REVIEW

The Application of Cooperative Learning in Chinese Education: A Systematic Review

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***Abstract**: Cooperative learning has been applied in Chinese education for decades, and an overview of its implementation in China is warranted for further improvements. This study seeks to survey the current application of cooperative learning at various education levels in China based on an analysis of 50 prior studies. The survey finds that comparable cooperative learning procedures and methods have been adopted by educators in different education phases and those teachers and students have encountered many challenges in enacting cooperative learning. We also put forward several suggestions in response to these challenges for improving instructional outcomes of this teaching approach.*

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Introduction

THE CONCEPT of cooperative learning (CL) was advanced in the 1970s and subsequently evolved into an established instructional modality. Deemed a potent strategy for fostering students' key competencies, including critical thinking, interpersonal communication, and collaboration abilities (Loh & Ang, 2020), CL has been widely adopted in the global educational community. It was introduced to China in the 1980s and used as a major pedagogical paradigm to change the traditional education style in China. Chinese researchers put a high value on CL, claiming that the promotive effects of CL on the student's academic success and social development as well as the improvement of the learning environment are of vital significance for the growth of the individual and the achievement of the national educational goals (Han, 2018). Governmental interest in cooperative learning in China finds expression in the "Opinions on Intensifying the Curriculum Reform and Implementing All-Round Education as the Core Mission," which advocates advancing instructional reform by popularizing relatively novel learning methods, such as cooperative learning, inquiry-based learning, and self-directed learning (Ministry of Education of China, 2014).

Global research on CL in the last few decades has substantiated its positive effects on student learning outcomes. In their review of 84 studies, Trung and Truong (2023) discovered that CL was beneficial for enhancing the student's learning motivation, academic performance, and practical skills. CL is also acclaimed to have positive effects on students' learning of specific subjects. For example, Xu & Yang's (2023) study suggests that it is effective in increasing the student's language acquisition in foreign language instruction and empirically verifies its effectiveness in improving their language accuracy, enhancing their learning motivation and confidence, boosting their engagement in learning, and reducing their anxiety in foreign language learning. In the area of physical education, research has demonstrated that the improved interpersonal relationships brought by CL are conducive to the student's physical, academic, social, and emotional development (Bores-Garc á et al., 2023; Casey & Goodyear, 2015). Recent meta-analytic studies of CL have verified that it can generate better learning outcomes than traditional teaching methods. At the same time, these studies also point out that factors such as the method and intensity of teacher intervention, grouping method, cooperation intensity, and group size can have significant impacts on CL's outcomes, which are likely to be neglected by teachers or researchers. Therefore, to optimize the effects of CL, it is necessary to look more thoroughly into its implementation processes. This study, based on a review of 50 relevant studies, aims to survey the application of CL in Chinese education at all levels and critically examine

prior experiences in this regard with the view to providing implications for more efficacious use of this instructional approach.

Literature Review

Conceptualization of Cooperative Learning

CL is an instructional strategy with which the teacher organizes the students to work toward a common learning goal or outcome or solve a common problem or task in groups, making sure that they complete their work through interdependent behavior but with each individual student being held accountable for their contributions and efforts (Brody & Davidson, 1998). The study group in CL is typically made up of a certain number of students with varying levels of competence, and group members are not only responsible for their own mastery of learning substances but also for helping each other to reach the shared learning objectives (Slavin, 1987). In CL, the student learns how to maximize their own and the team's achievements by means of information sharing, knowledge co-construction, and more (Johnson & Johnson, 1989). According to Sharan (2018), CL is not a rigid teaching and learning approach with prescribed procedures but does show certain consistent features: (i) small-group interaction surrounding the learning task; (ii) mutually supportive cooperation behavior among students; (iii) positive interdependence in working towards learning objectives; (iv) individual accountability and responsibility for group work outcomes (Sharan, 2014).

Education researchers in China claim that the idea of CL is deep-rooted in Chinese ancient educational philosophy. Statements in archaic Chinese like "Learning alone without peers leads to ignorance and prejudice" and "A cultured man gets along with others, though he may not always agree with them on learning" represent the educational wisdom of ancient Chinese on CL (Han, 2018). That is why CL, as a foreign pedagogical approach, can easily garner attention in Chinese academia. Wang (2002), one of the earliest Chinese researchers in the CL studies, defines CL learning as a teaching process in which students are grouped on the principle of "intra-group heterogeneity" to increase the interactions between classroom actors, with the group achievements being treated as the assessment criterion to motivate team efforts to reach the common instructional objectives. Compared to their foreign peers, Chinese researchers place a heavier weight on the teacher's role in CL by emphasizing the importance of their "inspiration and guidance" (Han, 2018), albeit also stressing the central position of students in CL (Li & Ham, 2013; Wang et al., 2020).

CP's Core Elements

The study group is the most fundamental organizational structure for implementing CL. Nevertheless, the presence of a study group does not necessarily mean the occurrence of CL. Students in a group working on their respective learning tasks without substantive inter-peer communication is not seen as CL. Integral to CL are certain essential elements (Ma, 2003), despite the fact that there is currently no conclusive definition of CL's core components. The five-element CL pattern, advanced by American researchers Johnson and Johnson (1989, 2009), has been the most referenced, which includes: (1) Positive Interdependence—meaning that group members rely on each other for the goal achievement, with each of them making a unique contribution to the collective endeavor. (2) Individual Accountability—stressing the necessity of a clear division of responsibility, with which each group member is held accountable for a specific section of the assigned task. (3) Promotive Interaction—highlighting the importance of inter-peer interaction for completing the learning task, including providing feedback to group members, posing questions to each other's reasoning and conclusions, and assisting each other in achieving the group's outcomes in an efficient manner. (4) Appropriate Use of Social Skills—emphasizing that the teacher has the responsibility to urge students to use legitimate social skills to solve problems to practice and develop interpersonal communication abilities, including trust-building, leadership, decision-making, and conflict management. (5) Group Processing—entailing the collective efforts to build the team, including setting shared learning objectives, evaluating the team performance regularly, and setting forth improvements to be made in order to enhance the efficiency and effectiveness of the group operation.

CL Implementation Methods

As per Slavin (1980), CP's in-class implementation entails three structures: the task, reward, and authority structures. The task structure is about the configuration of various learning tasks and the organization of study groups (e.g., the grouping method and the availability of teacher supervision). The reward structure exerts impacts on student performance and group cohesion. The authoritative structure concerns the students' power over their learning activities instead of the teacher's control of the learning process. The three structures, particularly the reward structure, are dynamic changes in the process of in-class CL implementation (Slavin, 1980) and hence deserve careful consideration by the teacher when they make the preparations for CL-based instruction.

