

What is cooperative learning?

Cooperative learning is a student-centered, instructor-facilitated instructional strategy in which a small group of students is responsible for its own learning and the learning of all group members. Students interact with each other in the same group to acquire and practice the elements of a subject matter in order to solve a problem, complete a task or achieve a goal.

Panitz offers a similar definition; he goes on to add that the teacher maintains control of the learning environment, designs learning activities, structures work teams, and, in his view, does not empower students. Kagan (1989) contributes that in cooperative learning the teacher designs the social interaction structures as well as learning activities. Johnson, Johnson and Holubec (1993) state that in cooperative learning students can maximize their own and each other's learning when they work together. Slavin (1996) argues that a critical element of cooperative learning is group team work and team goals.

In order to construct a lesson in cooperative learning model, the following 5 principles and elements should be included:

1. Positive interdependence

Each student in the same group has a unique contribution to make to the joint effort. Team members depend and rely on one another to achieve the goal. Each group member's effort is required and indispensable for group success.

2. Individual accountability

All students in a group must be accountable for contributing their own share of the work and mastering all of the material to be learned to the group's success.

3. Face-to-face promotive interaction

Although some of the group work may be parcelled out and done individually, some must be done interactively, with group members providing one another with feedback, challenging reasoning and conclusions, and perhaps most importantly, teaching,

helping, supporting, applauding and encouraging one another in order to reach the group's goals.

4. *Appropriate use of social, interpersonal, collaborative and small-group skills*

Students are encouraged and helped to develop and practice trust-building, leadership, decision-making, communication, and conflict management skills.

5. *Group processing*

Team members set group goals, describe what member actions are helpful or not, periodically assess what they are doing well as a team, and identify changes they will make to function more effectively in the future.

(Johnson & Johnson, 1999; Johnson, Johnson & Holubec, 1991; Kagan, 1994)

Systematically structuring those basic principles into group learning situations helps ensure cooperative efforts and enables the disciplined implementation of cooperative learning for long-term success.

Although the above basic principles of cooperative learning do not change, there are several modifications and variations of the model. The leading developers of cooperative learning include Robert Slavin, Roger and David Johnson, and Spencer Kagan, all of whom have slightly different approaches and emphases. Johnson and Johnson (1975) focus on developing a specific structure that can be incorporated into a variety of curriculums, with an emphasis on integrating social skills with academic activities. Kagan's work focuses on the use of many different structures to help facilitate active learning, group skills and team building. Slavin's work utilizes methods from both Johnson and Johnson, and Kagan, that has resulted in the development of specific cooperative learning structures.

What makes cooperative learning work?

According to Deutsh (1949); the effort of a student to reach his goal has,

a) a supportive effect in the cooperative case, and

- b) an obstructive effect in the competitive case, and
 - c) a neutral effect in the individualistic case
- on the other students.

Deutsch identified three windows through which students can view their peers—individual, competitive and cooperative. They can compete to see who is "best," they can work individualistically toward a goal without paying attention to other students, or they can work cooperatively with a vested interest in each other's learning as well as their own.

Of the three interaction patterns, competition is presently the most dominant. Research indicates that a vast majority of students view school as a competitive enterprise where one tries to do better than other students. This competitive expectation is already widespread when students enter school and grows stronger as they progress through school (Johnson & Johnson, 1991) Cooperation among students—who celebrate each other's successes, encourage each other to do homework, and learn to work together regardless of ethnic backgrounds or whether they are male or female, bright or struggling, disabled or not, is still rare.

There is a long history of research on cooperative, competitive, and individualistic efforts. Since the first research study in 1898, there are over 900 research studies have been conducted. The multiple outcomes studied can be classified into three major categories: achievement/productivity, positive relationships, and psychological health. The research clearly indicates that cooperation, compared with competitive and individualistic efforts, typically results in:

- (a) higher achievement and greater productivity,
- (b) more caring, supportive, and committed relationships, and
- (c) greater psychological health, social competence, and self-esteem.

