

Traditional Teaching Strategies versus Cooperative Teaching Strategies: Which Can Improve Achievement Scores in Chinese Middle Schools?

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Abstract: This study examines two teaching styles in Chinese middle schools, traditional lecture-based and cooperative learning. The study uses simple descriptive statistics to analyze economic status and achievement scores for both strategies in four Chinese middle schools. There were 145 randomly selected middle school students involved in the study. The results showed that the participants in the traditional lecture-based group obtained higher achievement scores during the course of the semester. The paper concludes with some discussion about the application, implementation and recommendation of traditional and cooperative learning and their impact on educational leaders, school improvement, educational policy, and educational reforms.

Key words: traditional teaching strategies cooperative teaching strategies achievement scores

1. Introduction

As Chinese educators and administrators move into the 21st century, it is important for some of them to try new teaching strategies other than the traditional methods. Traditional Chinese instruction places emphasis on the lecturer and deep learning through memorizing (Marton, Dall'Alba, & Tse, 1996). Cooperative learning strategies demand a facilitator that transfers greater responsibility for knowledge acquisition, organization and application from the teacher to the student (McKeachie, 2002). Traditional and Cooperative learning strategies have been studied for many years, but few studies have been conducted that examine the impacts of both teaching strategies on Chinese middle school students (Messier, 2003). This study provides data and perhaps valuable insights to help administrators, leaders and principals with decision-making.

The choice to integrate western cooperative learning strategies into an educational program that is committed to more eastern traditional style of teaching has its problems. Firstly, the school commits their instructors and administrators to a challenging task. Cooperative learning represents a major paradigm shift in focus from what is being taught to what is being learned. Secondly, this shift in focus and accountability is not an opportunity for the instructor to step back and let things happen. Thirdly, at its finest, very little would get done on the learning level; at its worst, it could result in real loss for the student's comprehension of cooperative work. For cooperative strategies to work, careful planning, inconspicuous observation and evaluation, and preplanned adjustments (alternative activities) are essential to help learners move consistently forward (Hardwick, 2000).

Effective cooperative teaching strategies are somewhat different from traditional teaching strategies because they require increasing accountability between individuals. Each participant does a fair share through active participation with cooperative social skills and successful and appropriate communication skills that bring task to completion. Western research shows that such cooperative learning practices lead to more efficient and effective

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processing increased achievement, positive relationships among students, and efficient exchange of information (Johnson, Johnson & Smith, 2000). The closer, more frequent student-teacher interaction that is inherent in cooperative learning provides teachers occasions for reflective examination of individuals and groups, evaluation of their learning dynamics, and adjustment of instructional plans to achieve the best learning experience for all students. The direct communication between teacher and student increases teacher satisfaction and gives students a greater sense of partnership with instructors in the learning process, as well as increasing cognitive, social, and emotional benefits (National Commission for Cooperative Education, 2003).

In most cases, eastern learning preferences differ from western learning preferences in that there is an important tendency of the Chinese to believe in knowledge and the power of memorizing, which will lead to understanding (Marton, Dall’Alba, & Tse, 1996). Other differences in learning preferences include pupils preferring to work alone rather than in groups, not being asked, or asking questions, to present no overt challenges to authority, and the belief that there is not much value in peer discussion (Tang, & Williams, 2000). The two fundamental reasons for these expectations and attitudes with regard to Chinese education are the respect for superiors and the loyalty to social piety (Pan, Chaffee, Chu, & Ju, 1994).

Today there is an added emphasis on improving goals and outcomes in education. As in most cases around the world, skilled instructors, principals and administrators will continue to search for effective and reliable instructional strategies. In China, the lecture is a traditional, common, and familiar teaching technique and can be fairly effective, especially when a lecturer is well prepared for an oral presentation on topics he/she is qualified to teach. If executed correctly, cooperative learning teaching strategies can also provide fairly effective learning outcomes. Today, little is known specifically about how western cooperative learning affects the academic achievement of Chinese middle school students. This study presents the research findings from an investigation of 145 participating middle school students regarding the question, “In Chinese middle schools which is more effective for students, the traditional lecture-based teaching strategies or cooperative teaching strategies.”

