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Cooperative learning as an evidence-based teaching strategy: what teachers know, believe, and how they use it

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ABSTRACT
Cooperative learning is an evidence-based teaching strategy. In cooperative learning, teachers structure students' interactions and prepare them for cooperation so that students work together in small groups supporting each other's' learning processes. This study investigated whether the empirical evidence of the effectiveness of cooperative learning is reflected in teachers' professional competencies and their teaching practices. We surveyed 1,495 language teachers in Poland, measuring their knowledge and beliefs about cooperative learning and their use of cooperative learning in class. Although teachers were well informed about the principles of cooperative learning, they only knew a few methods to implement cooperative learning in class. Teachers agreed that cooperative learning is effective for students' academic and social learning and can provide students with individualised support for their learning processes. Despite these positive beliefs, teachers used cooperative learning infrequently. When they used cooperative learning, teachers organised and supported students' interactions in accordance with the principles of cooperative learning. Teachers reported that they would like to learn more about cooperative learning and use it more often in class. They were especially interested in support such as lesson examples and teaching materials. We discuss the implications of these results for teacher education.

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Cooperative learning; teachers' beliefs; teaching practices; teacher education

Introduction

Cooperative learning is a teaching strategy that has been intensively researched in the past decades. Meta-analyses revealed positive effects of cooperative learning on students' academic achievements (Hattie 2009; Kyndt et al. 2013; Slavin 1995; Springer, Stanne, and Donovan 1999). Cooperative learning has also positive effects on students' social learning and their peer relationships (Roseth, Johnson, and Johnson 2008; Tolmie et al. 2010). Based on these empirical findings, implementing cooperative learning in class is advisable for teachers. The implementation of evidence-based teaching practices is an important issue for current teacher education (Kennedy et al. 2017; Vanderlinde and van Braak 2010). Learning effective teaching practices and integrating this knowledge into practice is believed to have positive effects on student learning. Given the positive effects of cooperative learning, an

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important inquiry is to quantify the extent that teachers are knowledgeable about and committed to this learning strategy in their class.

Little research exists on teachers' use of cooperative learning in class. The results might vary depending on the country-specific educational system. A recent study in Switzerland revealed that only 33% of the teachers use cooperative learning frequently (Buchs et al. 2017). In a current study in Germany, 26% of the teachers reported using cooperative learning on a weekly basis, and 53% reported using the strategy at least once a month (Völlinger, Supanc, and Brunstein 2018). This frequency was associated with teachers' knowledge about cooperative learning and their beliefs about the effectiveness of this teaching strategy. In general, teachers' knowledge and beliefs are aspects of their professional competencies and have an impact on their teaching practices and thus on student learning (Kunter et al. 2013). We investigated teachers in Poland and were interested in their knowledge and beliefs about cooperative learning and their use of cooperative learning in the classroom.

Cooperative learning

In cooperative learning, students work together in small groups supporting each other's' learning processes (Johnson and Johnson 1999; Slavin 1995). In contrast to traditional group work in which students are simply placed to work together, cooperative learning entails that teachers structure students' interactions and prepare them for cooperation (Topping et al. 2017; Webb 2009). For structuring students' interactions, two guiding principles are positive interdependence and individual accountability (Johnson and Johnson 1999; Slavin 1995). Positive interdependence is a goal structure between students in which they perceive that they can only achieve their goal when their learning partners also achieve their respective goals. Individual accountability means that every student is responsible for contributing to the group work, which is visible to other group members. Different methods have been recommended for implementing cooperative learning, structured around positive interdependence and individual accountability (see Green and Green 2005; Topping et al. 2017, for an overview). For example in *Team Tournament* (Slavin 1995), groups receive rewards based on each group member's performance increase. Positive interdependence and individual accountability are realised by each group member's contribution to the reward. In *Jigsaw* (Aronson, 2002), students instruct each other based on their preparation of expert topics. Every group member is responsible for preparing an expert topic. Due to the expert topics, the group members also depend on each other to gain knowledge about the learning content. Teachers probably need to know about the principles and methods of cooperative learning to implement this teaching strategy in class and to stimulate students' interactions when working together.