Over the years, the researchers have developed many distinctive methods for executing CL, among which the most widely adopted are Student Teams Achievement Divisions (STAD), Team Games Tournament (TGT), Jigsaw, Learning Together (LT), and Small-group Teaching. STAD is featured by the following procedures: First, the students are grouped on the principle of intra-group heterogeneity, with each group consisting of members with differential academic levels. Second, an assessment is administered to the students after they complete a learning task in groups. The scores of individual members are combined to calculate the average scores of the group according to prescribed rules that ensure the equal weight of the contribution of each student. Third, the score ranking is not conducted within the whole class, but instead, the class is divided into several layers, and the student is only compared with their peers in the same layer (Wittrock, 1978; Slavin, 1980). The basic procedures of TGT are comparable to those of STAD, except that in TGT, the competition replaces the assessment and takes place every week among students in the same academic layer from different groups (Stevens et al., 1991; Wang, 2002). "Jigsaw" adopts the same grouping method as the above two models. On top of that, it divides the teaching materials for a certain subject into several sections and has the students in a group address different sections separately. The students studying the same section make up a specialty study group, who work together to delve deeper into the content and subsequently teach their knowledge of the delegated section to peers in their respective groups (Slavin, 1994). Comparatively, LT has simpler procedures. The students with varying academic levels work together in a group, and the teacher gives feedback on the overall performance of the group. This model pays more attention to the group organization before the enactment of CL and the regular evaluation of the performance of group members (Wang, 2002). Small-group Teaching is a more general method with a special emphasis on the size of the study group, which should be ideally composed of two to six people. With this method, the group needs to establish a research project based on the learning materials available to the whole class and split it up into several separate tasks, assigning them to individual members, who later put together their work results and formulate the group report. Each group needs to make a representation of their research findings to the class, and the teacher and other groups give comments on their report (Slavin, 1980).

A Comparison of Cooperative Learning and Collaborative Learning

The two concepts, cooperative learning and collaborative learning, emerged almost at the same time. Initially, they were deemed two distinct approaches, with collaborative learning focusing more on the techniques involved in

inter-student interaction and cooperative learning more on the process of the inter-student interaction under the direction and supervision of the teacher (Panitz, 1999; McInnerney & Roberts, 2004). Yet, amid the advances in theoretical and practical research on them and increasing integration of technology, the distinction between the two has become blurred (Yang, 2023). Currently, the researchers tend to agree that there are no fundamental differences between them and that they are both student-centered instructional methods with the potential to help teachers and students shape new learning environments (Jacobs, 2015). This study acknowledges the subtle differences between cooperative learning and collaborative learning but contends that there are no significantly mutually contradictory elements between the two concepts and that they basically coexist in practical teaching. Hence, in this survey, the two terms are virtually interchangeable, both pointing to a learning approach that requires students to learn and practice disciplinary knowledge, fulfill learning tasks, and reach educational objectives primarily via intra-group interactions (Li & Ham, 2013).

Research Questions

Based on a survey of existing research on CL in the Chinese context, this study addresses the following questions:

Q 1: What are the conceptions of CL among Chinese educators and education researchers?
Q 2: How has CL been implemented in Chinese classrooms?
Q 3: What are the challenges of CL application in Chinese education?

Research Methodology and Process

We sourced literature from China National Knowledge Infrastructure (CNKI), Web of Science, EBSCO, and Scopus, using "cooperative learning," "group cooperative learning," "collaborative learning," and "China" as search terms. To obtain high-quality papers in Chinese from the CNKI, only journals listed in "A Guide to the Core Journals of China" and the "Chinese Social Science Citation Index" were selected as literature sources. As of August 2024, a total of 1876 journal articles were retrieved, with 797 in Chinese and 1079 in English.

Rayyan, a systematic literature review tool, was adopted to remove duplicate and irrelevant studies. We further screen the records using the following criteria: (1) including studies with a research topic on the practical application of CL but excluding theoretical studies and literature review-based studies; (2) including studies in the context of Chinese education; (3) including studies with a detailed description of the implementation

procedures of CL (CL implementation schemes, grouping methods, types of learning tasks, etc.) but excluding those skipping this step or only reporting research findings; (4) including studies accessible in full text to avoid misunderstandings due to incomplete information. Based on these criteria, 50 papers were obtained, with 34 in Chinese and 16 in English. Their publication years range from 2007 to 2023.

Research Results

Our review shows that existing literature on CL application in China has covered all of its education levels, from basic to tertiary education. Among the 50 studies, five address CL applications in primary schooling, 12 concern secondary education, and 33 concentrate on its application in tertiary education. Regarding their disciplinary scope, CL studies targeting the primary level mostly address the effectiveness of CL in multiple subjects (N=4), whereas research on CL applications in secondary and tertiary education typically focuses on a single discipline. As to the specific subjects involved, research at the primary level shows parallel interest in the mathematics-dominated natural science education (N=5) and Chinese language-centered humanities education (N=4). Studies at the secondary level focus more on natural science subjects (N=10), with less attention paid to humanities (N=1) and social sciences (N=1). Comparatively, research at the tertiary education level covers a wide range of subjects, such as physics, chemistry, medicine, computer science, and more from the domain of natural sciences (N=12); language education in the domain of humanities (N=12); and education-related disciplines in the domain of social sciences (N=6), with additional four studies specializing in CL in physical education (PE). In analyzing CL's effects on student development, all these studies, no matter which education level they target, have highlighted its positive roles in promoting student cognitive and non-cognitive abilities. In addition, classroom teaching remains the primary setting for CL (N=41). CL application in the online and mobile learning scenarios is also researched (N=9), particularly at the tertiary education level (N=7). The active implementation of online CL in higher education institutions is perhaps due to their richer education resources and more flexible teaching environments.

The above breakdown of literature indicates a widespread adoption of CL in all levels of Chinese education. The ensuing section is devoted to a more in-depth analysis of the following three dimensions: the perceptions of CL in Chinese researchers and educators, CL implementation patterns in various education phases, and challenges of CL application in China.

Perceptions of CL in Chinese Researchers

The researchers' perceptions of CL derive from their understanding of the purpose of CL. A sizable portion of them claimed that their adoption of CL was a reaction to new requirements from the national curriculum program or education policies (e.g., Lin, 2007; Tan, 2015; Yan, 2023). Some treated CL as an educational idea rather than simply a learning model, emphasizing the importance of students' agency in the learning process and the necessity of their use of their initiatives in completing learning tasks (Chen & Qin, 2013). On top of its role in enhancing student academic performance, CL is also acclaimed as a humanistic and pro-social modality of education (Pan & Wu, 2013), with the potential to lower the student's anxiety level in learning and classroom interaction, to boost their self-esteem, and improve their quality of interpersonal relationships (Jiang & Tan, 2007; Jiang, 2007). Certain researchers adopted a comparatively simple understanding of CL, viewing it as a mutually supportive learning modality that facilitates students working together to complete specific training activities according to established procedures and rules, and therefore, introduced it into physical education or vocational skills training (e.g., Zhang, 2009; Gao & Zhu, 2014).