In contrast to cooperative situations, competitive situations are ones in which students work against each other to achieve a goal that only one or a few can attain. In

competition there is a negative interdependence among goal achievements; students perceive that they can obtain their goals if and only if the other students in the class fail to obtain their goals (Deutsch, 1962; Johnson & Johnson, 1989). Norm-referenced evaluation of achievement occurs. The result is that students either work hard to do better than their classmates, or they take it easy because they do not believe they have a chance to win. In individualistic learning situations students work alone to accomplish goals unrelated to those of classmates and are evaluated on a criterion-referenced basis. Students' goal achievements are independent; students perceive that the achievement of their learning goals is unrelated to what other students do (Deutsch, 1962, Johnson & Johnson, 1989). The result is to focus on self-interest and personal success and ignore as irrelevant the successes and failures of others. Apart from that, adults often manage conflicts destructively. We tend to behave as we have been taught. A highly individualistic and competitive environment may lead to an inability to get along or manage conflicts constructively.

As cooperation has positive effects on so many important outcomes, while the other 2 efforts have quite a few defects, makes cooperative learning one of the most valuable tools educators have.

Theoretical perspectives on cooperative learning

While there is a general consensus among researchers about the positive effects of cooperative learning on students' achievement, there is a controversy about why and how they affect achievement and under what conditions they have these effects.

In earlier work, Slavin identified motivationalist, social cohesion, cognitive-developmental and cognitive-elaboration as the four major theoretical perspectives held by different researchers on the achievement effects of cooperative learning.

The motivationalist perspective presumes that task motivation is the single most impactful part of the learning process, asserting that the other processes such as planning and helping are driven by individuals' motivated self interest.

Motivationalist scholars focus especially on the reward or goal structure under which students operate, even going so far as to suggest that under some circumstances, interaction may not be necessary for the benefits of cooperative goal structures to manifest.

By contrast, the social cohesion perspective (social interdependence theory) suggests that the effects of cooperative learning are largely dependent on the cohesiveness of the group. In this perspective, students help each other to learn because they care about the group and its members and come to derive the benefits of self-identity from group membership.

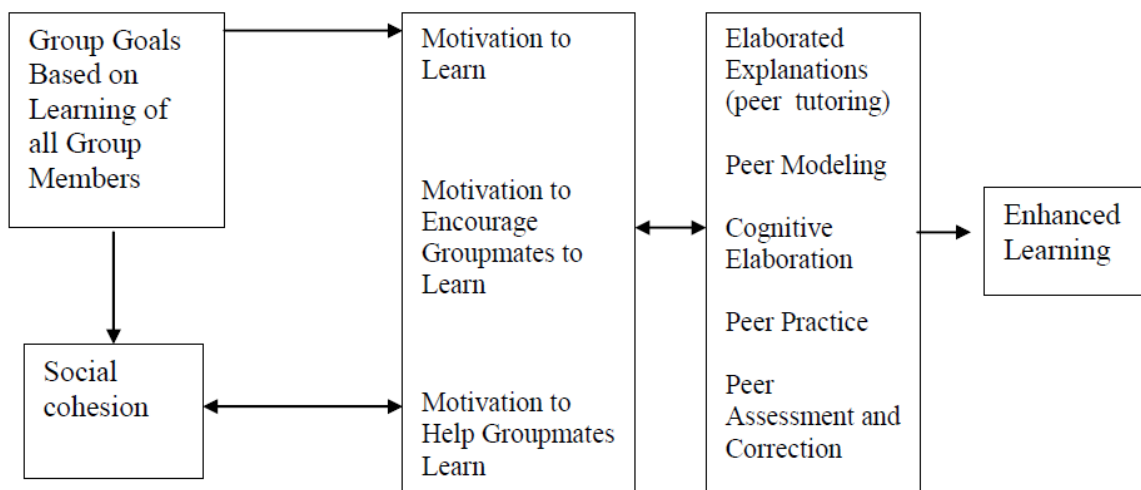
The two cognitive perspectives focus on the interactions among groups of students, holding that these interactions themselves lead to better learning and thus better achievement. Within the general cognitive heading, the cognitive developmentalists attribute these effects to processes outlined by scholars such as Piaget and Vygotsky. Vygotsky's work stressed benefits of collaborating with a more expert peer because what a student carries out jointly with another could be incorporated into his or her individual repertoire. Piaget's work stressed the benefits of cognitive conflicts among students that expose students' misconceptions and lead to higher-quality understandings. Work from the cognitive elaboration perspectives asserts that learners must engage in some manner of cognitive restructuring of new materials in order to learn them. Cooperative learning is said to facilitate that process.