2. The Study

The major goal of this study is to share the findings about effective teaching strategies with the participating Chinese schools in Macau, China. Four Chinese middle schools participated in this study during the summer of 2004. English as a second language was the chosen subject. Ten equally skilled university students from the Faculty of Education (University of Macau) were trained to teach the pupils by two teaching methods: traditional lecture (control group) or cooperative learning (treatment group). Each participating school was randomly assigned two sections of students (control and treatment) and two assigned teachers who taught only the traditional style or the cooperative learning style. For all the students, total instructional-contact time was 50 hours. A total of 15 lessons (lesson plans, handouts and presentations) on grammar basics were designed and equally shared so that there were no differences between the teaching content for the treatment and control groups. Each lesson lasted approximately 2.5 hours, five days a week for four weeks.

3. Methodology

This study was limited to 12-15 year old students (primary 5-7) who were enrolled in the Instituto Salesiano, the Keang Peng School, the Macau Baptist College (middle school) and the Tong Nam Middle School. All of the students (treatment and control groups) were randomly assigned from a summer school list and randomly

allocated into two sections per school. Each middle school's section started out with approximately the same number of students, 36-42 (a normal class size for students in China). An anonymous survey was developed and implemented the first day of class to gather information about each student's background and demographic factors. Also, on the first day students were pre-assessed and evaluated on grammar basics. Throughout the semester, four evaluation assessments and one final exam were designed and equally shared so that there were no differences between the assessment content for the treatment and control groups. The four assessments (50% of the final grade) were given on every Friday covering previously learned material. The format of the four assessments included fill-in-the-blank as well as multiple-choice questions. On the last day of class both treatment and control groups were given the same final exam (50% of the final grade), which comprehensively evaluated the semester's work. Since there are many different types of schools (K-12) independent from Macau's government schools, there is no designated Macau school system. Therefore, Macau does not have standardized ESL base-line test scores. For this study, pre-assessment grade scores were used for the base-line data. The assessment exams were designed to test concepts in grammar basics covered during the participants' middle school years.

All instructors were randomly assigned from a list of interested teachers and then evaluated for teaching ability. The selected instructors scored well on the following criteria: academic skills (interpersonal skills, public speaking skills, and enthusiasm for working with students), instructors teaching in the field of their training (has a specialization in the field taught/English grammar), and on how well the instructors performed on their induction training program for both control and treatment groups. The induction-training program trained teachers equally in quality and quantity for both treatment and control groups. Teachers who used the cooperative learning method were trained to teach pupils in groups of three or four. These teachers were also taught to make each group member responsible for a unique part of the group's task and to have students be individually responsible for their own learning. Further, the cooperative learning teachers were given examples of how students can learn from each other in many ways: by giving and receiving help, by recognizing and resolving contradictions between their own and other students' perspectives, and by internalizing problem-solving processes and strategies that emerge during group work (Messier, 2003). Teachers who used the traditional lecture were also trained in induction workshops to make sure that each instructor was well prepared to present qualified lectures on each grammar lesson. All instructors for the treatment and control groups were given the same content materials (PowerPoint slides, handouts and other teaching materials) and used them equally so that there were no significant differences between teachers. Teachers were randomly selected to teach at the four middle schools.

To answer the hypothesis question, "Can traditional lecture-based strategies be more effective than cooperative teaching strategies in Chinese middle schools?" A simple descriptive analysis was done to determine differences between treatment and control groups. The hypotheses are:

Null hypothesis (**H₀**): The control group is less than or equal to the treatment group.

Alternative hypothesis (**H_a**): The control group is greater than the treatment group (our objective).

Although this study is not representative of a large sample, its real value is that other educators and administrators can gather useful information from it. Tables and charts were created to show the demographic factors and any improvement in scores for treatment and control groups.

4. Demographic Data

Analysis of randomized experimental data does not require controls for background characteristics. Such controls are necessary only when one doubts that the experimental data are truly random (Trochim, 2002).

Although western research data suggests that economic status, parental control and other social economic variables can create gaps in student performance (Barton, 2003, Blank, 2003), the demographic data set for this study may be of interest to the participating Chinese middle schools administrators in Macau, China. All participants were required to fill in a pre-designed demographic questionnaire. The demographic survey garnered 145 completed questionnaires. After collecting the data, not all students answered every question, however, the data collected could provide valued information to the decision makers at the schools involved.