In addition to structuring students' interactions with positive interdependence and individual accountability, teachers need to prepare and guide students to cooperate (Webb 2009). For example, teachers can train learners to elaborate on each other's ideas (Jurkowski and Hänze 2015), practice communication and helping skills with their students (Webb and Farivar 1994), and prompt them to ask comprehension questions (King 1994). For preparing students, well-established training procedures include verbal and modelled instructions, practice and feedback (Jurkowski and Hänze 2015).

Organising and supporting students' interactions are characteristics of effective cooperative learning (Webb 2009). Yet, these characteristics can pose a challenge to teachers who might perceive them as difficult to implement (Buchs et al. 2017). Another difficulty that teachers could experience with cooperative learning is changing their role from controlling the classroom to managing groups and promoting students (Pauli and Reusser 2000). Cooperative learning might pose further challenges, including time and effort to prepare cooperative learning, time and spatial resources to implement cooperative learning in class, disciplinary problems during group work, and assessment of students' performances (see Buchs et al. 2017; Völlinger, Supanc, and Brunstein 2018 for an overview). Studies show that teachers mainly perceive difficulties in finding the time and space to prepare and implement cooperative learning (Buchs et al. 2017; Völlinger, Supanc, and Brunstein 2018) and that teachers' perception of challenges and difficulties predict the frequency of their use of cooperative learning in class (Buchs et al. 2017).

Teaching practices

A study with British teachers revealed that they use peer interactive work very infrequently (Baines, Blatchford, and Kutnick 2003). According to the authors, peer interactive work included working on segments of one task or working together on a single task with a shared goal. This teaching strategy occupied 23% of the lesson time, whereas the remaining time was spent on individual work (51%) and class interaction with the teacher (26%). A study in Switzerland revealed that 14.4% of the teachers used cooperative learning rarely, 25.7% from time to time, 26.6% moderately, 26.1% regularly, and 7.2% of the teachers used cooperative learning often (Buchs et al. 2017). Most frequently, teachers used transmission, class discussion, and individual work. In a study with Canadian teachers, only 15% of the teachers reported that cooperative learning was largely or entirely part of their classroom routine (Abrami, Poulsen, and Chambers 2004). The degree of teachers' use of cooperative learning correlated positively with teachers' perception that cooperative learning would be effective for student learning. In a German sample, 4% of the teachers reported that they never used cooperative learning, 26% of the teachers used cooperative learning on a weekly basis, 19% twice a month, 34% once a month, and 17% of the teachers used cooperative learning once in a term (Völlinger, Supanc, and Brunstein 2018). The frequency of teachers' use of cooperative learning correlated positively with their self-reported knowledge and teachers' beliefs that cooperative learning would have positive effects on student learning and that they would be capable of implementing cooperative learning in the classroom. Furthermore, teachers' beliefs about the effectiveness of cooperative learning varied between student groups. Teachers believed that cooperative learning is more effective for older students and students with a high or medium performance level than for students with special needs.

In sum, research indicates that teachers use cooperative learning less frequently than traditional teaching strategies. Although the frequency of cooperative learning varies between countries, less than 35% of the teachers use cooperative learning regularly. Contributing factors to its limited use could be teachers' competences, including their knowledge about cooperative learning, their beliefs about the effectiveness of cooperative learning for student learning, and teachers' perceptions of difficulties for implementing

cooperative learning in class. It can be assumed that teachers' professional competencies depend on the educational system of a country.