The cognitive elaboration perspective instead asserts that learners must engage in some manner of cognitive restructuring (elaboration) of new materials in order to learn them; co-operative learning is seen to facilitate that process. Both the Johnsons (1993) and Slavin (1987) have developed frameworks that combine their motivational approaches with cognitive theories.

Slavin *et al.* (2003) have proposed a theoretical model intended to acknowledge the contributions of each of the major theoretical perspectives and the likely role that each plays in co-operative learning processes. They explore conditions under which each may operate, and suggest research and development needed to advance co-operative learning scholarship so that educational practice may truly benefit the lessons of thirty years of research.

A model of how co-operative learning might improve learning, adapted from Slavin (1995), depicting the main components of group learning interaction and representing the functional relationships among the different theoretical approaches. He graphs the relationship between group learning goals, motivation, and enhanced learning as presented in the Figure below. Group learning goals produce within team members the motivation to learn, encourage other members to learn, and motivate members to help each other learn. Within each member deeper learning occurs as a result of peer tutoring, practice, assessment and correction.

Figure. Integration of Theoretical Perspectives on Cooperative Learning Effects on Learning



Adapted from Slavin (2011). . Instruction based on cooperative learning. In R. Mayer (Ed.), *Handbook of research on learning and instruction*. London: Taylor & Francis.

This diagram of the interdependent relationships among the components begins with a

focus on group goals or incentives based on the individual learning of all group members. It assumes that motivation to learn and to encourage and help others to do so activates co-operative behaviors that will result in learning. This includes both task motivation and motivation to interact in the group. In this model, motivation to succeed leads directly to learning, and it also drives the behavior and attitudes that foster group cohesion, which in turn facilitates the types of group interactions - peer modeling, equilibration, and cognitive elaboration - that yield enhanced learning and academic achievement.

Advantages of using cooperative learning

Cooperative learning is supported by one of the strongest research traditions in education, with thousands of studies conducted across a wide range of subject areas, age groups, ability levels and cultural backgrounds. The result, in general, suggest that cooperative learning develops high-order thinking skills, enhances motivation and improve interpersonal relations as well as enhancing motivation and peer relations (Slavin, 1985). Students can be learning-independent, who can learn how to learn by their own in groups. This is crucial as 'learning how to learn' is what being emphasized in the education reform in Hong Kong. Most important is that cooperative learning exploits the diversified abilities of students to increase their cognitive, psychological and social performance, and as such, it is an effective way to address the problem of individual differences.

The following aspects are the expected benefits of adopting cooperative learning:

1) Learning for all

Cooperative learning makes sense in inclusive classrooms because it builds upon heterogeneity and formalizes and encourages peer support and connection. However, cooperative learning is not of value only to children with disabilities. Cooperative learning is of value for all students including those who have been identified as "at risk," "bilingual," "gifted," and "normal." All students need to learn and work in environments where their individual strengths are recognized and individual needs are addressed. All students need to learn within a supportive community in order to feel safe enough to take risks.

2) Academic achievement

In experimental-control comparison studies of the achievement effects of cooperative learning, most found significantly greater achievement in cooperative than in control classes. Group goals and individual accountability had to be present for these academic gains to be present. Research on behaviors within groups that contribute to learning gains has found that learners who provide and receive elaborated explanations are those who gain the most from the activities. (Slavin, 1990) Learners in cooperative learning classrooms liked the subject areas more than other learners. They also had developed peer norms in favor of doing well academically.

Critical thinking is stimulated and students clarify ideas through discussion and debate. The level of discussion and debate within groups of three or more and between pairs is substantially greater than when an entire class participates in a teacher led discussion. Students receive immediate feedback or questions about their ideas and formulate responses without having to wait for long intervals to participate in the discussion.