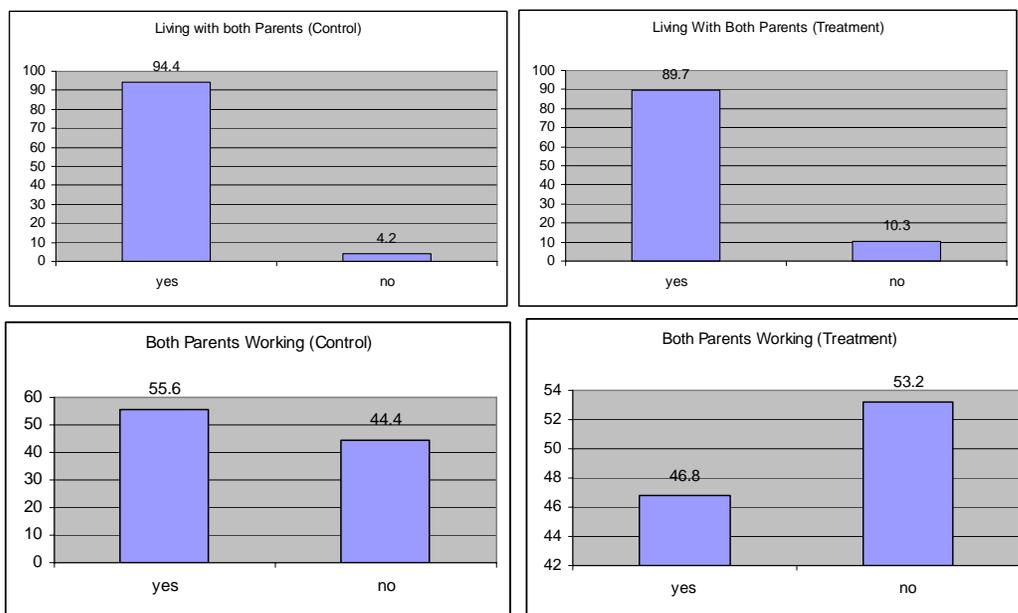
Of the 145 students who started the program 50 participants dropped the course, which leaves a sample of 95 students. All 95 students finished the semester studying basic grammar. From the background data, all of the respondents were Chinese nationals and were either born in Macau (Portuguese-Chinese) or other Chinese provinces or special administrative regions (SAR) and moved to Macau. 80% of the respondents were born in Macau, 16% in China, and 4% in Hong Kong. Most of the respondents lived with both parents while 4% - 10% lived with just one parent, with 1% of the students who did not answer some of the questions.

The student demographic data per school in our treatment and control samples are presented in the first five columns of Table. Chart 1, also helps describe the demographic data for both treatment and control groups. In columns (2) and (3) of Table 1, both treatment (90%) and control groups (94%) had large numbers of participants living with both parents. Columns (4) and (5) of table 1, show that the treatment group (47%) had a lower number with both parents working than the control group (56%).

Table 1: Middle Schools Student Background and Demographic Factors for Control and Treatment in Percent

(1) Yes/No	(2) % Living with both parents (Control)	(3) % Living with both parents (Treatment)	(4) % Both parents work (Control)	(5) % Both parents work (Treatment)
Yes	94.4	89.7	55.6	46.8
No	4.2	10.3	44.4	53.2

Chart 1: Middle Schools Student Background and Demographic Factors for Control and Treatment in Percent



5. Achievement Results

The results reported are from a randomized field study on academic achievements between cooperative learning and traditional lecture-based teaching strategies within Chinese middle schools in Macau. Although all of the respondents were Chinese nationals, either born in Macau or other Chinese provinces or special administrative regions; this study finds that some students who participated had different backgrounds and demographic factors. Further research may be needed to identify more precisely social economic variables affecting student achievement. When interpreting the results below, it should also be noted that there are many aspects of the level and quality of educational resources that may influence student performance, of which teaching method is only one.

Table 4 presents combined descriptive statistics of the dataset. Column (5) describes the standard deviation of the between-grade difference in both treatment and control groups at 3.5. Column (6) shows the combined negative P-value at -1.145. As is evident from Table 4, columns (1) and (2), overall mean scores were higher in the control group (68) than the treatment groups (65). However, the P-value for the t-test was 0.128 and the F-test was 0.973.

In the columns of Table 3, actual average scores and statistical data are reported for each middle school. In Table 3, column (7), the P-values for the T-test for all individual schools are as follows: Instituto Salesaino (0.090) and Tong Nam’s (0.421), Macau Baptist (0.400) and Keang Peng (0.258) show the equality in control and treatment population variances. Also, Table 4, column (8) also indicates this equality of variance for the control and treatment groups at 0.128.