In the Chinese historical context of collective culture, it is easy for the researchers to be identified with CL's core elements, claiming they were in conformity with Confucian ideas (Chan, 2014), and gave their own interpretations. For example, according to Peng et al. (2020), "positive interdependence" is most effectively realized through division of responsibility and sharing of resources; "promotive interaction" is not just about inter-student interaction but also involves teacher-student communication; when encouraging "appropriate use of social skills," the teacher should place a special emphasis on teamwork ability development in students. Moreover, the division of roles in CL is underlined in the literature. Zhang (2014) argued that the division of roles among group members was aimed at defining the accountability of everyone in the process of CL and that there was a need to give the learners necessary prompts on how to perform their respective roles for a successful completion of the common learning task. In addition, the classroom environment is also deemed an essential factor affecting the outcomes of CL. A digital learning environment facilitating interaction and timely feedback can help students solve problems more effectively in the group study (Xu et al., 2017).

To sum up, our review finds that under the influence of the national education policy and traditional culture, Chinese researchers and educators exhibit open and receptive attitudes towards CL. They have developed their own conceptions of CL's essential elements and realized that CL can bridge the gaps in the traditional educational modalities.

CL Implementation Patterns

The literature in review shows that there are primarily three CL implementation patterns in Chinese schools. (1) Using one single CL-execution method. For example, Liu and Zhao (2012) focused on STAD, and Luo (2020) on TGT in their studies. Among the aforementioned CL execution methods, LT was the most used, adopted by 16 studies, as opposed to the Jigsaw method, which was the least applied (Song Yi, 2012), possibly due to its entailing the organization of additional "specialty study groups," an extra burden for the teacher. In effect, the Jigsaw method is not quite applicable in a class with many study groups. (2) Mixing several CL-execution methods together. For instance, Jing (2007) and Li (2017) grouped the students according to STAD's grouping procedure before the students were required to carry out CL activities following the small-group teaching method. Each CL-execution method has its own limitations, whereas the mixed-methods-based pattern can make up for the inadequacies of any single method, which is evidenced by Ning's (2010) and Hornby's (2013) practices. They incorporated the Numbered-Heads-Together (NHT) method into STAD, numbering the groups and students first and assigning the learning tasks or representation opportunities to them by randomly drawing the numbers to avoid uneven task distribution. (3) Combining CL with other learning models, such as project-based learning (Chang & Song, 2023), mobile learning (Huang et al., 2020), and the flipped classroom (Jiang et al., 2016; Huang et al., 2021). Some researchers integrated these learning models into CL to improve the latter's learning outcomes. In the past, a portion of teachers assigned CL tasks to students before class and had them present their group study results in class, resulting in the latter's focus on the representation rather than the group learning process. To address this issue, Cao and Bai (2018) experimented with CL in a flipped classroom setting, making students engage in CL activity in the classroom and complete learning tasks under the supervision of the teacher to increase in-class interactions and the teacher's oversight of the students' group work process. At the same time, other researchers have tried to utilize CL to compensate for the shortcomings of other learning models. For example, Cao (2014) discovered in her interpretation classes that self-directed learning did not work well without effective supervision and therefore, introduced group-based CL to optimize the engagement of every student.

In addition, some researchers have examined the differences in CL's effects between various subjects. In their survey on students' perceptions of three CL-based courses, Guo and Zhang (2008) found that students tended to increase CL behavior in courses involving open-ended learning content. This finding is corroborated by research by Zhang et al. (2011), who compared task-specific CL and open-ended question-based CL to draw the conclusion that the latter elicited better performance and lower cognitive load in the students. In most studies included in our review, CP was enacted within one

class, with several exceptions where the researchers examined the effects of CL in interdisciplinary study. For example, Cheng et al. (2022) organized preschool education and digital media majors into groups to develop digital teaching resources for young children.

To delve into CL's implementation in China in more detail, this study further examines the composition of the study group, the types of learning tasks and cooperation behaviors, the assessment methods, and the roles of the teacher in CL discussed in the literature.

The Grouping Methods and Division of Roles

Most studies in the included literature organized CL study groups on the principle of homogeneity between groups and heterogeneity within the group to ensure that each group includes students with different characteristics and that the overall competence levels of groups are comparable. Only very few studies adopted the random grouping method or left the grouping to the students' discretion (e.g., Xu, 2016). Furthermore, most researchers employed the "static grouping" mode, where the composition of the group remains stable for a certain period, with only several of them choosing to regroup the class in the middle of the semester (e.g., Jiang & Tan, 2007; Jiang, 2007). Realizing that "static grouping" might cause issues like low motivation or the "bystander" effect, fixed role assignment, intra-group fatigue, etc., Zhong and Huang (2022) advanced the "dynamic grouping" mode, in which the teacher divides the learning task into several sub-tasks, administers assessment and interviews to students after the completion of each sub-task, adjusts the composition of the group in consideration of factors like group cohesion, group cooperation smoothness, and student academic achievements as indicated by the results of assessment and interviews, and, after that, advances the students to the next sub-task in reorganized groups. Yet, they also noted that "dynamic grouping" might compromise the student's attachment to group efforts (Zhong & Huang, 2022).

The majority of researchers grouped the students in light of their academic results and competence levels to ensure that each group contained both high- and low-performers. Nevertheless, this grouping method is not without its challenges, which will be discussed later in a separate section. Moreover, gender, personality traits, interests, and the learning style of the student are also the chief factors that researchers considered in grouping the students (e.g., Zhang & Zhao, 2009; He & Jing, 2019). The plurality-valued grouping method is aimed at enabling mutual complementation in group members. In most studies, a group of four to six is the common size of group (e.g., Cai & Zhang, 2008; Meng, 2017). Zhang (2013) noted that a group of over eight would have difficulty splitting responsibilities properly among its

members, leading to some students being marginalized with low levels of participation.

A portion of studies have explicitly specified the division of roles within the group. Common among these roles are the group leader, responsible for organizing, managing, and coordinating the group activities; the recorder, for documenting learning materials, the group inquiry process, and group study results; the spokesperson, for representing group learning outcomes to the class; and the information collector, for searching and organizing learning resources (e.g., Chen & Qin, 2013; Liu et al., 2022). Certain studies prescribed the roles of group members to suit the needs of the learning task. For example, in teaching a rehabilitation course, You (2016) required each student in the group to take on a specific role essential for a rehabilitation therapy group, such as the rehabilitation assessor, exercise therapist, occupational therapist, physical therapist, and speech therapist. In most cases, there was a rotation of roles among the group members, who took turns trying different responsibilities (Tan, 2015; Meng, 2017). However, in some studies, there was no purposeful specification of the division of responsibility among group members (Chan, 2014; Xiao & Chongda, 2014), or the teacher simply designated the best-performing student as the group leader, who had the responsibility to organize learning activities and assign specific duties to group members (Yin & Shen, 2016).

