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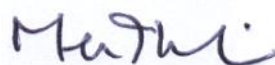
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THE UTM STUDENTS' PERSPECTIVE ON COOPERATIVE LEARNING

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A dissertation submitted in partial fulfillment of the requirements for award of the  
degree of Master of Education (Chemistry)

Faculty of Education  
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MAC 2006

I declare that this dissertation entitled “The UTM students’ perspective on cooperative learning” is the result of my own research except as cited in the references. The dissertation has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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## DEDICATION

Especially to mum and dad, sister Sheela, brother Premanan, junior girls (Hemalatha, Lavania and Sharmila), Durga Devi and to a special friend Ganes Kumar.

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## ABSTRAK

Kajian ini bertujuan untuk melihat perspektif pelajar terhadap pembelajaran secara kooperatif di Universiti Teknologi Malaysia Johor Bharu, Johor. Kajian ini juga dijalankan untuk mengenal pasti sama ada wujud perbezaan yang signifikan di antara pelajar lelaki dan pelajar perempuan dan perspektif pelajar bagi lapan fakulti terhadap pembelajaran secara kooperatif. Soal selidik telah digunakan untuk mengumpul maklumat mengenai perspektif pelajar terhadap pembelajaran secara kooperatif. Sampel kajian terdiri daripada 291 orang pelajar yang dipilih secara rawak mudah dari pelajar tahun satu hingga tahun lima di lapan fakulti. Soal selidik ini digunakan untuk mendapatkan maklumat tentang pandangan pelajar terhadap pembelajaran secara kooperatif bagi enam kategori iaitu tingkah laku berkaitan dengan bekerja dalam kumpulan, kolaborasi, kefahaman subjek, kemahiran komunikasi, kemahiran interpersonal dan kemahiran menyelesaikan masalah. Data yang diperolehi dianalisis dengan menggunakan sistem perisian SPSS versi 11.5. Ujian t digunakan untuk melihat sama ada wujud perbezaan yang signifikan antara pelajar lelaki dan pelajar perempuan terhadap pembelajaran secara kooperatif manakala ANOVA satu hala digunakan untuk melihat sama ada wujud perbezaan yang signifikan antara perspektif pelajar bagi lapan fakulti terhadap pembelajaran secara kooperatif. Hasil kajian menunjukkan perspektif pelajar terhadap pembelajaran secara kooperatif adalah positif. Kebanyakan pelajar memilih “setuju” bagi pernyataan dalam soal selidik itu. Terdapat perbezaan yang signifikan di antara pelajar lelaki dan pelajar perempuan bagi perspektif terhadap pembelajaran secara kooperatif; manakala, perspektif pelajar bagi lapan fakulti terhadap pembelajaran secara kooperatif tidak menunjukkan perbezaan yang signifikan. Cadangan untuk kajian lanjutan yang mungkin boleh digunakan untuk mengukuhkan kajian ini turut dikemukakan.

## ABSTRACT

The purpose of this study is to look at the students' perspective on cooperative learning at Universiti Teknologi Malaysia in Johor Bharu, Johor. This study is also to determine if there is any significant difference between male and female students and between the students' perspective for eight faculties on cooperative learning. The students' perspective on cooperative learning questionnaire was used as the research instrument to look at the students' perspective on cooperative learning. A sample of 291 students which was chosen randomly from first to fifth year was involved in the research. The students' perspective on cooperative learning was divided into six categories, which are Attitude Related to Teamwork, Collaboration, Communication Skills, Understanding the Course, Interpersonal Skills and Problem Solving Skills. Data collected were analyzed by using SPSS software version 11.5. t-test was used to determine if there is any significant difference between male and female students' perspective on cooperative learning while one way ANOVA was used to determine if there is any significant difference between the students' perspective for eight faculties on cooperative learning. Result shows that, the students' perspective on cooperative learning are positive. Most of the students chose "agree" response for the statements in the questionnaire. There are a significant difference between the male and female students' perspective on cooperative learning but not for the students' perspective for the eight faculties. Several recommendations were made at the end of the report for further research.

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## LIST OF SYMBOLS

CL	-	cooperative learning
CTL	-	Center For Teaching and Learning
UTM	-	Universiti Teknologi Malaysia
ERIC	-	The Educational Resources Information Center
STAD	-	Student Teams-Achievement Divisions
TGT	-	Teams-Games-Tournaments
TAI	-	Team Assisted Individualization
CIRC	-	Cooperative Integrated Reading and Composition
SMET	-	Science, Mathematics, Engineering and Technology
LPSS	-	Learning Preference Scale-Students
CSLP	-	Center for the Study of Learning and Performance
SPSS	-	Statistical Package for Social Science
ITTHO	-	Institute Teknologi Tun Hussein Onn
PBL	-	Problem-based Learning
FP	-	Faculty of Education
FS	-	Faculty of Science
FKM	-	Faculty of Mechanical Engineering
FKE	-	Faculty of Electrical Engineering
FKA	-	Faculty of Civil Engineering
FAB	-	Faculty of Built Environment
FPPSM	-	Faculty of Management and Human Development
FKKKSA	-	Faculty of Chemical and Natural Resource Engineering

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## CHAPTER 1

### INTRODUCTION

#### 1.1 Introduction

The Malaysian Ministry of Education has mandated that students in Malaysia become critical, creative and articulate thinkers who are technologically competent (Seventh Malaysian Plan, 1996). Recognizing that to succeed in a modern society, students must be able to think independently and work collaboratively, the Ministry has stated that teachers must encourage active learning. Unfortunately, many teachers in education classes themselves simply lecture about not lecturing (Seventh Malaysian Plan, 1996). The teachers seldom experience different models of teaching.

In most university classes, a lecturer's establishment of herself/himself as the source and evaluator of all information set a questionable standard in a world filled with personal and technological resources. As recognized by researchers in brain-based learning, cooperative strategies provide a way to recognize the classroom so that students accept responsibility for working together to construct their own learning and to become critical and creative thinkers (Ciane and Caine, 1991). This in no way diminishes a teacher's role

in organizing experiences, as well as providing materials, resources, and guidance. This student-centered approach requires a gradual change in teachers' and students' perspectives about the learning process.