Using cooperative learning, students are continuously discussing, debating and clarifying their understanding of the concepts and materials being considered during the class. They are constructing their own knowledge base. The emphasis is on understanding the material as evidenced by the student's ability to explain ideas to their peers. This leads to a sense of content mastery versus a passive acceptance of information from an outside expert. This further promotes a sense of helplessness and reliance upon others to attain concepts.

3) Skilled communication

Researchers found that learners involved in cooperative learning activities developed skills for interpersonal communications more readily than learners who were in other classroom settings did. They were more considerate of others feelings, worked in cross-cultural situations more easily, liked their classmates and liked their teachers more than other learners. Researchers found that they developed friends from other cultures and kept these friends outside of class. They had positive expectations toward future interactions. They had more accurate understanding of others' perspectives. In conflict situations, they were more able to negotiate and solve conflicts in a win-win manner.

Bruffee (1993) researched the concept of learning taking place when individuals move from the society which they are familiar with to the society which they wish to join by learning the vocabulary, language structure, and customs unique to that society. Working collaboratively is an ideal way to facilitate the acquisition of language and to practice the customs of debate and discussion which occur in any particular academic field. Interacting collaboratively with the instructor in and out of class also facilitates the reacclimation process defined by Bruffee.

Social interaction skills are developed with cooperative learning strategies. A major component of cooperative learning elaborated by Johnsons, Holubec & Roy (1984) includes training students in the social skills needed to work collaboratively. Students do not come by these skills naturally. Quite the contrary, in our society and current educational framework competition is valued over cooperation. By asking group members to identify what behaviors help them work together and by asking individuals to reflect on their contribution to the group's success or failure, students are made aware of the need for healthy, positive, helping interactions when they work in groups (Cohen, 1994). Developing ways to manage conflict before conflict arises is an important part of this process.

4) *Psychological health*

Learners who were in classrooms with a significant amount of cooperative learning were psychologically healthier than learners who were not. They had higher self-esteem. Learners in cooperative learning classes have more positive feelings about themselves than do learners in traditional classes. Slavin (1990) also documented the findings that these learners had feelings of individual control over their own fate in school, their time on task was higher and their cooperativeness and altruism were higher as well.

Why do we use cooperative learning?

In General

Learners bring with them their own negative attitudes and prejudices. Population diversity is becoming more the norm than the exception in many places. When there is a mix of learners in the same class there is the potential to diminish negative attitudes and to develop positive ones depending how interaction is structured.

Cooperative learning structures can be used to develop constructive and supportive peer relationships.

Learning environment for the 21st century must be ones in which students should be actively engaged in learning activities and with each other. Students nowadays should be all-rounded in order to increase their competitiveness. Cooperative learning offers a proven, practical means of creating exciting social and engaging classroom environment to help students to master traditional skills and knowledge as well as develop the creative and interactive skills needed in today's society and economy.

In Hong Kong

In the curriculum reform of Hong Kong, the development of students' generic skills and cultivation of attitudes are very important task. Nowadays, our society requires people who can work cooperatively with the others in a team. So the Education Commission has said that learners need to develop 9 generic skills in school like personal skills, cooperative or teamwork skills. Teachers usually neglect the importance of developing students' personal and social skills as they see them as the responsibility of the home. With family life changing, many students do not develop skills at home. Therefore, it is the responsibility for teachers to help develop their generic skills. Through the use of cooperative learning, three of the generic skills can be greatly developed, which are collaboration skills, communication skills and study skills. Apart from that, as students in the same group are reply on each other in order to achieve a goal, some of the attitudes such as cooperativeness and open-mindedness can be cultivated.

Student-centered approaches are emphasized and promoted in the Education Reform. The most important and crucial reform is the paradigm shift of teachers. The idea of open, multi-dimensional and learner-centered approach has to be adopted and established in the everyday classroom, no matter in primary or secondary school. Also, with the new academic structure, the cultivation of high intellectual abilities, language proficiency, and the capabilities to contribute to the future economy of HK are

strongly emphasized. The University Grants Committee (UGC) in the year 2010 restated the importance of teaching as the primary role of higher education institutions in Hong Kong, learner-centered teaching approach is recommended to stimulate active learning among university students. Under the above circumstance, a student-centered instructional approach should be promoted. Cooperative learning, which has established itself as a practical alternative to traditional teaching, and has proven its effectiveness in hundreds of studies throughout the world, is one of the great choices.