The Type of Learning Tasks and Cooperation Behavior in CL

Learning tasks for CL vary by education level. In CL at the primary education level, students typically work together in groups to solve problems using worksheets or assignment cards (Jiang & Tan, 2007; Jiang, 2007; Huang et al., 2020). On top of problem-solving, secondary school students have more challenging CL tasks to complete, such as theme-based group representation and creation tasks that require substantial hands-on manipulation skills from the group members. To make a thematic group representation, the students need to gather materials, discuss with each other, and prepare a representation based on the selected theme (Zhao, 2023); to complete a creation task, they must give full play to their creativity, designing and producing an artifact in collaboration (Tan, 2015). In addition, the students can review for exams more effectively via group work (Chen & Qin, 2013). University students have more complex CL tasks to address, such as project development, project-based research, and specialty-related practical study, which challenge their comprehensive competencies (Jiang, 2014; Zhang, 2014; Chang & Song, 2023).

Analyses of student cooperation behaviors are beneficial for revealing how CL is enacted. Regretfully, the literature in review has paid

inadequate attention to student cooperation behavior. Only a small number of studies gave concrete descriptions of students' interaction behaviors, including information sharing, idea exchange, and brainstorming, and their communication devices, such as summary, inference, commenting, analysis, and reasoning (Ning & Hornby, 2010, 2013; Cao & Bai, 2018; Cheng et al., 2022). Most studies used more general terms like group discussion and group work to describe intra-group cooperation behaviors without providing details, such as interaction patterns and tactics, as well as their impact on CL outcomes, resulting in our limited knowledge about CL enactment procedures. Hence, CL may appear a "black box" in most situations, into which we input learning tasks, grouping methods, and teacher interventions, and from which we get group representations and student performance as outputs (Cao & Bai, 2018). Yet, little is known about the key information inside the box, such as cognitive interaction and cognitive flow that occur during the CL process.

Evaluation Methods for CL

According to our analysis results, the teacher is the chief evaluator of student CL outcomes at the primary education level. This may be because self-reflection and inter-peer evaluation skills are not fully developed in primary school students, who are not sufficiently mature to make independent and objective judgments on their own learning outcomes or group performance. In secondary schools and universities, both the teacher and students act as the evaluators for the results of CL, jointly assessing the performance of the individual and the group. The most pervasive CL evaluation method in these education phases is the "intra-group evaluation + inter-group evaluation + teacher assessment + tests" pattern (e.g., Zhang & Zhao, 2009; Huang et al., 2021), which is also well-accepted by students as a multi-actor evaluation method (Guo & Zhang, 2008). The teacher is often held responsible for finalizing the evaluation criteria (Gao & Zhu, 2014), which cover not only student academic performance but also their collaboration and communication skills such as oral representation (Yin & Shen, 2016). Furthermore, researchers like Li (2017) highlighted the individual's contribution to the group work as a core component of the CL evaluation system. It is also noteworthy that studies focusing on CL at the secondary education level place an exceptional emphasis on the proper wording of the teacher's evaluation, as adolescent students tend to be more sensitive to external stimuli, particularly more concerned about others' comments. Therefore, the teacher's appraisal must be objective as well as inspiring for this group (Zhao, 2023). In addition, some researchers highly emphasized the importance of regular collective reflections on CL activities (e.g., Tan, 2015; He & Jing, 2019), claiming that they could help boost the engagement

of the students and the teacher, stimulate thorough discussion on the issues encountered in the CL process, and continuously optimize the CL implementation strategies.

The Teacher's Roles in CL

No matter which education phase they teach, the educator plays their roles in student group CL as the designer, director, assistant, and promoter, providing students with a learning environment that facilitates their CL enactment (Wu & He, 2014). In the initial stage, the teacher needs to fulfill three duties: student grouping, CP orientation, and lesson preparation (Jiang & Tan, 2007). First off, to strengthen positive interdependence between group members, most researchers designed certain supporting activities for the students, such as naming the group and establishing shared goals for the group (e.g., Zhang & Zhao, 2009). Second, a portion of researchers provided CP orientation for students. The majority of them only inform students of the learning objectives and evaluation criteria in advance (e.g., Jian, 2019; Li et al., 2019); a small number of them chose to give students sufficient time for knowing each other and practicing cooperation skills (Pan & Wu, 2013; He & Jing, 2019). Third, the lesson preparation work of the teacher typically focused on selecting appropriate learning materials and reorganizing them to suit the CL learning environment (e.g., Zhang & Zhao, 2009; Song, 2012; Gao & Zhu, 2014).

In the process of CL enactment, the teacher often acted as the supervisor without significant interference in actual group activities (e.g., Chan, 2014; Liu, 2022). Some researchers conducted class-based introductory instruction before students' group study, providing them with relevant basic knowledge and background information to ensure their group CL was informed by practices (e.g., Jing, 2007; You, 2016). In addition, after students' completion of each CL task, the teacher needs to give a summary, answer queries from the students, and offer directions to individuals who want extra instruction. This step has been emphasized in most studies included in our review (e.g., Pan & Wu, 2013; Liu et al., 2022).

Challenges of CL

Research on CL implementation has also revealed a variety of issues. The misconceptions of CL among Chinese educators are pronounced ones. Some teachers simply equated CL to group discussion (Tan, 2015) or assumed that CL would naturally take place after learning tasks were assigned to the group (Wang, 2007). Some treated CL as a rigid procedure (Yan, 2023), an established combination of processes including grouping, learning task assignment, task completion, group discussion, and group representation

(Guo & Zhang, 2008). Others failed to make necessary preparations for CL enactment: for example, their neglect of the division of roles in group members might lead to disorderly CL execution and low learning efficacy (Wang, 2007); the absence of well-designed learning objectives was an impediment to eliciting the dedication of all group members (Hsiung, 2011)—an overly unitary learning objective could be easily achieved by the high-performing members without involving teamwork; the lack of provision of CL skill training by the teacher was unfavorable for ensuring student CL outcomes (Chan, 2014). Furthermore, a portion of educators misunderstood teacher supervision of the CL process as the teacher's absolute control of student group work, disregarding the significance of team building and the cultivation of self-regulation ability in students (Wang, 2007).

Additionally, the educator may encounter certain practical challenges in implementing CL. Han (2015) noted that it was difficult for the teacher to seek out learning resources and methods that cater to the needs of students at distinct academic levels. The choice of the assessment method is also not easy. The two alternatives, evaluating student academic achievement based on group performance or evaluating group performance with test scores of individual students, can both have a negative impact on student motivation levels in CL (Song, 2012). Also, in the Chinese context of prevalent large-sized classes, the relatively big number of study groups in a CL classroom complicates class management. With finite classroom or laboratory space, mutual disruptions between groups are unavoidable (You, 2016).