Active learning is a class teaching and learning techniques that involves students in learning activities other than passively listening to lectures. The activities include speaking, discussing, reading, higher-level thinking, reflecting, etc. (Khairiyah *et al.*, 2005). Active learning has been shown to enhance learning (Ruhl *et al.*, 1987) this is hardly surprising because learning is a naturally active process (Khairiyah and Mimi, 2003). Students from diverse learning styles can adapt to active learning because it gives the responsibility of organizing what is to be learned in the hands of the learners. Active learning can be applied not only in small classes, but also in very large lecture halls with hundreds of students.

There are many categories of active learning techniques. Cooperative learning (CL) and problem-based learning (PBL), in particular, are widely used in higher education. Other than enhancing learning, CL induces generic skills, such as communication, interaction and interpersonal skills, teamwork and leadership skills, self-confidence and self-esteem, and higher-level thinking skills (Khairiyah *et al.*, 2005).

CL is by no means a new idea. For thousands of years, humans have recognized the value of cooperation in a broad range of endeavors, including education. However, the term cooperative learning seems to date back to the 1970s when a great deal of research and practical work began on discovering how best to harness peer power for the benefit of learning. This work continues to this day. Thus, CL has a strong foundation in research. Many hundreds of studies by now 1000s across a wide range of subject areas and age groups have been conducted (Slavin, 1995).

There is a long history of research on cooperative, competitive, and individualistic efforts. Since the first research study in 1898, nearly 600 experimental studies and over 100 correlation 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. The positive effects that cooperation has on so many important outcomes make CL one of the most valuable tools educators have (Murat Ulasir and Wright, 1999).

Cooperation is not having students sit side-by-side at the same table to talk with each other as they do their individual assignments. Cooperation is not assigning a report to a group of students where one student does all the work and the others put their names on the product as well. Cooperation is not having students do a task individually with instructions that the ones who finish first are to help the slower students. Cooperation is much more than being physically near other students, discussing material with other students, helping other students, or sharing material among students, although each of these is important in CL (Smith, 2001).

CL may occur in or out of class. In class exercises, which may take anywhere from 30 seconds to an entire class period, may involve answering or generating questions, explaining observations, working through derivations, solving problems, summarizing lecture material, trouble-shooting and brainstorming. Out of class activities include carrying out experiments or research studies, completing problem sets or design projects, writing reports, and preparing class presentation (Felder, 1994).

Cooperation enhances student satisfaction with the learning experience by actively involving them in designing and completing class procedures and course content. Effective teams or groups assume ownership of a process and its results when individuals are encouraged to work together toward a common goal, often defined by the group (Panitz, 1999).

CL promotes mastery while passive acceptance of information from an outside expert often promotes a sense of helplessness and reliance on others to grasp concepts. In a typical college classroom that emphasizes lecturing there is little time for reflection and discussion of students' errors or misconception. In the CL paradigm, students are continuously discussing, debating, and clarifying their understanding of the concepts (Panitz, 1999).

## 1.2 Research Background

The problem is that no two students are alike. They have different backgrounds, strengths and weaknesses, interests, ambitions, senses of responsibility, levels of motivation, and approaches to studying. Teaching methods also vary. Some instructors mainly lecture, while others spend more time on demonstrations or activities; some focus on principles and others on applications; some emphasize memory and others understanding. How much a given student learns in a class is governed in part by that student's native ability and prior preparation but also by the compatibility of the student's attributes as a learner and the instructor's teaching style (Felder and Brent, 2005).

This is not to say that instructors should determine their students' individual learning attributes and teach each student exclusively in the manner best suited to those

attributes. It is not possible to discover everything that affects what a student learns in a class, and even if instructors could, they would not be able to figure out the optimum teaching style for that student—the task would be far too complex. Moreover, even if a teacher knew the optimum teaching styles for all students in a class, it would be impossible to implement them simultaneously in a class of more than two students (Felder and Brent, 2005).

Learning styles are “characteristic cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment”. The concept of learning styles has been applied to a wide variety of student attributes and differences. Some students are comfortable with theories and abstractions; others feel much more at home with facts and observable phenomena; some prefer active learning and others lean toward introspection; some prefer visual presentation of information and others prefer verbal explanations. One learning style is neither preferable nor inferior to another, but is simply different, with different characteristic strengths and weaknesses. A goal of instruction should be to equip students with the skills associated with every learning style category, regardless of the students’ personal preferences, since they will need all of those skills to function effectively as professionals (Felder and Brent, 2005).

Teaching and learning techniques that becomes the attention among the teachers in higher education is the active learning methods, especially CL. Chickering and Gamson (1987) had collected a lot of the research and papers about the higher education levels. They had created seven principles of good techniques in higher-level students. One of the principles is:

*Learning is not a spectator sport. Students do not learn much just sitting in classes listening to teachers, memorizing pre-packaged assignments and spitting out answers. They must talk about what they are learning, write about it, relate it*

*to past experiences, and apply it to their daily lives. They must make what they learn part of themselves.*

(Chickering and Gamson, 1987: 4)

There are people who still do not understand and believe the effectiveness of this method. From the literature review, there are teachers in higher education using the traditional technique as the one and only technique on teaching and learning in classroom (Bonwell and Eison, 1991). The teachers do not want to use CL because they believe this approach is just an alternative and could not increase the teaching and learning process compared to the traditional teaching techniques (Chickering and Gamson, 1987). To learn effectively, students need to do more than just listening.

When active learning techniques were used in the classroom, teachers still have to give lecture. Although in traditional method teachers just disseminate information to the students. But, it will create problems among the students and the teachers (Chickering and Gamson, 1987).

According to Hamm and Adams (1992), benefits of CL to student improves academic performance among high- and low- achieving students, minority students have made consistently favorable achievement in cooperative classes, disadvantaged students significantly benefit from collaborative learning techniques, working in mixed-ability groups doesn't stifle individual initiative, positive effects on students' self-esteem, enhances social race relations and attitude toward mainstreamed students.

By teaching others, all of the students actually come to understand the material better. Children's cooperative behavior was shown to transfer through interaction with

peers who weren't members of the same learning teams. It also transferred their good behavior in social situations not structured by the teacher (Hamm and Adams, 1992).