Education in Poland

School curricula and teacher education in Poland have recently gone through numerous changes. Two criteria are of special importance for this study because they likely affect the use of cooperative learning at schools. First, the Ministry of Education in Poland followed the recommendations of the Council of Europe and, in 2017 and 2018, developed curricula for public schools that focus on students' key competences for lifelong learning (Rozporządzenie Ministra Edukacji Narodowej, 2017, Rozporządzenie Ministra Edukacji Narodowej, 2018). These key competences include students' motivation and responsibility for learning, their skills for self-regulated learning, learning strategies, and social skills, which teachers should address in lessons. Cooperative learning is a teaching strategy suitable to pursue and achieve these goals (Johnson and Johnson 1999; Slavin 1995). Second, related to these requirements for teaching and learning, regulations for teacher education were set in 2012 that focus on teachers' knowledge about pedagogy, psychology, didactics, and methods and their flexibility in implementing strategies depending on student characteristics and specific subjects and tasks (Rozporządzenie Ministra Nauki I Szkolnictwa Wyższego, 2012). For example, teachers should have knowledge about contemporary theories of teaching and learning as well as different evidence-based teaching practices and their implementation in class. Cooperative learning is such an evidence-based teaching strategy (Johnson and Johnson 2009; Slavin 2008). Hence, teachers should know about cooperative learning and be able to use it in the classroom.

In short, education in Poland is still developing. The use of cooperative learning in class and the preparation of teachers for implementing cooperative learning might be an important aspect of this development because cooperative learning meets the goals and requirements of the school curricula and teacher education in Poland. However, the state of cooperative learning in Poland is an open research question.

This study

The aim of this study was to describe the state of cooperative learning in Poland. Given that knowledge, beliefs, and practices are important aspects of teachers' professional competencies (Baumert and Kunter 2013), we were interested in the extent of these three aspects as they pertain to cooperative learning and its use in the Polish classrooms.

Teachers were given questions about their knowledge of the principles and methods of cooperative learning, how they evaluate their knowledge, and whether they want to learn more about cooperative learning. They reported on their beliefs in terms of how they evaluate the effectiveness of cooperative learning for student outcomes and how they evaluate this effectiveness for specific student groups. Teachers were also asked questions about their practices in cooperative learning, for example, the extent that they used it in the classroom, the quality of their organising and supporting students' interactions in cooperative learning, and their challenges in implementing it. In addition, teachers reported whether they would like to use cooperative learning more often and what kind of support they would need. Finally, we investigated the correlations between

teachers' knowledge, beliefs, and practices, assuming that these aspects of teachers' professional competencies would be positively related.

Methods

Participants and procedure

A schoolbook publisher in Poland supported the collection of the data. Via the publisher's internet platform, an email was sent to the registered users requesting language teachers (English, German) to take part in an online survey about cooperative learning. The link to the questionnaire was active for six weeks.

A total of 1,495 teachers (80.4% English, 15.6% German, 4.0% English and German; 96% female) participated in the study. Most of the teachers were between 31 and 50 years-old (81.8%). Their experiences with teaching ranged between 1 and 40 years (1–10 20.3%, 11–20 54.0%, 21–30 23.0%, 31–40 2.7%). According to the school levels in Poland, teachers gave lessons in the following levels: primary school class 1–3 (38.4%), primary school class 4–8 (61.4%), secondary school (32.6%), lyceum (31.0%), technical school (22.2%), and vocational school (10.0%). Note that teachers could teach in more than one school level.

The survey questions were presented in the following order. First, teachers received questions about the principles and methods of cooperative learning as well as the quality of their implementation of cooperative learning. They then read a brief definition of cooperative learning. Subsequently, they responded to questions about their knowledge evaluation and interest in learning more about cooperative learning as well as the frequency that they used it, their challenges, their interest in implementing it more often, and their support needs in using the strategy. Finally, teachers indicated their beliefs about the effectiveness of cooperative learning. This procedure allowed for an unbiased measure of knowledge about and quality of cooperative learning, while obtaining at the same time the frequency of using and teachers' beliefs about cooperative learning based on the definition of cooperative learning in contrast to group work.

Measures

Teachers' knowledge

Teachers answered five single-choice questions about the principles of cooperative learning. They were required to choose whether the statements about cooperative learning are correct or incorrect. Two examples of knowledge items are: 'In cooperative learning, every group member is responsible for a significant part of the group work' and 'In cooperative learning, students can also solve the tasks on their own.' Across the five items, teachers gave 46.6% to 94.1% correct responses.