In column (6) of Table 3, the T-values for Instituto Salesaino (-1.108) and Tong Nam’s (-0.852) were negative. Conversely, Keang Peng (.202) and Macau Baptist (.212) show positive T-values. In column (5) of Table 3, standard deviations for both schools’ treatment groups Tong Nam, (9.2) and Instituto Salesaino, (8.2) are lower than the standard deviation for the schools’ control groups, Tong Nam, (16.9) and Instituto Salesaino, (14.7). Also, as noted, both treatment groups’ standard deviations were higher for Macau Baptist (15.6) and Keang Peng’s (19.8) than Macau Baptist (6.0) and Keang Peng’s (13.1) control groups. Column (9) of Table 3 shows the break down of the averaged pretest scores for treatment and control groups at each school. The Macau Baptist Middle School (35) and the Tong Nam Middle School (35) had the lowest pretest averages, while Instituto Salesaino Middle School (51) and Keang Peng Middle School (51) had the highest averages.

Table 3: Itemized Semester Scores and Statistical Data of Cooperative Learning vs Lecture-Based Learning

(1) Middle School	(2) (Control) Average Scores (N)	(3) (Treatment) Average Scores (N)	(4) Sample Size (N)	(5) Standard Deviation (C) (T)	(6) t-value	(7) p-value for t-test	(8) p-value for f-test	(9) Pretest
Instituto Salesaino	69.7 (28)	64.7 (12)	40	14.7, 08.2	-1.108	0.090	0.095	50.5
Keang Peng	71.9 (11)	73.3 (12)	23	13.1, 19.8	0.202	0.421	0.244	51.0
Macau Baptist C.	52.7 (7)	54.1 (10)	17	06.0, 15.6	0.259	0.400	0.043	34.6
Tong Nam	70.6 (5)	65.0 (10)	15	16.9, 09.2	-0.852	0.258	0.160	35.1

Table 4: Combined Statistical Data of Cooperative Learning vs Lecture-Based Learning

(1) (Control) Traditional Average Scores	(2) (Treatment) Cooperative Average Scores	(3) Sample Size	(4) Standard Deviation (C) (T)	(5) Std. Error Difference	(6) t-value	(7) p-value for the f-test	(8) p-value for the t-test
68.2	64.7	95	14.5, 15.3	3.500	-1.145	0.973	0.128

6. Generalization and Discussion

One must qualify any generalizations from the result of this single study to the population of the four middle schools in Macau. Only a small fraction of Macau's pupils were studied. A larger-scaled vigilant research study that would involve many more schools and children over a longer time frame within Macau's middle schools could conceivably have quite different educational outcomes.

School systems around the world differ in many respects. How ESL standardized base-line data is gathered is a good example, a common practice in the United States and other countries, yet in Macau, China (due to many independent schools), not a practice valued as important or practical. Gaps in social economic conditions are evident in different schools around Macau as Table 1 indicates. Chart 1 indicates that in the control group over 55% of the students had both parents working while the treatment group had over 53%. A small percentage of control (4%) and treatment (10%) groups did not live with both parents. As noted by the western research, this could affect student achievement scores (Blank, 2003). Many school districts around the world are just starting to at least identify that race, income, teacher performance and parent involvement can affect a student's achievement (Barton, 2003). Studies in the United States conclude that social economic gaps can affect achievement scores of some students (The Teaching Commission, 2004, Barton, 2003, Blank, 2003).

Variation in learning preferences is another difference for schools in Macau. Teachers encourage memorization, and many teachers put less value on students, cooperatively learning, working in groups and students asking questions from group settings. All of these variables could have significant effect on academic achievement in school system.

Given these differences, it is not obvious that findings from any particular school or study translate directly into general principles for other school systems to follow. The data collected met stringent requirements, including the random sample of students with similar demographic background, age, instructional-content, grade-level as well as using the same achievement tests. A good deal of time was also taken to make sure that the curriculum framework was set up to ensure that the test content was appropriate and reflected students' current curriculum for both the treatment and control groups. It is very difficult to control the enthusiasm and style of each teacher, therefore some groups may have a more motivated teacher while other groups may not. In the future, perhaps having the same teacher instruct both treatment and control groups can help. Also, many of the treatment teachers lacked training in or personal experience with cooperative learning and were more comfortable using the control method of instruction. Further study using the same instructors over several semesters could prove useful to determine if cooperative learning mixed with traditional learning could benefit student's achievement.