How to apply cooperative learning? What are the methods for applying it?

Various cooperative learning methods and models have been developed over the years by different scholars and put into actual practice in the classroom. Cooperative learning methods fall into 2 main categories:

1) Structured Team Learning

It involves rewards to teams based on the learning progress of their members, and they are also characterized by individual accountability, which means that team success depends on individual learning, not group products.

2) Informal Group Learning Methods

It covers methods more focused on social dynamics, projects, and discussion than on mastery of well-specified content.

In the following, different methods of cooperative learning are being discussed: (See the table below)

Categories	Methods
Structured Team Learning	- Student Teams-Achievement Division (STAD) - Teams-Games-Tournament (TGT) - Cooperative Integrated Reading and Composition (CIRC)

<p>Informal Group Learning Methods</p>	<ul style="list-style-type: none"> - Jigsaw II - Learning Together - Think-Pair-Share - Group Investigation
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1) Structured Team Learning

Student Teams-Achievement Division (STAD)

STAD is appropriate to use in a wide variety of subjects including mathematics, language arts and social studies. It is most appropriate for teaching well-defined objectives, such as mathematical computations and applications, language usage and mechanics, geography and map skills, and science facts and concepts.

According to Slavin (1995), STAD consists of four steps:

- 1) Whole-class presentation
- 2) Group discussion
- 3) Test
- 4) Group recognition

- (1) Teachers present materials to the whole class with the aid of technology and questioning techniques as used in any other teaching methods.
- (2) Afterwards, heterogeneous teams of four are formed, based on students' performance level, ability, sex, ethnicity and social economic status, to study the materials and do the worksheets. Students work within their teams to make sure that all team members have mastered the lesson by questioning and giving elaborated explanations, as they know they are interdependent and accountable for themselves and the whole group
- (3) After the group discussion, all students take individual test on the material, at which time they cannot help one another. Usually, the quizzes are in the form of multiple-choice questions. Students test scores are compared to their own past averages, and points are awarded based on the degree to which students can meet

or exceed their own earlier performances. The difference between the test score and the base score is then checked against the Improvement Score Conversion Table (Table 1) to determine the individual improvement score which is then entered into the Test Score Sheet (Table 2).

Table 1. Improvement Score Conversion Table

Difference between test score and base score	Improvement score
Outstanding performance	15
More than base score by 10 or more	15
More than base score by 1 - 9	10
Equal to base score	5
Less than base score by 1 – 9	0
Less than base score by 10 or more	-5

Modified with reference to Slavin's work:

Slavin (1991). *Student team learning: a practical guide to cooperative learning*. Washington, DC: National Education Association.

Table 2. Test Score Sheet

Member	Date		
	Base score	Test score	Improvement score
Sam	80	94	15
David	90	98	15
May	79	79	5
June	40	60	15

Modified with reference to Slavin's work:

Slavin (1991). *Student team learning: a practical guide to cooperative learning*. Washington, DC: National Education Association.

- (4) These points are then summed to form team scores, the group with the highest average group improvement score receives a group reward. Alternatively, any group which has its group score reaching a pre-determined level can receive a group reward.

The whole cycle of activities, from teachers' presentation to team practice to quiz, usually takes 3-5 class periods.

It can be seen from Table 2 that the use of an improvement score allows members in different performance levels an equal opportunity to earn points towards the group score so long as they improve themselves over their past performance, irrespective of their actual score. Low achieving students could see their contribution to the group if they showed improvement in the quizzes. The success of STAD lies in the concept that each member has a common goal of doing well and obtaining the group reward. They will then do their best themselves and being eager to help the others.

Teams-Games-Tournament (TGT)

TGT uses the same teacher presentations and teamwork as in STAD, but replaces the test with weekly tournament game which does not use the system of improvement score.