In the meantime, the students also experience additional complications in a CL classroom. There are significant disparities in the CL engagement level between high- and low-achieving students. Low-achieving students have low intention of engaging in CL because of the following reasons: their ideas are often disregarded by peers during the group work (Zhang & Zhao, 2009); they are primarily to blame when the group fails to reach the learning objective (Jiang & Tan, 2007); and they have few chances to exhibit their ability as the high-achieving students are the chief actors in dealing with the learning task (Wang, 2007). On the other hand, high-achieving students have their own complaints. They may feel "exploited" because their low-achieving peers are seemingly taking a "free ride" (Jiang, 2007). When facing the pressures of high-stakes examinations, this group is more willing to work independently (Meng, 2017). Furthermore, there are individual differences in group discussion behavior (Chen & Qin, 2013), showing two extremes. Some students are not interested in speaking openly to a group of people (Tan, 2015); some, on the other hand, show a strong propensity for being the center of attention, who may purposefully interrupt others' speeches or initiate casual conversations to attract peer attention (Jiang et al., 2016). Worse still, the students typically feel helpless in dealing with disputes due to a lack of coping tactics (Chan, 2014). They are likely to

be intolerant of inter-peer disagreements or to get emotional over the disputes (Yan, 2023), which poses serious barriers to the smooth enactment of CL.

Discussion

Basically, CL implementation at various education levels in China follows broadly similar procedures: grouping, learning task assignment and provision of learning resources, group CL enactment, CL outcome representation, and multi-dimensional evaluation, summary, and reflections, despite the minor adaptations due to the variations in the cognitive characteristics between different age groups and the disparities in the education resources and environment between different levels of education. Aside from the conventional CL methods, Chinese researchers have also experimented with other approaches, including integrating CL into the flipped classroom model to combine self-directed learning with group study (Li et al., 2019) and leveraging educational technology (such as the smart classroom) to enhance teacher management efficiency and student CL outcomes (e.g., Xu et al., 2017). Nevertheless, there is currently a lack of in-depth research into student cooperation behaviors in CL and their effects on student learning results. The challenges encountered by educators in their practical application of CL underscore the necessity of strengthening research in this area.

Issues with students' CL enactment are largely due to the teacher's less-ideal organization of CL activities. The unclear division of roles leads to unbalanced contributions to group work results among group members. Explicit division of roles within a group is crucial for maintaining students' CL engagement intention as it ensures each group member can perceive their value to the team (Liu, 2013). Although the students are allowed autonomy in dividing the specific responsibilities, the teacher must be substantively involved in the division of roles in a group. At the same time, the absence of division of roles also reflects the illegitimate design of CL learning objectives and tasks. When the learning task has an overly simple structure, focusing on a single skill, it can be easily finished off by more competent students in the group, making the division of responsibility unnecessary. To make students engage in genuine group cooperation, the teacher must develop well-structured CL tasks that are challenging and demand team efforts as well. In addition, the students' low consciousness of cooperation and poor collaboration skills also contribute to their difficulty conducting CL, which are, to some extent, associated with the inadequacies in intervention and guidance on the part of the teacher. To help students develop sound awareness of cooperation, the teacher needs to formulate legitimate incentives for cooperative behaviors while also teaching them how to

balance cooperation and competition. Also, it is important for the teacher to provide essential CL skills training to students beforehand to ensure the students are well prepared for CL implementation.

Challenges of CL faced by the teachers are also attributable to the following two reasons. First off, a sizable portion of teachers do not have a complete understanding of the concept of CL and may fail to comprehensively consider the five key elements of CL: positive interdependence, individual accountability, promotive interaction, appropriate use of social skills, and group processing. The absence of any of these components may directly negatively affect the effectiveness of CL (Dyson et al., 2022). Meanwhile, the manipulation of in-class CL is complicated and demanding, necessitating a thorough comprehension of the diverse ability levels of the students and the characteristics of current teaching materials on the part of the teacher. It entails considerable additional burdens of lesson preparation and classroom management. To address these issues, it is imperative to supply the teachers with comprehensive guidelines on CL implementation and promote the use of educational technology in CL-based teaching.

Our analysis results suggest that more successful CL implementation in Chinese education warrants a systematic framework for CL practice, which should cover an overarching concept of CL, an interpretation of its core elements, concrete execution steps, and coping tactics for common issues. The teacher needs such a framework to develop knowledge about CL and establish CL instruction paths in an efficient manner.

Conclusion

Based on a review of relevant research over the last more than 10 years, this study gives an overview of CP's application in Chinese education, with a focus on exploring the challenges of CL implementation in China and their causes. Pertinent suggestions for improving student CL enactment are also proposed. The survey finds that the Chinese education world shows strong interest in CP as an instructional strategy, whereas a lack of systematic CL implementation guidelines for Chinese teachers negatively affects its effectiveness.

The limitations of this study should be acknowledged. The limited literature search scope may lead to an insufficient inclusion of prior studies. It is suggested that future research, on the basis of this survey, delve more thoroughly into factors that potentially influence CL's outcomes, such as the use of educational technology in CL in the context of digital transformation in education. Also, comparisons with overseas CP research should be increased to provide a more comprehensive reference framework for Chinese CL studies and practice.

References

(The studies included in the systematic review are marked with asterisks)

Bores-García, D., Hortigüela-Alcalá, D., Fernandez-Rio, F. J., González-Calvo, G., & Barba-Martín, R. (2021). Research on cooperative learning in physical education: Systematic review of the last five years. *Research Quarterly for Exercise and Sport*, 92(1):146-155. DOI: https://doi.org/10.1080/02701367.2020.1719276

Brody, C., & Davidson, N. (1998). Introduction: Professional development and cooperative learning. In. Professional Development for Cooperative Learning: Issues and Approaches. State University of New York Press.

*Cai, Q. & Zhang, H. (2008). Cooperative Learning in the Teaching of English as a major: Introduction to the cultural background of Advanced English. *Journal of Hebei Normal University (Education Science Edition)*, 2008(2):67-71. DOI: https://doi.org/10.13763/j.cnki.jhebnu.ese.2008.02.005

*Cao, M. & Bai, L. (2018). A cooperative learning Model for mathematical problem solving. *E-education Research*, 39(11):85-91. DOI: https://doi.org/10.13811/j.cnki.eer.2018.11.011

*Cao, Y. (2014). Group cooperative learning in the interpretation class: An empirical study of novice learners of English interpretation. *Journal of Xi'an Foreign Studies University*, 22(1):122-125. DOI: https://doi.org/10.16362/j.cnki.cn61-1457/h.2014.01.029

Casey, A., & Goodyear, V. A. (2015). Can cooperative learning achieve the four learning outcomes of physical education? A review of literature. *Quest*, 67(1):56-72. DOI: https://doi.org/10.1080/00336297.2014.984733

*Chan, K. W. (2014). Cooperative learning in a Hong Kong primary school: Perceptions, problems and accommodation. *Intercultural Education*, 25(3):216-228. DOI: https://doi.org/10.1080/14675986.2014.911805