CL is important because it appears to promise positive effects for student in increased academic achievement and improved social attitudes and behavior (Miller and Peterson, 2003). CL also encourages students to engage in the type of discourse about concepts and problem solving that moves them toward more meaningful learning strategies (Towns, 1998). CL activities discovered that the sharing of insights and ideas between students leads to the development of interpersonal and communication skills (Towns and Grant, 1997).

### **1.3 Cooperative Learning in UTM**

In an effort to increase the quality of courses, UTM have gone a step forward to implement a number of innovations in the teaching and learning activities. The Centre for Teaching and Learning (CTL) in UTM is given the task to ensure that the innovation activities are successful. The role of CTL is to help the lecturers to apply different types of innovation in the teaching and learning processes. In addition, CTL also encourage lecturers to carry out research on how to increase the quality of teaching and learning process (Bulletin P&P, April to June 2005).

In UTM, efforts are being made to emphasize the importance of teaching as much as research. To produce quality graduates, UTM had recently come up with attributes to reflect its graduates. UTM graduates shall have sound disciplinary and professional knowledge, high self-esteem and effective skills in communication, good team working, problem solving skills and lifelong learning. To achieve this ambitious

goal, the university is aggressively encouraging active learning techniques, especially CL and PBL to enhance teaching and learning as well as generic skills of the graduates (Khairiyah *et al.*, 2005).

CL and PBL, which are active learning techniques, are currently being widely promoted in UTM among engineering graduates. A bottom-up and top-down approach is taken to ensure a successful outcome. Bottom-up and top-down approaches are taken to promote CL and PBL. A gradual and non-drastic approach is taken to raise awareness and educate lecturers and students on the usefulness techniques. This natural progression is essential in winning the hearts and minds, and thus the support of the academic community.

The bottom-up model consists of student-centered lecturers who form a central committee, called the CL-PBL taskforce or support group, to facilitate the promotion of CL and PBL to all levels of the academic community in UTM. At the faculty level, faculty representatives form a core-group to give closer guidance and/or mentoring. The taskforce and core group members were given training workshops by outside experts; they were then expected to plant the initial seeds of change. Task force members also went for visits to observe PBL in action in institutions of higher learning in Kuala Lumpur and Singapore. Implementations of CL and PBL by the task force and core-group were gathered and documented for evidence and information sharing.

In the top-down execution, the deputy vice chancellor for academic affairs and the Teaching and Learning Unit of UTM plays an active role in promoting CL and PBL to the executive level of the university, the deans, deputy deans, head of departments and lecturers. The deans of all faculties are being reminded from time to time to ensure variations in teaching techniques used in the courses offered.

Educating administrators, lecturers and students on CL and PBL will be the major focus. Road shows on CL and PBL are held at all faculties to create awareness on the need for change in the teaching and learning techniques, and what is active learning, CL and PBL. Evidence of implementations and outcomes in the form of students' performance and response were also shared during the road shows. Other than road shows, technical papers and articles are written to disseminate information on the techniques and implementations.

A lot of courses in UTM were carried out to create the awareness on the important of CL and PBL among the lecturers. The second level of generic skills and the CL course was conducted in the month of September. This was done among the UTM lecturers for various faculties (bulletin P&P, August 2005).

According to Khairiyah *et al.* (2005), UTM is aggressively encouraging lecturer to enhance teaching and learning to produce graduates who are relevant in today's highly competitive world. To achieve this goal, grassroots awareness and training campaign, followed by encouragements are rigorously being made.

Active learning techniques, especially the CL and PBL are currently being promoted across all disciplines as well as levels of studies. This effort, which was initiated by a group of enthusiastic lecturer, received a welcome endorsement from the highest level of university administrative key personnel. A special task force called CL-PBL Support Group was then set up to facilitate the promotion of CL and PBL practices across the board. At implementation level, faculty-based core groups were set up and trained to acquire and apply the necessary knowledge and teaching skills pertaining to these active learning approaches. This study describes strategies and efforts to convince and encourage the implementation of active learning techniques among lecturer and

administrators, especially those in the engineering and engineering-related faculties (Khairiyah *et al.*, 2005).

Workshops were conducted by CTL for the lecturer from various faculties. The aims of the workshops were to get the lecturer understand the philosophy, concepts and objectives of CL. They were also exposed on the necessary skills of using CL methods in the teaching and learning process. It is hoped that they will be able to plan and apply CL in their classrooms. The following topics were discussed by the facilitators in the workshops: Introduction to active and cooperative learning, Why need to change to active and cooperative learning, Informal and formal CL, Planning and implementation of CL, The CL structures, Team formation and dynamics and The assessment of CL.

CL activities may require more planning than the traditional ones. Besides planning for the delivery of content, they also need to plan the students' activities and way to evaluate the students' understanding. Timing is especially important in the CL settings. The planning should involve developing CL activities and grading, time management, assessment tools and readiness and facilitation skills as well.

Lecturers, who wish to apply CL in the classroom for the first time, should start gradually. They should follow the following simple steps: To get the personal information and peer evaluation of the students, to establish rules and regulations and to brief on CL and motivation to the students. Team formation and teambuilding should also be included in these steps. Before starting a lesson, he has to identify parts and the activities for the CL and to estimate the time required for the activities.

Engineering curricula worldwide have emphasized on the usage of groupwork as one method of improving the interpersonal and teamwork skills among the graduates.

These activities, in which students teach and learn from each other, provide ways for students to explore new paths and consolidate understanding. Hence, a study was carried out to assess the practice of group-work among lecturers and final year undergraduate students at the Faculty of Chemical and Natural Resources Engineering, Universiti Teknologi Malaysia. Results showed that lecturers and students of the faculty had positive perceptions towards group-work activities (Mohd Zaki and Talib, 2003).

The two greatest concerns of employers today are finding good workers and training them. The difference between the skills needed on the job and those possessed by applicants, sometimes called the skills-gap, is of real concern to human resource managers and business owners looking to hire competent employees. While employers would prefer to hire people who are trained and ready to go to work, they are usually willing to provide the specialized, job-specific training necessary for those lacking such skills. Finding workers who have generic or job readiness skills that help them fit into and remain in the work environment is a real problem. UTM has launched its list of graduate attributes in the second quarter of 2004 in which the university believes will enable its graduates to function effectively in a wide range of social and professional contexts. A class of forty final year undergraduate chemical engineering students were asked to score their competencies on the seven attributes listed by the university and to give suggestions on ways of improving the skills required in the class room environment. Result showed that having been exposed to active and CL styles students ranked themselves quite high in communication, teamwork and problem solving and quite moderate on other attributes. Students were found to be greatly excited with the opportunities of giving presentations and public speaking in the class (Mohd Zaki, 2005).