Teams-Games-Tournament has 4 steps:

- 1) Whole-class presentation
- 2) Group discussion
- 3) Tournament
- 4) Group recognition

- (1) Whole-class presentation is the same as that in STAD
- (2) Group discussion is done as in STAD
- (3) After the above 2 processes, students are assigned to different ‘tournament tables’ according to their own performance in the past tournament. Each tournament table has three players with a similar past record and ability from different groups so that they can compete with others on an equal footing. Each player of a tournament table takes turns to ask and answer each other’s question from the game sheet. A player can take a card if he/she answers correctly. The other two players can challenge his or her answer. The challenger can take the card if the challenge is successful; if not, he or she has to give one card to the one being challenged. Games end when all the questions on the game sheet have been answered. Players will be awarded tournament points according to the number of cards they have won. For example, the one who has the most cards is awarded 60 tournament points while the one with the minimum number of cards is awarded 20. (See Table 3) The winner at each tournament table brings the same number of points to his/her team, regardless of which table it is, then add up to become the group tournament point.

Table 3. Tournament Point Conversion Table

Player (Position)	Different tournament point	Same tournament point		
		1 st & 2 nd	2 nd & 3 rd	All 3 rd
John (1 st)	60	50	60	40
David (2 nd)	40	50	30	40
Susan (3 rd)	20	20	30	40

Modified with reference to Slavin’s work:

Slavin (1991). *Student team learning: a practical guide to cooperative learning*. Washington, DC: National

Education Association.

(4) Group recognition is done as in STAD

In this way, low achiever (competing with other low achievers) and high achievers (competing with other high achievers) have equal opportunity for success and make the competition fair. As in STAD, high performing teams earn certificates or other forms of award. TGT is appropriate for the same types of objectives as STAD.

Several studies found that TGT has positive effects on achievement in mathematics, science and language arts. Also, the use of games in TGT contributes an element of excitement to this method.

Cooperative Integrated Reading and Composition (CIRC)

Developed by Slavin, CIRC is designed for use with specific materials for teaching reading and writing in the upper elementary grades.

CIRC comprises three major language activities:

- 1) Basal-related activities
- 2) Direct instruction in reading comprehension, and
- 3) Integrated language arts/writing

All students are assigned to teams composed of two pairs from two different groups. Each heterogeneous group is made up of a high ability pair and a low ability pair. In other words, while the pair is homogeneous in ability, the group is heterogeneous in ability. Different reading materials are assigned to the pairs according to their ability so that all members have an equal opportunity to succeed, irrespective of their ability. Though the pairs work on different materials, the pair with higher ability will help the low ability pair to learn. Scores will then be given to each member who has completed the three major languages activities. Each member's scores are counted towards the group's score each week. Rewards are given to the groups whose scores meet a required standard.

- (1) For effectively conducting basal-related activities, the whole class is divided into two reading groups, one in high ability the other of low ability. Teachers select suitable readers for each group and introduce the story to the groups separately. In the introduction, teachers perform a series of tasks, for example, introducing the characters and main theme of the story, teaching the skills of word attack and making predictions about the story. After that, students go back to their heterogeneous groups to work in pairs on a series of cognitively engaging activities, including reading to one another, summarizing stories to one another, writing responses to stories, and practicing spelling, writing, decoding and vocabulary. During pair work, the low ability pair is encouraged to seek help from the high ability pair when they face difficulties. Afterwards, each pair will check the partner's work and enter the record of what they have done. At the end of the week, students take a test to assess their understanding of the stories, their use of vocabulary and their skills of reading aloud. The test scores and evaluation of the story-related tasks of each member will be added together and carry a major weighting of the weekly group scores.

- (2) Teachers also give direct instruction in reading comprehension skills to the whole class once a week. These skills focus on skills of decoding, analyzing, synthesizing and drawing a conclusion from stories. After the whole-class activities, students stay in their heterogeneous group to complete a set of reading comprehension worksheets together, followed by working on another set of papers individually. These reading comprehension skills enable students to do reading independently every day as homework. Students can borrow English story books from school library to do independent reading at home, say for example, 30 minutes. Their parents are asked to sign a form to prove their children have completed the task every night. Each student is required to submit a book report at least every 2 weeks. Students can gain points for his/her group by handing in the book report and the parent's form.