*Chang, J. & Song, L. (2023). Group cooperative learning in country and area studies. *Foreign Language Research*, 2023(3):81-87. DOI: https://doi.org/10.16263/j.cnki.23-1071/h.2023.03.012

*Chen, H. & Qin, W. (2013). Cooperative learning in preparation for Gaokao in high schools. *Journal of the Chinese Society of Education*, 2013(S1):94-96. Available at: https://kns.cnki.net/kcms2/article/abstract?v=8XtZWovJaISV3-yppNQgJmpl9MkAnFBD5zhTpVr5EC7Pq5yEOO0s24Nv19pj9IGwdAifvG25-7hhxDeBgho4Uc4w66lvMbbN14waPexmTGZCBNVJ4BCSaGRiC-i88QtHrXyLxIKdyBpgXbKNEtLSmAreQjtlwWJEUoPMSOS4T9yrQXOWgj2xSw==&uniplatform=NZKPT&language=CHS

*Cheng, C. Y., Kao, C. P., Hsu, T. W., & Lin, K. Y. (2023). A study of the feasibility of a cross-college curriculum based on the experience of student cooperation. *International Journal of Technology and Design Education*, 33(1):23-37. DOI: https://doi.org/10.1007/s10798-022-09752-3

Dyson, B., Shen, Y., Xiong, W., & Dang, L. (2022). How cooperative learning is conceptualized and implemented in Chinese physical education: A systematic review of literature. *ECNU Review of Education*, 5(1):185-206. DOI: https://doi.org/10.1177/20965311211006721

*Han, M. (2015). An Empirical Study on the Application of Cooperative Learning to English Listening Classes. *English Language Teaching*, 8(3):177-184. DOI: http://dx.doi.org/10.5539/elt.v8n3p177

Han, X. (2018). Progress and trends in research on cooperative learning in China amid the last 40 years of reform and opening Up: A bibliometric analysis using CiteSpace. *Contemporary Education Sciences*, 2018(04):76-83. Available at: https://kns.cnki.net/kcms2/article/abstract?v=-4s28oSk47_HJn6snOgVpa0-I6fn7oCmKmXyRl9l-jD3ruiGaj7W6y_wwrKYBoyDbVEjsF7atZRgRKFfMQ7hb7o0xBKbVa_pgsK3IVIRbfC4v8jRtSMjlIqH71tSdNsfYWIcIQUH2zuu4PJ-V1L-PXDrt7tHPTOMiKcDDJgv5O0wcjMWVLgwsQ==&uniplatform=NZKPT&language=CHS

*He, Y. & Jing, L. (2019). Cooperative learning-based teaching practice in middle school

classrooms in remote rural areas. *Biology Teaching*, 2019(10):32-34.

*Hsiung, C. M. (2011). Empirical investigation into the ability-condition interaction effect of cooperative learning. *International Journal of Engineering Education*, 27(2):303-309.

*Huang, F., Cheng, L., Ke, Y., & Shang, L. (2021). Group cooperative learning in flipped classroom teaching for university nursing students. *Journal of Nursing Science*, 2021(7):1-3.

*Huang, P. S., Chiu, P. S., Huang, Y. M., Zhong, H. X., & Lai, C. F. (2020). Cooperative mobile learning for the investigation of natural science courses in elementary schools. *Sustainability*, 12(16):6606. DOI: http://dx.doi.org/10.3390/su12166606

*Gao, X. & Zhu, J. (2014). A cooperative learning-based model for training professional competences of pre-service mathematics teachers. *Bulletin of Science and Technology*, 2014(7):240-243. DOI: https://doi.org/10.13774/j.cnki.kjtb.2014.07.057

*Guo, J. & Zhang, C. (2008). The application of collaborative learning in post-graduate education. *E-education Research*, 2008(05):77-81.

Jacobs, G. M. (2015). Collaborative Learning or Cooperative Learning? The Name Is Not Important; Flexibility Is. *Beyond Words*, 3(1):32-52. DOI: https://doi.org/10.33508/bw.v3i1.676

*Jian, Q. (2019). Effects of digital flipped classroom teaching method integrated cooperative learning model on learning motivation and outcome. *The Electronic Library*, 37(5):842-859. DOI: https://doi.org/10.1108/EL-02-2019-0024

*Jiang, B. (2014). Web-based cooperative learning in college chemistry teaching. *International Journal of Emerging Technologies in Learning (Online)*, 9(2):45. DOI: http://dx.doi.org/10.3991/ijet.v9i2.3224

*Jiang, B. (2007). Does cooperative learning affect student academic excellence? An experimental study of a fifth-grade class. *Shanghai Research on Education*, 2007(1):64-66. DOI: http://dx.doi.org/10.16194/j.cnki.31-1059/g4.2007.01.024

*Jiang, B. & Tan, D. (2007). An experimental study of the effect of cooperative learning in improving the performance of low achievers in primary schools. *Chinese Journal of Special Education*, 2007(2):82-85.

*Jiang, Y., He, X., & Wan, K. (2016). The effectiveness of cooperative learning in the flipped classroom and implementation strategies. *Modern Educational Technology*, 2016(3):80-86.

*Jing, Li (2007). The application of cooperative learning to the comprehensive English Class. *China Adult Education*, 2007(9):183-184.

Johnson, D. W., & Johnson, R. T. (1989). Cooperation and competition: Theory and research. Interaction Book Company.

Johnson, D. W., & Johnson, R. T. (2009). An educational psychology success story: Social interdependence theory and cooperative learning. *Educational Researcher*, 38(5):365-379. DOI: https://doi.org/10.3102/0013189X09339057

Li, B. & Gong, L. (2019). The effect of cooperative learning on student Learning outcomes: A meta-analysis based on 54 experimental and quasi-experimental studies. *Research in Educational Development*, 2019(24):39-47. DOI: https://doi.org/10.14121/j.cnki.1008-3855.2019.24.008

*Li, H. (2017). Networking for English Literature Class: Cooperative Learning in Chinese Context. *English Language Teaching*, 10(12):219-229. DOI: http://doi.org/10.5539/elt.v10n12p219

Li, M. P., & Lam, B. H. (2013). Cooperative learning. *The Hong Kong Institute of Education*, 1:33.

*Li, Y., Xiao, J., Xu, L., Luo, Y., & Tao, L. (2019). The effectiveness of group cooperative learning in the flipped classroom teaching of basic nursing. *Chinese Nursing Research*, 2019(22):3959-3963.

*Lin, W. (2007). An experimental study of cooperative learning in basketball teaching. *Journal of Guangzhou Sport University*, 2007(4):126-128+118. Available at: https://kns.cnki.net/kcms2/article/abstract?v=8XtZWovJaIRlzxbFpFH1rDHYsgejQLgHKAeZJgdHwN3kVCBhYmz2fcLbKHlFq1GUIJN-WUC9AdZi5qQxEDBSSUwPISmIiu1LjgMHnPiiBk6QdvBNAYCh_bolvdyLv1PekWBtB_B8IB1yzAecVoZnvOaPDnWaa1uw1Y5wjiebMFZvHhVZ18g1Cw==&uniplatform=NZKPT&language=CHS

*Liu, B. & Zhao, J. (2012). The application of internet-assisted group collaborative

learning. *China Educational Technology*, 2012(8):16-21.