Teachers responded to a list of 11 cooperative learning methods whether they knew it or not. We listed the cooperative learning methods based on the literature about the implementation of cooperative learning in class (cf. Borsch 2018; Green and Green 2005; Topping et al. 2017).

Teachers evaluated their knowledge about cooperative learning on a single item with a 5-point scale (insufficient – sufficient – satisfying – good – very good). They also reported

on their interest in learning more about cooperative learning on a single item with a 5-point scale (disagree – somewhat disagree – undecided – somewhat agree – agree).

Teachers' beliefs

The four questions in Völlinger, Supanc, and Brunstein (2018) were used to assess teachers' beliefs about the effectiveness of cooperative learning for students' academic learning (Cronbach's α = .74). Two example items are: 'When students work together, they learn a lot from each other' and 'When students discuss the learning topic, they get to know different perspectives and gain elaborate insights into the material.' To measure teachers' beliefs about the effectiveness of cooperative learning for students' social and personal learning, we formulated five items (Cronbach's α = .80). Two example items are: 'Cooperative learning enhances students' social skills and their social interactions' and 'In cooperative learning, students learn social values, for example helping each other.' We also formulated four items to measure teachers' beliefs about the possibilities of cooperative learning to provide students with individualised support for their learning processes (Cronbach's α = .84). Two example items are: 'In cooperative learning, the pace of work can be adapted to students' needs' and 'In cooperative learning, students can get tasks that correspond to their performance level.' Furthermore, seven questions from Völlinger, Supanc, and Brunstein (2018) were adapted to assess teachers' beliefs about the effectiveness of cooperative learning for specific student groups, including different performance levels, ages, and special needs.

Teachers answered all belief questions on a five-point scale (disagree – somewhat disagree – undecided – somewhat agree – agree).

Use of cooperative learning

Teachers reported on the frequency of using cooperative learning in class on a single item with a 6-point scale (never – once a term – once a month – twice a month – weekly – daily). To measure the quality of teachers' implementation of cooperative learning, 14 questions from Völlinger, Supanc, and Brunstein (2018) were used (Cronbach's α = .83). Two example items are: 'When I implement cooperative learning, group members instruct each other about their knowledge' and 'When I implement cooperative learning, we reflect upon the groups' cooperation after the group work.'

We adapted 24 questions from Buchs et al. (2017) and from Völlinger, Supanc, and Brunstein (2018) to assess the challenges in implementing cooperative learning. Factor analysis revealed seven factors with an eigenvalue > 1 that explained 63.5% of the variance in the 24 questions. Thus, the questions were grouped into seven scales (see Table 1).

Teachers reported on their interest in implementing cooperative learning more often on a single item. Furthermore, five questions from Völlinger, Supanc, and Brunstein (2018) were used to measure teachers' ideas about support in using cooperative learning, including teacher training or lesson examples. Teachers reported on the quality of cooperative learning, their challenges, their interest in using cooperative learning more often and ideas about support on a 5-point scale (disagree – somewhat disagree – undecided – somewhat agree – agree).

Table 1. Challenges for the implementation of cooperative learning.

Scale	Sample Items	Cronbach's α (Number of Items)	*M* (*SD*)
Preparing Students	Explicitly work on the cooperative skills needed for cooperative group work with pupils	.78 (4)	3.75 (0.79)
Role as a Promoter	Accepting not being at the centre of interactions in class	.71 (4)	3.14 (0.93)
Organising Groups	Assigning group roles	.85 (2)	2.76 (1.20)
Disciplinary Problems	Dealing with disciplinary problems	.91 (2)	2.93 (1.32)
Time and Effort	Releasing the time to plan and prepare cooperative group work	.81 (5)	4.01 (0.79)
Resources	Insufficient spatial resources	.70 (3)	3.22 (1.04)
Performance Assessment	Assessing the learning of each pupil after the group work	.83 (4)	3.44 (0.91)

Note. 5-point scale, 5 = agreement.