CL is a proven teaching technique that is able to enhance students' learning through active learning. This technique has been widely accepted in engineering education in the United States, Europe, United Kingdom and Australia. In UTM,

lecturers from different faculties of engineering implement CL in their classes. The main aim is to induce better retention, in-depth understanding and mastery of knowledge among students. This paper shows how CL successfully enhanced students' learning by looking at the performance of their grades in different engineering classes (Mimi *et al.*, 2004).

It shows UTM is actively encouraging academic staff to be aware in the use of the active learning techniques in classroom. Three different techniques are involved in teaching and learning process, namely cooperative learning, generic skills and problem-based learning.

#### **1.4 Statement of Problem**

To produce quality graduates, UTM had recently come up with attributes to reflect its graduates. UTM graduates shall have sound disciplinary and professional knowledge, high self-esteem and effective skills in communication, good team working, problem solving skills and lifelong learning. To achieve this ambitious goal, the university is aggressively encouraging active learning techniques, especially CL (Khairiyah *et al.*, 2005). Some of the faculties and lecturers are using the cooperative learning approach in the classroom (CTL, Centre for Teaching and Learning, 2005). A study has not been carried out to see the students' perspective on this approach. So, this study is to analyse the students' and faculties perspective on cooperative learning for six categories: Attitude Related to Teamwork, Understanding the Course, Collaboration, Interpersonal Skills, Communication Skills and Problem Solving Skills.

## 1.5 Objectives

The objective of this study is:

1. To look at the students' perspective on cooperative learning for six categories: Attitudes Related to Teamwork, Understanding the Course, Collaboration, Interpersonal Skills, Communication Skills and Problem Solving Skills.
2. To determine if there is any significant difference between male and female students' perspective on cooperative learning
3. To determine if there is any significant difference between students' perspective for the eight faculties on cooperative learning.

## 1.6 Research Questions

This study is carried out to answer the following research questions:

1. What is the students' perspective on cooperative learning for the six categories?
2. Is there any significant difference between male and female students perspective on cooperative learning?
3. Is there any significant difference between students' perspective for the eight faculties on cooperative learning?

## **1.7 The Importance of the Study**

The main purpose of this study is to look at the students' perspective on cooperative learning on many different courses and faculties. Cooperative learning can help students to improve a lots of skills in daily life when compare with the normal traditional learning method. Students also can determine the important skills to bring about success in a team of cooperative learning group.

This study will help the lecturers know the students' perspective on cooperative learning. The lecturers can plan the teaching and learning methods which suitable for the students. The students' perspective on cooperative learning will motivate the lecturers to continually use the cooperative learning techniques in the classroom.

This study will benefit CTL to encourage all the other lecturers to apply cooperative learning instruction in the classroom. This will help to increase the strategy of teaching and learning in the university.

## **1.8 Scope of Study**

The scope of this study is to look at the students' perspective on cooperative learning on many different courses and eight faculties in Universiti Teknologi Malaysia.

The students' perspective on cooperative learning, a questionnaire was modified and used. The items in the questionnaire is contain of six categories: Attitudes Related to

Teamwork, Understanding on the Course, Collaboration, Communication Skills, Interpersonal Skills and Problem Solving Skills in the questionnaire.

## **1.9 Limitations of Research**

This study was conducted on the UTM students, who involved with cooperative learning in semester one 2005/2006. They are from the eight different faculties in UTM: Faculty of Education, Faculty of Science, Faculty of Chemical and Natural Resource Engineering, Faculty of Electrical Engineering, Faculty of Mechanical Engineering, Faculty of Management and Human Resource Development, Faculty of Built Environment and Faculty of Civil Engineering. All the faculties were chosen except the Faculty of Geoinformation Science and Engineering and Faculty of Computer Science and Information System because it does not involve with cooperative learning.

We assumed that students already exposed to cooperative learning in classroom by the lecturers. This study cannot be generalized to all the university around the Malaysia, because it involved only one university that is UTM and the respondent are students from the eight faculties only.

## **1.10 Operational Definition**

The operational definition is to describe the words used in this study according to the context of the study.

### 1.10.1 Cooperative Learning

CL has emerged as a “new” approach to classroom instruction. It involves a number of people working to complete an assigned task (Townsend and Grant, 1997). CL is a philosophy that gives teachers and students the skills to work effectively in teams, large or small (Jongste, 1996). This is a very wide definition of cooperative learning.

CL may be simply defined as students working together in small groups (Lumpe et al., 1998) to maximize their own and each other’s learning (Johnson & Johnson, 1999). CL is structured, systematic instructional strategy in which small groups work together to produce a common product (Cooper, 1990).

Panitz (1999) define more specifically that CL as a motivational strategy includes all learning situations in which students work in groups to accomplish particular learning objectives and in which they are interdependent for successful completion of the objective. This is similar with Chang (1999) definition that is CL is a teaching strategy in which students work together in heterogeneous groups (Watson and Marshall, 1995) and use a number of activities to achieve academic objectives and improve their understanding of subject matters.

In this study, the definition of CL is a learning situation which students work together in a group to complete an assigned task and a number of activities to achieve academic objectives and applied the six categories that are on attitudes related to teamwork, understanding, collaboration, interpersonal skill, communication and problem solving skills.

### 1.10.2 Perspective

Perspective is a view or prospect, a particular way of regarding something and understanding of the relative importance of things (Concise Oxford English Dictionary, 2004). Perspective also defines as a certain point of view in understanding of judging things or events, especially one that shows them in their true relations to one another (Basic Dictionary of American English, 1998).

In this study, the definition of perspective is a certain point or view of the students in understanding the important of cooperative learning in classroom.

## CHAPTER II

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter will address four aspects of the study. First section will be the review of the students learning style. The second section will review the differences between the cooperative learning and the traditional learning groups. The third section will review the five main elements in the cooperative learning. The last sections will review the effects of cooperative learning on the students.