*Liu, H., Zhao, W., & Duo, Z. (2013). Design and practice of mobile technology-assisted in-class collaborative learning. *China Educational Technology*, 2013(6):86-92.

*Liu, L., Huang, X., & Yi, P. (2022). The application of concept map-based group cooperative learning in the emergency treatment placement of university nursing students. *Nursing Journal of the People's Liberation Army*, 2022(5):84-87.

*Liu, W. (2022). Analysis on the Effectiveness of PE FCT Model Based on Cooperative Learning Model. *Wireless Communications and Mobile Computing*, 2022(1), 7955813. DOI: https://doi.org/10.1155/2022/7955813

Loh, R. C. Y., & Ang, C. S. (2020). Unravelling cooperative learning in higher education. *Research in Social Sciences and Technology*, 5(2):22-39. DOI: https://doi.org/10.46303/ressat.05.02.2

*Luo, Y. J., Lin, M. L., Hsu, C. H., Liao, C. C., & Kao, C. C. (2020). The effects of team-game-tournaments application towards learning motivation and motor skills in college physical education. *Sustainability*, 12(15):6147. DOI: https://doi.org/10.3390/su12156147

Mcinnerney, J., & Roberts, T. (2004). Collaborative or cooperative learning? In. Online Collaborative Learning: Theory and Practice. p. 203-214. DOI: https://doi.org/10.4018/978-1-59140-174-2.ch009

*Meng, J. (2017). An Empirical Study on the Application of Cooperative Learning to Comprehensive English Classes in a Chinese Independent College. *English Language Teaching*, 10(2):94-99. DOI: http://dx.doi.org/10.5539/elt.v10n2p94

Ministry of Education of China. (2014). Opinions on Intensifying Curriculum Reform and Implementing All-Round Education as a paramount mission. Available at: http://www.moe.gov.cn/srcsite/A26/jcj_kcjcgh/201404/t20140408_167226.html

Ma, H. (2003). The concept, core elements, and significance of cooperative learning. *Studies in Foreign Education*, 2003(5):16-19. Available at: https://kns.cnki.net/kcms2/article/abstract?v=-4s28oSk47_7PE7fITc3XM-rvfQa35bKpRFbIDGj2huc_1nqGlXOGn8NCIOEaXvQUe7xPm29_Nf5hBPsbCT-kgpt6zm6AguXRigPJkz1hAMG_IbwF8VegaV_RoVxLJPkgTspDUHXIEWDxxpZwGCHbYhWOQgFdL_lAmy-M5CXByY3UoI_6dM50A==&uniplatform=NZKPT&language=CHS

*Ning, H., & Hornby, G. (2010). The effectiveness of cooperative learning in teaching English to Chinese tertiary learners. *Effective Education*, 2(2):99-116. DOI: https://doi.org/10.1080/19415532.2010.522792

*Ning, H., & Hornby, G. (2013). The impact of cooperative learning on tertiary EFL learners' motivation. *Educational Review*, 66(1):108-124. DOI: http://dx.doi.org/10.1080/00131911.2013.853169

*Pan, C. Y., & Wu, H. Y. (2013). The cooperative learning effects on English reading comprehension and learning motivation of EFL freshmen. *English Language Teaching*, 6(5):13-27. DOI: http://dx.doi.org/10.5539/elt.v6n5p13

Panitz, T. (1999). Collaborative versus Cooperative Learning: A Comparison of the Two Concepts Which Will Help Us Understand the Underlying Nature of Interactive Learning. Available at: http://home.capecod.net/~tpanitz/tedsarticles/coopdefinition.htm

*Peng, H., Jiang, Y., & Ma, S. (2020). An empirical analysis of the effectiveness of collaborative learning in a flipped classroom: Using the "Computer Networks and Applications" course for college students as an example. *Distance Education in China*, 2020(1):62-72. DOI: http://dx.doi.org/10.13541/j.cnki.Chinade.2020.01.006

Sharan, Y. (2014). Learning to cooperate for cooperative learning. *Annals of Psychology*, 30(3):802-807. DOI: https://doi.org/10.6018/analesps.30.3.201211

Sharan, Y. (2018). My Personal and Professional Involvement with Cooperative Learning. In. Collaborative Learning in a Global World. Information Age Publishing. Available at: https://www.researchgate.net/publication/329738034_My_Personal_and_Professional_Involvement_with_Cooperative_Learning_2018_Information_Age_Publishing

Slavin, R. E. (1980). Cooperative learning. *Review of Educational Research*, 50(2):315-342. DOI: https://doi.org/10.3102/003465430500023

15

Slavin, R. E. (1987). Cooperative learning and the cooperative school. *Educational Leadership*, 45(3):7-13.

Slaven, R. E. (1994). Cooperative Learning: A global perspective. (Chinese Translation by T. Wang). *Shandong Education Research*, 1994(1):75-79. Available at: https://kns.cnki.net/kcms2/article/abstract?v=8XtZWovJaITalYadMicBfSOdHBxPwIIlYOk4-geklmuRDf-Ac6jzuTX3b6CDEQOmGX-vYz1LF4qswf0UGrwobYkvzD3VjCib2kre_5CNWeaqpq1SB9U1mkOc_UbZVM6ue5Hjxj_YioMewTTKIyeCso5P5gzmvWxc9ZeDeiSqJvHgji0wlgRsZQ==&uniplatform=NZKPT&language=CHS

*Song, Y. (2012). The Application of the Jigsaw method of cooperative learning in chemistry teaching. *Education in Chemistry*, 2012(9):23-26.

Stevens, R. J., Slavin, R. E., & Farnish, A. M. (1991). The effects of cooperative learning and direct instruction in reading comprehension strategies on main idea identification. *Journal of Educational Psychology*, 83(1):8-16. DOI: http://dx.doi.org/10.1037/0022-0663.83.1.8

*Tan, S. (2015). Group cooperative learning in junior secondary physics education with the mentoring system. *Teaching Reference of Middle School Physics*, 44(14):68-69. Available at: https://kns.cnki.net/kcms2/article/abstract?v=8XtZWovJaITPiu2iIAI4JtFMWvjP2eNJuIl1lF7LmZqEVV9AWEDbTtxW5xeJ2MgNOOtWWoNhGAM2UG7JIVXY7cfjJ-xOEhYPu-zAZO_NyxD6vRbmMYTHu19o-E1aexBLDL1GTf9addrqDBo5mwQC8IJsUgDVSOSf6vQXJL7Hf7_zFoq-RjObfg==&uniplatform=NZKPT&language=CHS

*Tan, X. (2015). Research on the application of cooperative learning in rural middle school English teaching. *Journal of Language Teaching and Research*, 6(4):847-854. DOI: http://dx.doi.org/10.17507/jltr.0604.19

Trung, D. N., & Truong, D. X. (2023). The benefits of cooperative learning: an overview. *Technium Education and Humanities*, 4:78-85. DOI: https://doi.org/10.47577/teh.v4i.8709

*Wang, C. (2007). Cooperative learning in rural primary schools. *Global Education*, 2007(11):86-91.