Results

Teachers' knowledge

The knowledge test about the principles of cooperative learning revealed that teachers answered $M = 3.43$ ($SD = 1.08$) of the five questions correctly. Teachers reported that they knew $M = 2.77$ ($SD = 2.00$) of the 11 given methods of cooperative learning with *Pairs Check* and *Project Work* being the most known methods (see Table 2). The correlation between teachers' knowledge about the principles and knowledge about the methods of cooperative learning was not significant, $r = -.05$, $p > .05$.

Teachers evaluated their knowledge as sufficient ($M = 1.93$, $SD = 1.00$). Nonetheless, they somewhat agreed that they would like to learn more about cooperative learning ($M = 4.43$, $SD = 0.63$). Teachers' evaluation of their knowledge correlated significantly with their knowledge about the methods of cooperative learning, $r = .35$, $p < .01$, but this evaluation was not associated with teachers' knowledge about the principles of cooperative learning $r = .01$, $p > .05$.

Teachers' beliefs

Teachers somewhat agreed that cooperative learning has positive effects on students' academic learning ($M = 4.05$, $SD = 0.60$) and that it is an effective means to support students' social and personal learning ($M = 4.46$, $SD = 0.51$). Furthermore, teachers

Table 2. Teachers' knowledge about cooperative learning methods.

Method	Teachers Knowing the Method (%)
Think-Pair-Share	36.3
Learning Pace Duet	10.0
Pairs-Check	52.5
Numbered Heads	11.6
Inside/Outside Circle	13.5
Reciprocal Reading	17.5
Jigsaw	32.7
Team Tournament	33.4
Structured Controversy	5.5
Placemat	9.8
Project Work	53.9

Table 3. Teachers' evaluations of cooperative learning effectiveness for specific student groups.

	M (*SD*)
Low-achieving students	3.33 (1.16)
Mid-achieving students	3.87 (0.83)
High-achieving students	4.07 (0.98)
Older Students	4.08 (0.93)
Younger Students	3.36 (1.16)
Students with learning disabilities	3.39 (1.15)
Students with behaviour problems	2.64 (1.19)

Note. 5-point scale, 5 = agreement.

somewhat agreed that cooperative learning is useful to provide students with individualised support for their learning processes ($M = 3.98$, $SD = 0.73$). Some descriptive statistics results of the effectiveness of cooperative learning for specific student groups (see Table 3) should be noted. Teachers somewhat agreed that cooperative learning is effective for high-achieving or older students. In contrast, teachers were either undecided or somewhat disagreed about the effectiveness of cooperative learning for students with behaviour problems.

Use of cooperative learning in class

Teachers reported that they used cooperative learning in class once a term to once a month ($M = 2.60$, $SD = 1.17$). When teachers implement cooperative learning, they somewhat organise and support students' interaction in accordance with the principles of cooperative learning ($M = 4.17$, $SD = 0.48$). The frequency of cooperative learning and the quality of its implementation correlated significantly, $r = .14$, $p < .01$. The means (see Table 1) indicate that teachers are challenged in preparing students for working and learning together and in finding the time and effort to prepare lessons with cooperative learning.

Teachers somewhat agreed that they would like to use cooperative learning more often ($M = 4.21$, $SD = 0.71$). Teachers were especially interested in examples and materials that could support them in using cooperative learning in class (see Table 4).

Teachers' knowledge, beliefs, and practices

Table 5 presents the bivariate correlations between the measures of teachers' knowledge and beliefs about cooperative learning and their use of cooperative learning in class. The frequency of cooperative learning was associated with teachers' knowledge about the methods of cooperative learning, $r = .34$, $p < .01$, but it was not associated with teachers' knowledge about the principles of cooperative learning, $r = .01$,

Table 4. Teachers' Interest in Support to Use Cooperative Learning.

	M (*SD*)
Teacher Training	4.37 (0.77)
Lesson Examples	4.78 (0.46)
Teaching Material	4.82 (0.43)
Lesson Videos	4.33 (0.95)
Colleagues Observing	3.58 (1.17)

Note. 5-point scale, 5 = agreement.

