehension were found not until one year later.

In our study, assignment to treatment group or control group was based on federal state location. To account for non-randomization of classes to both groups and corresponding pre-existing differences between both groups, we used latent difference score modelling (e.g. McArdle and Nesselrode 2014) instead of regression analysis (see Köhler, Hartig, and Naumann 2021; Wright 2020). We thus already accounted for prior (group-related differences in) reading competence as the well-known strongest predictor of post-test reading competence. However, it is necessary to carefully consider differences between both groups that might in turn have affected the *change* between the pre and post assessment ($M = 53.0$ days). In our study, the time interval between pre and post assessment was significantly larger ($t = 7.1, p < .001$) in the treatment group ($M = 57.8$ days) than in the control group classes ($M = 46.1$ days). However, results did not reveal differences in reading comprehension between treatment group and control group students (see Tables 3 and 4). Moreover, the lack of gains in reading strategies in the control group confirms empirical

studies showing that reading strategy instruction in regular German primary school is rare (Kistner et al. 2010). Furthermore, the socioeconomic status (SES) of the students' families might be considered. Using students' self-reported number of books at home as an indicator of the SES, further analyses reveal that treatment group students had significantly less books at home than control group students ($\chi^2 = 10.2, p = .001$), and monolingual students had significantly less books at home than multilingual students ($\chi^2 = 23.7, p < .001$). However, as mentioned before, we already considered prior differences between the compared groups using latent change-score modelling. Moreover, further analyses revealed that SES was not correlated with differences of reading competence in each of our analyses.

Differential benefits of LRRT for multilingual students

Although LRRT supported multilingual students' correct use of reading strategies, the effectiveness of LRRT did not differ between multilingual and monolingual students compared to the difference between multilingual and monolingual control group students. The findings thus correspond with recent intervention studies showing no particular benefits of linguistically responsive teaching for multilingual students (Hopp and Thoma 2021; Prediger and Neugebauer 2021). First, this result indicates that students regardless of their multilingualism gained in reading competence during the teaching unit. Only in the rather small sample of monolingual treatment group students, the gain in the reading strategy summarising was not significant. Hence, this result also provides empirical support that monolingual students still perform well when teachers implement elements of linguistically responsive teaching in their classes. For instance, Bredthauer and Engfer (2016) reported that German teachers were afraid of monolingual students being discriminated by establishing different language use in class. And second, this finding also suggests that offering students the use of different languages for strategy learning is not an obstacle for learning. Not only teachers often argue that using different languages during learning and using the non-majority language at home hinders learning (e.g. Alisaari et al. 2019; De Angelis 2011), this issue is discussed in research as well (e.g. 'language switching costs'; Saalbach et al. 2013).

However, the lack of differential effects of LRRT favouring multilingual students counteracts assumptions about the benefits of linguistically responsive teaching for multilingual students by, for instance, providing students with possibilities to use their full linguistic repertoire (García 2009; Lewis, Jones, and Baker 2012) and by establishing a positive classroom climate towards linguistic diversity to reduce negative emotions (Pappamihel 2002; Setati 2008). The lack of differential effects of LRRT might also be connected with gains in the control group. Although latent mean difference scores of reading competence were larger for multilingual treatment group students than for monolingual treatment group students, multilingual students outperformed monolingual students in the control group as well. This unexpected finding should be examined in further studies and might, for instance, be explained by control group teachers' knowledge on participating in an intervention study on dealing with linguistically diverse classrooms and corresponding implicit or explicit particular support of multilingual students in their regular German language arts classes.

Benefits for multilingual students (Not) having used different languages for learning

Finally, we assumed that using different languages for learning was of particular importance for multilingual students' learning (e.g. García 2009; Grosjean 2020). Significance testing confirmed larger gains in reading comprehension for students having used different languages during the teaching unit than for students having used German only. Although latent mean difference scores suggested the same finding for the correct use of the reading strategy questioning, this difference was not significant ($p = .064$). Yet, considering the small sample size, this difference testing also had low statistical power. Further descriptive analyses of our data revealed that multilingual students with German language use only initially outperformed their peers with different language

use (reading comprehension: $\Delta M = 0.73$; questioning: $\Delta M = 0.29$; summarising: $\Delta M = 0.32$). However, this prior advantage was not connected with a larger gain in reading competence. Hence, the results suggest that multilingual students' use of different languages might be of particular importance for reading gains. Moreover, being multilingual might be less important for learning than actively using (or not using) the full linguistic repertoire in a generative mode (Chi and Wylie 2014) and a multilingual mode (Grosjean 2020).

Yet, although teachers encouraged multilingual students to use different languages for learning, a substantial number of multilingual students refused doing so. This result provides further evidence on the difficulties in stimulating multilingual students' different language use in educational settings with a monolingual habitus (Gogolin 1997; Schastak et al. 2020; Schüler-Meyer et al. 2017). Moreover, we only considered students' self-reported multiple language use. For instance, Schastak et al. (2020) showed that although more than two-thirds of the Turkish-German students reported having used Turkish during peer tutoring, peer discourse analysis revealed a much lower quantity of bilingual turns. Further studies should thus examine the extent and purposes of students' different language use and corresponding contextual conditions.

Limitations

Reciprocal teaching (including strategy learning, small-group learning, and teacher guidance) and linguistically responsive teaching (referring to a positive climate towards linguistic diversity and opportunities for translanguaging) each comprised different elements of effective instruction. Moreover, reciprocal teaching and linguistically responsive teaching were closely connected with each other: Small-group learning was not only an element of reciprocal teaching but was also an element of linguistically responsive teaching (possibility for translanguaging by having a partner that shares the same language). We thus did not distinguish between the effects of reciprocal teaching and linguistically responsive teaching. However, findings of our third hypothesis might provide first evidence on the benefits of linguistically responsive teaching over and above reciprocal teaching. Using German language only might be considered as commonly used reciprocal teaching, whereas using different languages during reciprocal teaching might be connected with the additional benefit of linguistically responsive teaching.

Finally, we did not use videography or in-class observation in the control group classes and thus could not provide further information on learning and instruction in these classes. This could have provided a better understanding of the studies' findings, particularly regarding the benefits of multilingual control group students in reading comprehension.

Conclusions

This study enriched reciprocal teaching with elements of linguistically responsive teaching and examined its effectiveness for supporting students' reading competence in German primary school. The results underline its feasibility and potential for teaching in today's linguistically diverse primary school classes. Results on its effectiveness showed that this approach fostered students' correct use of reading strategies. Multilingual students as well as monolingual students benefited in reading competence. Moreover, particularly multilingual students who reported having used different languages for learning benefited from LRRT. In summary, this study provides empirical evidence on the benefits of combining evidence-based teaching practices with elements of linguistically responsive teaching. For educational policy and practice, this study provides various stimuli for addressing students' linguistic diversity in today's heterogeneous primary school classes.

Note

1. Due to total agreement in some coding, kappa could not be computed.

Acknowledgements

We would like to thank Igor Osipov for his methodological support.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by Federal Ministry of Education and Research, Germany.

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