(3) For integrated arts and writing, teachers also give direct instruction in writing skills to the whole class once a week. These writing skills focus on aspects such as syntax and usage of the language to help students write English which is free from grammatical errors. After the whole-class instruction, students stay in their heterogeneous groups and each chooses a topic to write an individual composition. Students draft their composition after they have consulted group members. After finishing their drafts, they give them to their peers for comments and correction of grammar errors. They can also consult teachers in case the members in higher ability are in doubt. At last, they share their composition with the others.

Research on CIRC has found positive effects in upper-elementary and middle school reading.

2) Informal Group Learning Methods

Jigsaw II

Jigsaw was originally designed by Elliot Aronson and his colleagues in 1978. Slavin (1994) developed a modification of Jigsaw by adapting Elliot Aronson's technique. It is appropriate to use in subjects like language, literature and social studies in which the learning materials are in the written narrative mode.

Jigsaw II has 5 steps:

- 1) Reading
- 2) Expert group discussion
- 3) Home group reporting
- 4) Testing, and
- 5) Group recognition

In general, materials to be learned are divided into 4 parts with guiding questions. Students work in four- or five-member team as in STAD and TGT. Each pupil in a group is assigned to focus on reading one part of the materials. After the reading, pupils in different groups with the same focus of learning materials form an expert

group to discuss the materials. After the discussion task, each member becomes expert of the materials on which he/she focuses, and takes turn to teach the other members in the same group until they have mastered all the materials. Then students take individual quizzes, which result in team scores based on the improvement score system of STAD. The group with the highest average group improvement score receives a group reward. And any group which has its average group improvement score reaching a pre-determined level can receive a group reward.

- (1) Each student being assigned a particular section of text, which can be a reading comprehension passage, short story, biography or a chapter from a book. For groups of four, the expert sheet consists of four questions each of which focuses on one of the four themes of the reading materials. Every member of each group is responsible to answer one of the questions in the sheet from reading the relevant parts in reading materials. Questions in the expert sheet can be randomly assigned to the group members. Every student reads the relevant materials alone. Alternatively, the reading of the materials can be done as homework prior to coming to class to save lesson time, if the materials are lengthy.
- (2) Students working in the same question in the expert sheet for man expert group. Four expert groups are thus formed. Students with the same topics meet in expert groups to discuss them. In order to facilitate discussion, guiding questions can be provided to each expert group. Every member is encouraged to take notes of what they have discussed so that they can teach their teammates in their home group after the discussion. Whenever a problem arises, students should try to find their own solution before seeking help from the teacher. Conflicts should be resolved using different social skills. Depending on the type of questions, it may not require a group consensus for the question discussed.
- (3) Then, students go back to the home group from the expert group to teach one another the things they have discussed. They are reminded to help each other to master the materials as much as possible. Teachers can conduct a short whole

class discussion after the teaching task in all home groups ended. The aim of the class discussion is for clearing up doubts, if any, as well as for provoking further discussion of the topic.

- (4) Students take an individual short test of quiz after mastering the reading materials. Immediately after the test, members exchange their paper for marking, referring to an answer sheet provided by the teacher. The score of each student is entered under the column of test score on the group score sheet. The test scores are then computed as improvement scores by comparing with each member's base score that represents his/her past performance, as in STAD.
- (5) The group with the highest group improvement score or with score reaching a pre-determined level can receive a certificate or group reward.

Since the only way students can learn sections other than their own is to listen carefully to their team members, they are motivated to support and show interest in one another's work. Jigsaw II is primarily used in social studies and other subjects where learning from text is important.

Learning Together

David Johnson and Roger Johnson developed the Learning Together models of cooperative learning (Johnson and Johnson, 1998). The model is characterized by the 5 elements of cooperative learning:

- 1) Positive interdependence
- 2) Individual and group accountability
- 3) Face-to-face promotive interaction
- 4) Interpersonal and small group skills
- 5) Group processing

In the model, students working on assignments sheet in four- or five- member heterogeneous groups. The groups hand in a single sheet and receive praise or rewards

based on the group product.

This method emphasizes team-building activities before students begin working together and regular discussions within groups about how well they are working together. Numerous relatively brief experiments have shown positive effects of these approaches.