#### 2.2 Student Learning Styles

Educators have, for many years, noticed that some students prefer certain methods of learning more than others. These dispositions, referred to as *learning styles*, form a student's unique learning preference and aid teachers in the planning of small-group and individualized instruction (Kemp *et al.*, 1998). Grasha (1996) has defined

learning styles as, "personal qualities that influence a student's ability to acquire information, to interact with peers and the teacher, and otherwise participate in learning experiences".

The different ways in which students take in and process information describe their different learning styles and these are frequently modeled along bi-polar dimensions such as active/ reflective, right-brained/left-brained or concrete experience/ abstract conceptualization (Rosati, 1998).

Some faculty simply opt to utilize a wide variety of teaching activities, hoping that they will cover most student learning preferences along the way. This method, though expedient, may not be the most effective or systematic way to address student learning preferences in the classroom. Many instructors think that the same teaching methods that are effective in their traditional classes will also work in distance learning settings. The underlying assumption is that students who enroll into distance education classes will have the same learning preferences as students enrolled in traditional classes. Also, faculty are assuming that teaching styles, and accompanying classroom processes, are like a "master key" and thus appropriate for any setting (Diaz and Carnal, 1999).

The lecturers should be willing to change their teaching strategies and techniques based on an appreciation of the variety of student learning styles. "Teachers should try to ensure that their methods, materials, and resources fit the ways in which their students learn and maximize the learning potential of each student" (Sarasin, 1998).

Several extant studies have demonstrated that females and males learn differently. In general, the studies on males' and females' learning differences have

concluded that more females are relational learners, whereas more males are independent learners (Keri, 2002).

In the classroom, females prefer to use a conversational style that fosters group consensus and builds ideas on top of each other; the interrelationship of thoughts and actions is paramount. Males, conversely, learn through argument and individual activity-behaviors fostered early. Most classroom discourse is organized to accommodate male learning patterns (Ong, 1981).

The development of women and girls within a hierarchical power structure relative to the development of their self-esteem, and general academic performance in certain subjects was examined. Mann reported that faced with several challenging learning conditions such as instructor bias and passivity, and institutions that destroy friendship networks; females were less likely to exemplify their learning styles in subject areas such as math and sciences. The author, therefore, encouraged teaching techniques that place more emphasis on collaboration and hands-on learning, as well as recommended textbooks that depicted females as authors of science books and originators of novel scientific discoveries (Mann, 1994).

Allen and Van Sickle (1987) examined instructional strategies that matched individual learning styles regarding students' gender, communication avoidance behavior, and classroom achievement. In this study the authors concluded that, while females preferred collaborative and participative learning styles, they also experienced communication apprehension in the classroom.

In conversations males and females function out of differing conceptualizations of reality, explanatory of many instances of missed opportunities (Tannen, 1990).

Compassion, sensitivity, and managed communication are common to ways by which females interpret reality. If so, then, it is of consequence to know that in the context where such characteristics are not shared, females are likely to feel less expressive, and so might not volunteer personal information that informs the teaching and learning process (Gilligan,1982)

The results of the current study indicates that the common interest in terms of learning preferences between males and females is social; that is males and females prefer to work with people, and associate with others on learning tasks (Pettigrew and Zalkrajsek, 1984),

### 2.3 Differences Between Cooperative Learning and Traditional Learning Group

Considering the variety of learning styles that students possess, traditional lecture is not always the most effective way to transmit information to the students. Furthermore, the lecture-based approach alone will not prepare students for complex demands found in the workplace such as the ability to think critically, collaborate with others, and engage in active problem solving. The goal is to find and implement instructional methods that will better address differences in student learning styles and improve the student's ability to think critically, use higher-level reasoning, and recognize the responsibility of becoming a life-long learner (Johnson and Johnson, 2000).

CL groups differ from traditional classroom groups in that the process implemented ensures that all students are actively involved in the organization, explanation, summarization, and integration of the material into an existing conceptual structure and application. CL occurs when students work together to maximize their and

each other's learning experience. In a team-teaching environment, CL groups provide students and faculty members with the opportunity to work together to raise the achievements of all students, to provide the dialogue and experiences that Bennett et al. (1992) indicated for the instructors and to build positive relationship between all involved parties (Leon and Tai, 2004). In the traditional classroom groups, students are allowed to self-select their teams and identify a financial application and client for their term projects using their own self-developed process. No formal interaction between any of the team members, no individual accountability existed and minimal attention was paid to intragroup student dynamic (Leon and Tai, 2004).

In a traditional classroom, when a teacher calls on a student, that student becomes the focus of attention of the entire class. Any mistakes or incorrect answers become subject to scrutiny by the whole class. In contrast, in a CL situation when students work in a group, the focus of attention is diffused among the group. In addition, the group produces a product that its members can review prior to presenting it to the whole class, thus diminishing prospects that mistakes will occur at all (Slavin and Karweit, 1981). When a mistake is made, it becomes a teaching tool instead of a public criticism of an individual student (Panitz, 1999).

Many faculties told that they already expose to CL, where students complete term projects together. Further exploration, however, reveals that although they do have students working in groups, the work is not cooperative learning. Table 2.1 summarizes some of the major differences between traditional learning groups and CL groups.

**Table 2.1: Comparison between Traditional and Cooperative Learning groups**

Traditional Learning Groups	Cooperative Learning Groups
Low interdependence. Members take responsibility only for themselves. Focus is on individual performance only.	High positive interdependence. Members are responsible for their own and each other's learning. Focus is on joint performance.
Individual accountability only.	Both group and individual accountability. Members hold themselves and others accountable for high quality work.
Little or no attention to group formation (students often select members). Groups typically large (5-10 members).	Deliberately formed groups (random, distribute knowledge/experience, interest). Groups are small (2-4 members).
Assignments are discussed with little commitment to each other's learning.	Members promote each other's success, doing real work together, helping and supporting each other's efforts to learn.
Teamwork skills are ignored. Leader is appointed to direct members' participation.	Teamwork skills are emphasized. Members are taught and expected to use collaborative skills. Leadership shared by all members.
No group processing of the quality of its work. Individual accomplishments are rewarded.	Group processes quality of work and how effectively members are working together. Continuous improvement is emphasized.