In certain western research studies on achievement and demographic backgrounds (Barton, 2003, Blank & Shah, 2003, The Teaching Commission, 2004, National Assessment Governing Board US, 2002), there are certain factors that affect achievement in the classroom and what happens outside the classroom is just as important as what happens inside. A November, 2003 report by the Educational Testing Service, a research group in Princeton, New Jersey, USA, looked at fourteen factors that may influence student achievement, including nutrition, teacher experience, class size, school safety, television/game use and parent support (Barton, 2003). Barton, 2003, infers that parent support is one of the key factors for student success in the classroom. If we compare some of the demographic data and the students' achievement scores, Table 4, columns (1) and (2) show the control group with higher average achievement (66%) then the treatment group (64%). In this study, the treatment groups had a higher percentage of students with both parents working and a higher percentage of students's who were being

raised by a single parent. Could these demographic variables affect student achievement in Macau's middle schools? One could infer that student's in the control group's could have an advantage over the treatment groups. One could also infer that in some middle schools in Macau, a student's economic status has some influence on academic performance. The data in this one study suggests a possible link to achievement and social economic conditions. Although further generalizations are beyond the scope of this study, it may be of some importance to educational leaders in Macau to model this investigation and do further research on social economic factors and achievement scores.

Except for the Keang Peng and Macau Baptist middle school, all control groups achievement scores were higher than the treatment groups' scores. Instituto Salesaino (70) and Tong Nam (71) control group's had higher achievement scores than the counterpart treatment groups, Instituto Salesaino (65) and Tong Nam (65). An interesting note about some schools in Macau, some are very old and well established in society, most notably are Instituto Salesaino and Tong Nam. These well established schools have been around a long time and are very traditionally based. These schools do not change their rituals or teaching strategies very often. Also, schools like Instituto Salesaino and Tong Nam receive pressure from past students and parents who send their children there expecting instruction and rituals to be the same. Any deviation in instruction or tradition is deemed experimental and unacceptable. Some of these traditional-based schools in Macau will have higher admittance standards and limit how many students can enter their schools. As a result, competition from parents to have their children go to the same school as they did is strong. This practice influences achievement at certain schools in Macau with more students with stronger attitudes and capabilities in subjects like math, science and English entering the school's programs (Messier, 2003).

In column (9) of Table 3, pretest average scores for all the schools were significantly lower than the final scores. From these averages, Macau Baptist (35) and Tong Nam (35) had the lowest scores while, Instituto Salesaino (51) and Keang Peng (51) had the highest pretest scores. All 95 students who completed the program seemed to improve their achievement scores. The students who dropped-out of the program may have a lower interest rate in learning English as a second language leaving behind the students who did. Further, as Table 3, columns (2) and (3) shows, all schools experienced drop-outs with Tong Nam and Macau Baptist experiencing the most and Instituto Salesaino experiencing the least. Very interesting, each school's treatment groups had more students completing the program than their control groups, as Table 3, columns (2) and (3) also indicates.

Administrators and educators who seek out new teaching techniques that empower students to be more responsible may want to explore cooperative teaching methods for their pupils. This exploration is being done in Singapore, Hong Kong and Taiwan (Tang & Williams, 2000). For many traditionally based schools in Macau, parent pressure and lack of resources may prevent new teaching strategies from being explored. While it is clear that certain traditionally based teaching strategies can provide higher achievement scores (Marton, Dall'Alba, & Tse, 1996), it is hoped that additional research studies will be done in Macau to establish if cooperative learning is also an appropriate teaching method for their schools.

7. Conclusion and Recommendation

As a consequence, this study provided a unique opportunity to examine traditionally lecture-based schools in Macau, China. The results from the data show that the mean score of the control group is not significantly higher than that of the treatment group in each of the four schools and the same conclusion is found for the combined

statistical data as seen in Table 3 and Table 4. Therefore, the Null hypothesis (**H₀**): The control group is less than or equal to the treatment group is accepted. The Alternative hypothesis (**H_a**): The control group is greater than the treatment group is rejected.