Table 5. Correlations between teachers' knowledge, beliefs, and practices.

	Knowledge Methods	Knowledge Evaluation	Belief Academic Learning	Belief Social Learning	Belief Individualised Support	Frequency	Quality
Knowledge Principles	−.05	.01	.13**	.13**	.05	.01	.11**
Knowledge Methods		.35**	.09**	.07**	.04	.34**	.10*
Knowledge Evaluation			.13**	.10**	.15**	.45**	.25**
Belief Academic Learning				.47**	.41**	.13**	.25**
Belief Social Learning					.59**	.13**	.25**
Belief Individualised Support						.14**	.30**
Frequency							.14**

Note. *p <.05, **p <.01.

p >.05. Analyses revealed a moderate to strong correlation between the frequency of cooperative learning and teachers' evaluation of their knowledge, r = .45, p <.01. The frequency of cooperative learning also correlated to a small degree with teachers' beliefs about cooperative learning (academic: r = .13, social: r = .13, individualised support: r = .14). Furthermore, small correlations were found between teachers' knowledge about cooperative learning and their beliefs (.04 ≤ r ≤.15). The quality of the implementation of cooperative learning correlated also to a small degree with teachers' knowledge about the methods, r = .10, p <.01, and the principles of cooperative learning, r = .11, p <.01, and it was associated with teachers' evaluation of their knowledge, r = .25, p <.01. The analysis also revealed correlations between the quality of the implementation of cooperative learning and teachers' beliefs about cooperative learning (academic: r = .25, social: r = .25, individualised support: r = .30).

Discussion

This study investigated the state of cooperative learning in Poland and described teachers' knowledge and beliefs about cooperative learning and their use of cooperative learning in class. The descriptive results show that teachers knew some principles of cooperative learning, although they knew only a few methods for implementing positive interdependence and individual accountability. Teachers' knowledge about the principles of cooperative learning and their knowledge about the cooperative learning methods were found to be unrelated, indicating two different aspects of knowledge: theoretical and practical knowledge about cooperative learning. Furthermore, teachers' evaluation of their knowledge was not associated with their knowledge about the principles of cooperative learning. In contrast, teachers' evaluation of their knowledge correlated to a moderate degree with their knowledge about cooperative learning methods, indicating that teachers emphasise their practical knowledge.

The correlations between the measures of teachers' beliefs about the effectiveness of cooperative learning were moderate to strong, indicating that there are different aspects of teachers' beliefs about the effectiveness of cooperative learning for students' academic learning, its effectiveness for students' social and personal learning, and the possibilities of cooperative learning to provide students with individualised support. For all three aspects, teachers somewhat agreed that cooperative learning is effective. Thus, in general, teachers' beliefs reflect the empirical evidence (Hattie 2009;

Kyndt et al. 2013; Roseth, Johnson, and Johnson 2008; Tolmie et al. 2010). However, some discrepancies are revealed in the detail. The descriptive results show that the teachers in our study believed that cooperative learning is effective especially for social and personal learning as well as for high-achieving and older students. For students with behaviour problems, teachers were either undecided, or they somewhat disagreed. Although these results are in line with teachers' reports in a German sample (Völlinger, Supanc, and Brunstein 2018), teachers' beliefs contradict empirical results about cooperative learning being effective in particular for younger and low-achieving students' academic learning (Kyndt et al. 2013; Slavin 1995). These results in addition to the only small correlations between teachers' knowledge and their beliefs indicate that teachers' beliefs at least in part are based on everyday knowledge or individual concepts.

Teachers used cooperative learning in class infrequently, from once a term to once a month. The frequency of teachers' use of cooperative learning correlated to a small degree with teachers' beliefs about the effectiveness of cooperative learning, which indicates that teachers' beliefs only to a small extent resulted in the implementation of cooperative learning in class or in return were only in part an expression of teachers' use of this teaching strategy. However, the frequency of cooperative learning was associated with teachers' knowledge about cooperative learning methods. Thus, the frequency of cooperative learning could largely depend on teachers' practical knowledge and range of methods.