(Smith & Waller, 1997: 4)

## 2.4 Five Main Elements In Cooperative Learning

The first and most important element in structuring CL is positive interdependence. Positive interdependence is successfully structured when group members perceive that they are linked with each other in a way that one cannot succeed unless everyone succeeds (Murat Ulasir and Weight, 1999). In other words, students

must perceive that they sink or swim together. In a problem-solving session, position interdependence is structured by group members (1) agreeing on the answer and solution strategies for each problem and (2) fulfilling assigned role responsibilities. Other ways of structuring positive interdependence include having common rewards, being dependent (Johnson *et al.*, 1998).

The second basic element of CL is promoting face-to-face interaction. Students need to do real work together in which they promote each other's success by sharing resources and helping, supporting, encouraging, and applauding each other's efforts to achieve (Murat Ulasir and Wright, 1999).

The third basic element of CL is individual accountability. Each member of the group must be accountable for contributing his or her share of the work. This means that members are held accountable for a) doing their share of the work and b) mastering all material (Murat Ulasir and Wright, 1999). The group needs to know who needs more assistance in completing the assignment and group members need to know they cannot hitchhike on the work of others. Common ways to structure individual accountability include giving an individual exam to each student, randomly calling on individual students to present their group's answer and giving an individual oral exam while monitoring group work (Smith and Waller, 1997).

The fourth basic element of CL is teaching students required interpersonal skills. This means that team members practice and receive instruction on leadership, decision-making, communication, and conflict management (Murat Ulasir and Wright, 1999). These skills have to be taught just as purposefully and precisely as academic skills. Many students have never worked cooperatively in learning situations and therefore lack the needed teamwork skills for doing so (Smith and Waller, 1997).

The fifth and final basic element of CL is group processing. Group processing exists when group members discuss how well they are achieving their goals and maintaining effective working relationships. Group members periodically reflect on what they are doing well as a team, what they could improve, and what (if anything) they will do differently in the future (Murat Ulasir and Wright, 1999).

## **2.5 The Effects of Cooperative Learning on the Students**

There are many reasons that CL is entering the main stream of educational practice. One is the extraordinary research base supporting the use of CL to increase student achievement, as well as such other outcomes as improved inter group relations, acceptance of academically handicapped classmates and increased self-esteem (Slavin, 1995).

One of the most important reasons that CL methods were developed is that educators and social scientists have long known about the detrimental effects of competition as it is usually used in the normal classroom. This is not to say that competition is always wrong; if properly structured, competition between well-matched competitors can be effective and harmless means of motivating people to do their best. But the forms of competition typically used in classrooms are rarely healthy or effective (Slavin, 1995).

There are several reasons why CL works as well as it does. Weak students working individually are likely to give up when they get stuck; working cooperatively, they keep going. Strong students faced with the task of explaining and clarifying

material to weaker students often find gaps in their own understanding and fill them in. Students working alone may tend to delay completing assignment or skip them altogether, but when they know that others are counting on them, they are often driven to do the work in a timely manner (Felder, 1994).

Cooperation is working together to accomplish shared goals. Within cooperative activities individuals seek outcomes that are beneficial to themselves and beneficial to all other group members. CL is the instructional use of small groups so that students work together to maximize their own and each other's learning. CL in college classes involves small groups of students working together to achieve the common goal of maximizing their own and each other's learning (Smith and Waller, 1997).

CL strategies appear to promise positive effects for students, both with and without disabilities, as reflected in increased academic achievement and improved social attitudes and behavior. The general principle behind CL is that the students work together as a team to accomplish a common goal, namely that each student learns something of value from the CL activity. Although CL activities may require more teacher preparation of group material and monitoring of group activities, the rewards and benefits for both the teacher and students go a long way. They appear likely to positively influence a school's academic and social climates as well (Miller and Peterson, 2003).

There is a growing interest in the CL techniques in college courses, some in science and engineering (Kogut, 1997). Johnson and Johnson both in surveys of the literature and in their own studies, determined that under most conditions groups are more productive than individual. Dougherty *et al.* (1995) reported that CL had a positive impact on student retention and student performance in general chemistry. CL in chemistry is feasible and desirable. At the least it increases the time students spend studying and encourages students to help each other to learn (Kogut, 1997).

According to Towns (1998), CL helps students build a feeling of community in the classroom and fosters a warmer classroom climate, which promotes learning and achievement. CL activities encourage students to engage in the type of discourse about concepts and problem solving that moves them away from rote learning strategies and toward more meaningful learning strategies. Students strive to understand different ways of explaining concepts and different perspectives on solving problems.

The purpose of the study is to share the reflection from 140 university seniors from secondary methods classes in the School of Education who have participated in cooperative written examinations for group grades. The experience is examined and defined through reflections of the participants based on their experiences. Students participate in-group examinations for group grades, thus allowing them to experience the full implication of positive interdependence within CL setting. Eight thematic clusters were formed based on the comments that students made regarding their first experience with writing a cooperative exam. Results show that Support and/ or reinforcement was mentioned by every student. Learning situations can be very lonely experiences. CL used as a strategy not only for the acquisition of knowledge but also in testing, creates the “sink or swim” feelings associated with positive interdependence. Students feel a responsibility to perform well not only for themselves, but also for their peers (Morgan and Bobbette, 2003).

Johnson and Johnson (1989) have performed a Meta analysis of over 1200 studies in University of Minnesota, which researchers have compared the performance of students educated using CL strategies with that of students taught by traditional methods, such as the lecture method. The results of this meta-analysis are unequivocal and overwhelming. CL promoted higher individual knowledge than did competitive and individualistic learning, whether the tasks required verbal, mathematical or physical skills. The retention knowledge was greater (Herreid and Freeman, 1998).

The students in a physical sciences course were introduced to cooperative learning at the University of Queensland, Gatton Campus. Groups of four to five students worked together in tutorial and practical sessions. A peer and self-assessment system was successfully adapted to account for individual performance in cooperative learning group assignments. The results suggest that, students very well received cooperative learning and they expressed willingness to join cooperative learning groups in other courses. In addition, cooperative learning offered benefits to students in terms of graduate attributes such as teamwork, communication, lifelong learning and problem solving (Gupta, 2004).