Overall achievement scores were higher in the traditionally lecture-based groups (control) than the cooperative lecture groups (treatment). Table 4, columns (1) and (2), indicates that the control group's overall average grade (68) was higher than the treatment groups (65). In Table 3, columns (2) and (3), individual school's achievement scores were mixed between Keang Peng and Macau Baptist and Instituto Salesaino and Tong Nam. Keang Peng (73) and Macau Baptist (54) treatment groups had higher achievement scores than Instituto Salesaino (70) and Tong Nam (71), who had higher scores from the control groups. In Table 3, columns (2) and (3) indicate, at Instituto Salesaino, there is a 5 unit difference in achievement scores between the control and treatment groups, and this could reject the null hypothesis. However, the chance of error is very high at 0.25%, the p-value is greater than 0.05 and the sample size is small, therefore, the null hypothesis cannot be rejected. All p-values were high except at the Macau Baptist School (0.043). Possible reason for this is allowing different instructors to teach both control and treatment groups. If the same instructor teaches control and treatment groups, student achievement could be better represented. Also, although all the instructors were randomly assigned from a list of interested teachers and then evaluated for teaching ability, some qualified teachers for both control and treatment groups may not have diligently practiced or effectively applied the induction training, therefore contributing to this bias.

With 145 students starting the program and 95 students finishing the program, fifty students had dropped the course. Among all the schools, Macau Baptist and Tong Nam had the highest student dropout rate, as Table 3, columns (2) and (3) indicate. The high dropout rate could also be from the teaching style or attitude of the instructors. Further improvement in keeping students from dropping-out will be needed in future studies. As mentioned, improved induction training strategies could help solve this problem.

While numerous western studies show the benefits of cooperative learning pedagogy (Council for Exceptional Children, 2003, Doo, 2000, Hardwick, 2000, Kemery, 2000, The National Center for Education Statistics, 2003 and Thousand, 2001), certain instructional strategies and factors must be met for it to be a rewarding experience or accepted in a traditional-based program. A skillful facilitator, capable of balancing guidance with flexibility, is one crucial factor. Another is student groups with the skills, both technical and social, to truly collaborate in the learning process. When those crucial factors as well as other pedagogical issues come together in a learning setting, collaborative learning can result in a product exceeding the expectations of the teacher. Presently in Macau, training of teachers in the use of cooperative learning is viewed experimental and not accepted by many educational leaders when comparing it to traditional-based learning. Further, resources and community pressures have slowed the progress of experimental teaching strategies in Macau. For now, traditional teaching methods work, educators and administrators feel the pressure from parents to succeed and experimental teaching methods could prove too costly and time consuming for that success. It is hoped that educators who read this study will try cooperative learning as one of their tools in class. As educators seek to make future decisions about using new teaching methods, it is hoped that parents, administrators and faculty alike will support each other for its success and gain valuable perspectives and insights for the decision process.

In the early years of the new millennium, in every country, the imperative to improve educational achievement is increasing, at the same time, the world in which young people and adults are being educated is changing radically. Education and the tasks and responsibilities of educational leaders, faculty and administrators are changing and becoming more demanding. The use of new teaching methodologies, the growth of knowledge

economy, the need to safeguard the environment, increasing insecurity (social, political and economic), are all changing the nature and purpose of education. These changes have important implications for all educational leaders, faculty and administrators. Consequently, the all work of researchers in gaining new understandings of the ways in which schools adopt new teaching methodologies is the more significant. Gaining new understandings in education may require researchers and administrators to improve existing methodologies or to create new approaches to their pedagogy, outside the classroom as well as inside.

For this study, research reports and recommendations were administered to the four participating middle schools and the Department of Education and Youth, to stimulate Macau's exploration into future pedagogical research and projects. Demographic data and the findings about this study were also presented in table and HTML format. All participants were presented with a CD resource kit that included pedagogy reports resources about the study.

The pedagogical report highly recommended that:

- Further long-term tracking of students and teachers using cooperative learning and traditional learning strategies could prove useful to administrators and educational leaders.
- Macau's Department of Education and Youth establishes research centers of data collection for student achievement.
- Demographic students' databases are created and shared among school administrators and education leaders.
- Macau's research centers explore and share scientific research studies about teaching and learning strategies and student achievement.
- All schools in Macau create a educational council to effectively and fairly create and share database information on teaching strategies and achievement
- All schools in Macau create a teaching and learning research database network for the effective implementation of new research, pedagogical methodologies and sharing of information.

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