Teachers organised and supported students' interactions in accordance with the principles of cooperative learning to a moderate extent. However, the quality of teachers' implementation of cooperative learning was associated with the frequency of teachers' use of cooperative learning in class only to a small degree. This result is in line with the findings of Völlinger, Supanc, and Brunstein (2018), which suggest that the frequent use of cooperative learning does not directly imply a high quality of its implementation. Furthermore, the quality of cooperative learning implementation was weakly associated with teachers' theoretical knowledge (knowledge about principles) and with teachers' practical knowledge (knowledge about methods). Instead, the quality of teachers' implementation of cooperative learning moderately correlated with their beliefs about the effectiveness of cooperative learning. These results indicate that the frequency of teachers' use of cooperative learning and the quality of its implementation are different aspects of teachers' implementation of cooperative learning. We assume that the frequency of teachers' use of cooperative learning is predominantly related to teachers' practical knowledge, whereas the quality of cooperative learning implementation is related to a more reflective and elaborated process that also manifests in teachers' beliefs.

Finally, teachers reported that they would like to know more about cooperative learning and use it as a teaching strategy in class more often, although the descriptive results show that teachers found it especially difficult to allocate the time and make the effort to prepare lessons with cooperative learning and to prepare students for cooperation. In contrast, teachers found it less difficult to organise groups and deal with disciplinary problems. These results are in line with the teachers' reports in Buchs et al. (2017), which suggest that the main challenges for teachers are conditions that are difficult for teachers to influence. To use cooperative learning more often, teachers were especially interested in ancillary support such as examples and other written materials. However, they did not favour being observed and receiving feedback from colleagues. In sum, the findings indicate that

teachers are motivated to use cooperative learning more often and would like to receive very practical types of support, but their interest is limited by constraints in time and effort.

Implications for teacher education

Our results point to challenges for teacher education. Implementing cooperative learning is challenging for teachers because of the time and effort needed to prepare lessons. They are interested in materials and examples that would provide them with guidance without consuming too much time. In this study, teachers' knowledge about cooperative learning methods was associated with the frequency of their use of cooperative learning in class. Therefore, information on methods of cooperative learning using specific teaching subjects as examples might increase the frequency of teachers' use of cooperative learning. Textbooks about methods and with ancillary materials can provide efficient support (cf. Green and Green 2005; Topping et al. 2017). Furthermore, teachers can use digital environments, including videos in which teachers model how to integrate the principles of cooperative learning into their teaching practices (cf. Kennedy et al. 2017). However, currently such online examples of best practices are rare.

The quality of cooperative learning implementation was only weakly related to the frequency of its use but more strongly related to teachers' beliefs about the effectiveness of this teaching strategy. Thus, to integrate cooperative learning effectively into the classroom, understanding and becoming convinced of its effects on student academic and social learning outcomes appears to be a necessary antecedent. Teachers could also reflect on these outcomes when they use the strategy. However, this more sophisticated approach of professional development needs time and the broader context of school and lesson development (Timperley et al. 2007). Examples are *lesson studies* in which teachers get together in teams, plan lessons, and receive feedback from their colleagues about their teaching (Kullmann 2012). This feedback would focus on students' behaviours and learning, which could be a way to contend with teachers' scepticism towards peer feedback. For cooperative learning, lesson studies could make the positive effects of cooperative learning visible for teachers, which in turn would likely foster positive beliefs towards using this strategy.

Conclusion

In line with the standards of the educational system in Poland, teachers would like to learn more about cooperative learning and use it more often as a teaching strategy. Teacher education programmes need to understand the challenges of cooperative learning and develop approaches that address teachers' practical knowledge and their beliefs towards cooperative learning. This objective should foster teacher commitment in using cooperative learning as an evidence-based teaching strategy.

Disclosure Statement

No potential conflict of interest was reported by the authors.

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