Think-Pair-Share

Kagan (1989) developed the Structural Approach based on using ‘structure’ which are defined as ‘content-free ways of organizing social interaction in the classroom. Structures usually involve a series of steps, which prescribed behavior at each step’. These content-free structures provide teachers with frameworks to be applied to any subject matter. The structure has different learning outcomes. Teachers can choose the appropriate structure or a combination of structures to match their teaching objectives or intended learning outcomes and apply them to a lesson in an appropriate sequence.

One of an easy-to-use cooperative learning structures is Think-Pair-Share which consists of 3 steps:

- (1) For example, in a reading comprehension lesson, each student is asked to do silent reading on the comprehension material or passage and to try to answer the questions provided by teachers.

- (2) After working individually for an answer, students pair up and share their views on the questions until they have consensus on an answer. During the sharing, half of the class is practicing the skill of speaking; while the other half is practicing the listening skill. Kagan and Kagan (1994) call this simultaneous interaction because ‘it increases the number of students actively involved at any one moment and thus the amount of active participation time per student’.

- (3) The students share their answers with the whole class.

Group Investigation

Group investigation, developed by Shlomo Sharan and Yael Sharan in 1992, is a general classroom organization plan in which students work in small groups using cooperative inquiry, group discussion and cooperative planning and projects. Moreover, it is said to be one of the most student-centered methods as students have much freedom to choose their topics of interest for investigation, plan and carry it out, present and evaluate the results.

As group investigation is most suited for investigating problems which can have different solutions, it helps develop students' higher order thinking skills. In this respect, group investigation is often used in doing group projects in various key learning areas, for example English language and literature. It can also be used in cross-curricular group projects.

According to Sharan and Sharan (1994), the implementation of group investigation has 6 stages:

- 1) Determining subtopics and organizing into groups
- 2) Planning investigation
- 3) Carrying out investigation
- 4) Planning a presentation
- 5) Giving a presentation
- 6) Evaluating achievement

(1) The teacher discusses with the whole class on a topic or a unit in textbook, for example, pollution. During the discussion, subtopics such as air pollution, land pollution, light pollution, noise pollution and water pollution are identified. Students who are interested in working in the same subtopic can form groups together and develop questions for investigation. Sometimes, teacher may need to intervene in order to strike a balance between the heterogeneity of the group and the interest of students. The most appropriate number of students in a group is 4-6.

- (2) Students plan together, in concrete terms, what they want to investigate and develop their research questions related to the subtopics they have chosen.

Examples of questions are:

What are the sources of noise pollution?

What can the government do to alleviate the problem?

How can the HK community help to minimize noise pollution?

Then they have to decide how to tackle the research questions and think of some ways to collect those relevant materials, information and resource. For example, finding information from books, newspapers or internet, collecting field notes, interviewing or administering questionnaires are some of the ways. Then they have to divide the work among individual members or pairs.

- (3) Each student or pair of the group carries out the investigation of their assigned work. They have to apply their application, analysis, synthesis and evaluation skills to work through the information collected. Though each of them has their own work, they have to work closely together and help the other group mates whenever possible. Sometimes, it is the responsibility of teachers to teach them different social skills to facilitate their cooperative work. When members have completed their work, each of them has to write a summary of their findings which contribute to the group's findings.
- (4) The groups have to plan how to present their findings to the whole class. It requires the students to select those important facts from their investigation and present them in a clear and concise way so that all the students in the other groups can learn from them. In order to facilitate the presentation, a steering committee can be formed from the representative of each group for coordination. The committee listens to what and how the groups present and then give advices to them for improvement.

- (5) Groups make their public presentation in class. Teacher may consider to teach students the relevant presentation skills, such as speaking clearly and concisely, capturing and maintaining the attention of the audience by avoiding long lecturing, as well as involving the whole class in tasks for interaction.
- (6) The achievement of each student and the group can be assessed. A quiz can be set to assess individual knowledge. The test is made up of the questions that are prepared by each group according to their subtopic investigated. The question should not only test factual information, but also higher-level thinking skills of students. Teachers can also assess the students by observing them in the process of working on the projects as well as assessing the final project report as the product. Furthermore, teachers can also ask the students to undergo self assessment and peer assessment.

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