A study by Tlusty (1993) looked at the attitudes and achievement of college chemistry students. The researchers had two different classes taught by the same professor. In one class the professor used cooperative learning strategies, and in the other, more traditional instructional methods. The researchers had the students in both groups complete an attitude survey at the beginning and the end of an eight-week period. The subjects also did journal entries, interviews, and reflective writings. After the eight-week period, they switched groups, and the control group received the treatment (Cooperative learning), and the experimental group received the non-treatment (Traditional teaching). They found that college women learning cooperatively not only achieved at a higher level than the control group women learning in a more traditional setting, but also had a more positive attitude toward science and science-related careers.

CL has been lauded over the years as one of the most successful teaching/learning strategies employed by professors of science, mathematics, engineering and technology (SMET) in institutions of higher education throughout Puerto Rico. A short survey was developed and distributed among SMET faculty members at Alliance for Minority Participation (AMP) institutions in Puerto Rico. 14 campuses of 5 AMP universities participated. 85 surveys were returned, which represented 8% of the SMET faculty population. Data was gathered on faculty members'

use of CL and their perception of the effect of CL strategies on student performance and attitudes. Principal survey results showed that over 60% of faculty felt confident in their knowledge of CL theory and role assignment, although somewhat less confident in conflict resolution, grading activities and individual accountability. Fifty percent (50%) reported using the strategy very often or often (primarily for the exploration and learning of new concepts, in term projects and presentations and in quizzes). 41% described their experience in implementing CL as excellent or very good. In addition, faculty perceived more positive than negative changes in student performance and attitudes (Morell, 2001).

Formal laboratory reports have been used successfully in engineering technology courses in Pennsylvania State University, Altoona for the dual purpose of integrating the concepts learned in class into a coherent disciplined knowledge structure and integrating communication skill into the curriculum. The teams were chosen to function as “cooperative base groups” since such teams tend to provide more assistance and encouragement to their members as opposed to formal CL groups. The teams were comprised of three to four students by the instructor. Overall, the result from this initiative were encouraging and suggest that collaborative techniques can be designed to increase both substantive learning and communication skills (Shull, 2005).

A structured eight weeks cooperative learning intervention was implemented in two year 11 psychology classes at technical and further education College in Melbourne, Australia. In class A, there were 13 students (10 female, 3 males) and in class B, there were 10 students (5 females, 5 males). Each class was taught alternately under cooperative learning and traditional instruction. Three different measures of student achievement were used: A pretest, a 10 items quiz and an overall posttest. In addition, all students completed the Learning Preference Scale- Students (LPSS) at posttest. The results indicated no overall effects on academic achievement. Rather, it was found that the effects of cooperative learning differed across the two classes. Further, significant

differences were found in preferred learning styles between the two classes. It was concluded that successful implementation of cooperative learning in adult education classes relies upon effective teacher management skills (Thompson, 2004).

This experiment involved three large lecture sections of first-term introductory university chemistry in Florida State University, Tallahassee. The initial registrations for these sections were approximately 180, 180 and 240 students. One section served as control. Cooperative learning and enhanced communication were introduced into the remaining two sections with different levels of organization and structure. The results show that introduction of cooperative learning and enhanced communication leads to increased performance. The amount of increase seems related to the level of structure provided in the cooperative learning and communication environment (Dougherty *et al.*, 1995).

A one-semester introductory analytical chemistry course is described that accomplishes the goal by the use of open-ended laboratories, cooperative learning and spreadsheet programs. It is offered at upper class level to non-majors and at the freshman level to students with solid chemistry backgrounds in University of Wisconsin, Madison. Typically there are 90 students, who are divided into 5 sections. A teaching assistant is assigned to each section. Since there are many skills required to make these project work, the first half of the course is spent developing the individual conceptual, computational, laboratory, problem solving and group skills so students are prepared for the last half. These changes have markedly improved the student attitudes towards each other and towards learning chemistry, in addition to increasing the depth of coverage of the material and the students' comprehension levels (Wright, 1996).

The purposes of the study were to describe the structure of events during cooperative learning activities in a graduate-level thermodynamics course and to

understand what these activities meant to the students. The participants were graduate students at a large Midwestern University in the United States. The class was composed of 26 graduate students: 24 from the chemistry department, 1 from biological sciences and 1 from civil engineering. They found that cooperative learning activities move students away from rote learning strategies and toward more meaningful strategies, which allowed them to integrate concepts over the entire semester. In addition, they discovered that the sharing of insights and ideas between students leads to the development of interpersonal skills and communication skills, which the students perceive as an important component of the discussion sessions (Towns and Grant, 1997).

The study were to: (1) provide information concerning how middle level practicing teachers gained their knowledge about cooperative learning, (2) determine for what purposes teachers used cooperative learning, (3) learn how teachers kept students accountable for performance in cooperative learning activities, (4) learn what teachers did to encourage higher-level thinking. A total of eleven teachers were identified, interviewed, and observed. The eleven teachers from five states (Alabama, Michigan, Montana, New York, Washington) in six disciplines (language arts, mathematics, physical and health education, social studies, science, Spanish). Schools were located in urban, suburban and rural settings. Results showed teachers (1) learned about cooperative learning incidentally, (2) used cooperative learning for basically routine activities, (3) were constantly monitoring group behavior and performance, (4) seldom had higher-level thinking as an objective for cooperative learning. Teachers appeared to have successfully implemented cooperative learning, but were not very "risk taking" in their uses of cooperative learning (Sparapani *et al.*, 1997).

Since 1924, more than 168 studies have compared the relative efficacy of cooperative, competitive (where students work against each other), and individualistic (where students work alone) learning on the individual achievement of students 18 years or older. The results of these studies show that cooperative learning promotes a significantly higher level of individual achievement than either competitive (mean effect

size = 0.49) or individualistic (mean effect size = 0.53) learning. These results hold for verbal tasks such as reading, writing, and orally presenting, mathematical tasks, and procedural tasks such as swimming, golf, and tennis (Johnson, 1998). In addition to promoting meaningful increases in achievement, cooperative learning also seems to encourage the development of positive relationships. Such relationships play a distinct part in creating a true learning community on a college campus, building friendships among diverse groups of people, and retaining students until graduation. Meta-analysis of the research shows that cooperative learning promotes greater camaraderie among students than either competitive (mean effect size = 0.68) or individualistic work (mean effect size = 0.55). Moreover, 24 studies that focused exclusively on social support reveal that college students learning cooperatively perceive that they are getting more support (both academic and personal) from peers and instructors than students who work either competitively (mean effect size = 0.60) or individualistically (mean effect size = 0.51). On the whole, it seems that students who work cooperatively to complete assignments, even when they come from different ethnic, cultural, linguistic, social class, ability, and gender groups, develop positive, supportive ways of interacting (Johnson, 1998).