Wang, T. (2002). An overview of cooperative learning. *Journal of the Chinese Society of Education*, 2002(1):32-35. Available at: https://kns.cnki.net/kcms2/article/abstract?v=-4s28oSk478VhlOffnK2z6ZI1UxzMrdpokXhahtIQEzDnPWoI3FHULUMyHYf4nn6GBdsX6n6-ohDmxJSPgF_avi65ftECF-8MSpozCIWHSaAnhj-4-7RDyHWiPP0kpRtV6ea3wuJrgybt4mINm72CRWV1AVRGcaX2L6aGflxq_PhEJ9RN85w_g==&uniplatform=NZKPT&language=CHS

Wang, W., Dong, Y., & Yang, M. (2020). The impact of cooperative learning on student learning outcomes: A meta-analysis based on 48 experimental or quasi-experimental studies. *Journal of Shanghai Educational Research*, 2020(7):34-40+59. DOI: https://doi.org/10.16194/j.cnki.31-1059/g4.2020.07.008

Wittrock, M. C. (1978). The cognitive movement in instruction. *Educational Psychologist*, 13(1):15-29. DOI: https://doi.org/10.1080/00461527809529192

*Wu, R. & He, G. (2014). The effectiveness of cooperative learning in college English writing teaching. *Foreign Language Education*, 2014(3):44-47. DOI: https://doi.org/10.16362/j.cnki.cn61-1023/h2014.03.021

*Xiao, C. & Chongda. (2014). An experimental study of the application of cooperative learning in college English teaching: Using Tibet University as an example. *Journal of Tibet University (Social Sciences Edition)*, 2014(3):169-176. DOI: https://doi.org/10.16249/j.cnki.1005-5738.2014.03.006

Xu, J. & Yang, J. (2023). A scoping review of technology-enabled cooperative learning in foreign language instruction. *Technology-Enhanced Foreign Language Education*, 2023(2):42-48+111. Available at: https://kns.cnki.net/kcms2/article/abstract?v=-4s28oSk479FvYiT8fDJGLdCeEeuGkwpf-Xlp-laVDce-hqK4J9YeNimzvyZa9DgXUyvxlBl6iu39nKsdWO4VKWw_7AzaU6vctZJJBg5NKFeSJKIbWghtrJkqVKCDKifAMZ2jQmcpjRoXApPUISOfd6oaM-3Vafp-5O2HCI4K9df6nlI0Vh04Q==&uniplatform=NZKPT&language=CHS

*Xu, X., Wang, X., & Gu, X. (2017). Group cooperative learning in the smart

classroom. *Open Education Research*, 2017(4):112-120. DOI: https://doi.org/10.13966/j.cnki.kfjyyj.2017.04.011

*Xu, Y. (2016). Boosting the teaching outcomes of the "Plant Quarantine" classes by group study. *Journal of Environmental Entomology*, 2016(3):665-668.

*Yan, Y. (2023). The application of group cooperative learning in Junior secondary geography teaching under the "Double Reduction" policy. *Teaching Reference of Middle School Geography*, 2023(31):29-31. Available at: https://kns.cnki.net/kcms2/article/abstract?v=8XtZWovJaISo5YfwdcIkqkDcJU5Y4WhAOgrsz9vGJUoet_IoKtdDuXDprbKOMgU8P8x479NfNLmvMiF_hIomPHrtC0gceIz2e8SB-irKq71risuBTpgk0-BwGzCLu_sIb3loJJtzhLl6xRTwan9gzPm63nl6tMi8Jbl4sNpPrjgYS5SsPAkmyA==&uniplatform=NZKPT&language=CHS

Yang, X. (2023). A historical review of collaborative learning and cooperative learning. *TechTrends*, 67(4):718-728. DOI: https://doi.org/10.1007/s11528-022-00823-9

*Yin, J. & Shen, G. (2016). Task-driven group cooperative learning in microbiology teaching. *Microbiology China*, 2016(2):410-416. DOI: https://doi.org/10.13344/j.microbiol.china.150396

*You, X. (2016). The application of case teaching and cooperative learning in college clinical rehabilitation classes. *Chinese Journal of Rehabilitation Medicine*, 2016(4):465-466.

*Zhang, H. (2009). Cooperative learning in volleyball teaching as a compulsory course. *Journal of Shenyang Sport University*, 2009(1):75-77.

*Zhang, H. & Zhao, W. (2009). The application of collaborative learning in the secondary information technology classes. *Modern Educational Technology*, 2009(9):47-50.

Zhang, K., Zhou, X., & Yu, C. (2021). A meta-analysis of the effectiveness of cooperative learning. *Journal of PLA University of Foreign Languages*, 2021(4):95-104+160. Available at: https://kns.cnki.net/kcms2/article/abstract?v=-4s28oSk47_n_310AOVEzJBTkARlPGZDyA76KcUskyyvBswSnYah6sz7bA4HO7IEeBCo4x_t4ogmAWlAKZbuwX3r1XPT5v0_RcgIxVW_pmh3ubL06BqGxmGGPygYZmYbw0eCAPB0ghEw3ba67lh9vMrM5HID6P-JMjJW-lqSWbEhJpIxoiRDEA==&uniplatform=NZKPT&language=CHS

*Zhang, L. (2014). PBL-based online collaborative learning activities using role scripts and problem prompts. *Distance Education in China*, 2014(2):36-40+96. DOI: https://doi.org/10.13541/j.cnki.Chinade.2014.02.007

*Zhang, L., Ayres, P., & Chan, K. (2011). Examining different types of collaborative learning in a complex computer-based environment: A cognitive load approach. *Computers in Human Behavior*, 27(1):94-98. DOI: https://doi.org/10.1016/j.chb.2010.03.038

*Zhang, X. (2013). The application of cooperative learning in the geography class and students' comments. *Teaching Reference of Middle School Geography*, 2013(Z1):45-46.

*Zhao, L. (2023). The application of scheduled learning program-based cooperative learning in biology teaching: Using "Human Genetic Diseases" as an example. *Teaching of Middle School Biology*, 2023(32):31-33.

Zeng, Q. (2000). Basic elements of cooperative learning. *Journal of Subject Education*, 2000(6):7-12. DOI: https://doi.org/10.14082/j.cnki.1673-1298.2000.06.002

*Zhong, B. & Huang, S. (2022). The application of dynamic grouping in college robotics education. *Modern Educational Technology*, 2022(3):61-70.

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