The Faculty Instructional Development Program in the College of Engineering at San Jose State University were concerned with the effectiveness of the program in introducing, promoting and implementing cooperative learning among the faculty in the school. Six faculty representing four different programs (Aerospace, Mechanical, Civil and General Engineering) used the survey in their courses (Freshman, Junior and Senior). Total respondents are 327 students. A variety of performance criteria have been used in this assessment, some faculty-centered and some student-centered. The results indicate that although a relatively small percentage of faculties have chosen to adopt cooperative learning as a teaching tool in their courses, the impact on student attitudes and learning is significant, making the effort worthwhile. Students in turn report significant gains in their attitudes, understanding of engineering subjects,

communication, team and problem solving skills, as a result of cooperative learning (Mourtos and Allen, 2000).

## 2.6 Summary

In this chapter two, the four main sections in cooperative learning have been discussed. First are the base differences between male and female students learning styles. The second is the differences between cooperative learning and traditional learning groups. This different important for the lecturers to know what is cooperative learning compare to normal classroom where students work in a group. Next section is discussed about the important of the five elements in cooperative learning. This element makes the different between cooperative learning and traditional learning. The final section is about the effectiveness of cooperative learning to the students.

## **CHAPTER III**

### **METHODOLOGY**

#### **3.1 Introduction**

This chapter describes the methodology used in the study. It composed of six main sections: Overview of the research design, population and sample, instrument, procedure of research, pilot study and data analysis.

#### **3.2 Research Design**

This is a quantitative research. The three main purposes of this research as mentioned before are to look at the students' perspective on cooperative learning which consists of six categories: Attitude Related to Teamwork, Understanding the Course, Collaboration, Interpersonal Skills, Communication Skills and Problem Solving Skills. This research is to look at the differences between the male and female students'

perspective on cooperative learning and also the differences between the students' perspective for the eight faculties on cooperative learning.

The questionnaires were distributed to the students who involved in cooperative learning. Students need to answer all the statements in the questionnaire. All the data collected were used to look at the students' perspective on cooperative learning and to look at the differences between the male and female students on cooperative learning. Beside that, the data collected were used to look at the differences between the faculties on cooperative learning.

### **3.3 Population and Sample**

The population of this research is the students from semester one session 2005/2006 from Universiti Teknologi Malaysia, Skudai, Johor. The populations of the students involve were 1200 students.

The sample of this research consists of students from the eight faculties in Universiti Teknologi Malaysia which were involved in cooperative learning. The students were 291 students from first years until fifth years which were consisted of different races and gender. The students were chosen using the simple random sampling method. The sample size of students was chosen based on the Krejcie and Morgan table (1970) for determining sample size from the given population. The students were chosen from the Faculty of Science (FS), Faculty of Education (FP), Faculty of Management and Human Resource Development (FPPSM), Faculty of Mechanical Engineering (FKM), Faculty of Civil Engineering (FKA), Faculty of Electrical Engineering (FKE),

Faculty of Built Environment (FAB) and Faculty of Chemical and Natural Resources Engineering (FKKKSA).

### **3.4 Instrument**

Questionnaire was used as the instrument in this research. Two university lecturers from Faculty of Education who were expert in cooperative learning were asked to provide feedback on the content validity of the questionnaire.

#### **3.4.1 Questionnaire on Students' Perspective on Cooperative Learning**

As mentioned previously the three main purposes of this questionnaire are to look at the students' perspective on cooperative learning and to look for any significant differences between the male and female students on cooperative learning. The third purpose is to look for any significant differences between the students' perspective for the eight faculties on cooperative learning.

The questionnaire was adapted from Mourtos and Allen (2000). Permission was sought from the author (see Appendix A). A few questions have been added in the collaboration and communication categories part in the questionnaire (see Appendix B for the new questionnaire).

The questionnaire consists of two sections. Section A is the background of the students which include the gender, races, year of studying and faculties.

While section B of the questionnaire consists of statements on students' perspective on cooperative learning. Responses to the statements are in the Likert 5 scale which ranges as follows:

- 1- strongly disagree
- 2- disagree
- 3- do not feel strongly about it
- 4- agree
- 5- strongly agree

The questionnaire consists of 45 statements, which were divided into six categories. For each of the statement, students choose one of the responses according to the student's preference. The six categories, the number of statements and the total number of statements were shown in Table 3.1.

**Table 3.1: Six categories and the number of statements in student questionnaire**

<b>Categories</b>	<b>Characteristic of categories</b>	<b>Number of statement</b>	<b>Total of statement</b>
Attitude Related to Teamwork	Enjoy, less stressful , work hard	1, 7, 13, 19, 25, 30, 34, 37, 40	9
Understanding the Course	Understand, learn, high scores	2, 8, 14, 20	4
Collaboration	Check the understanding, ask and give reasons, respond politely, encourage team mates	3, 9, 15, 21, 26, 31	6
Interpersonal Skills	Open discussion, feelings of other members, listen to idea with open mind, patient and tolerate ideas	4, 10, 16, 22, 27, 32, 35, 38, 41, 43	10
Communication Skills	Communicate with other team members	5, 11, 17, 23, 28	5
Problem Solving Skills	Plan the works, organize information, apply concepts to real problems, understand problems, open-ended problems	6, 12, 18, 24, 29, 33, 36, 39, 42, 44, 45	11
		<b>Total</b>	<b>45</b>

### 3.5 Procedure of Research

The research started by collecting the information from articles about how cooperative learning been practice among the students. Next step is discussion with the supervisor about how to carry out the research and to design a questionnaire. The instrument for this research was adapted from Mourtos and Allen (2000). After the instrument was modified and added with more statements, the pilot study was carried out among thirty students of second years of Faculty of Education, who would not be taking part in the real study. The data collected from the pilot study were used to make correction to the questionnaire before the real study was carried out.

The information about the lecturers and students who involved in cooperative learning was collected with the cooperation from the entire deputy deans from the eight faculties in UTM (see Appendix C for permission letter from faculty). The students who involved with cooperative learning were chosen randomly from all the eight faculties. After that, permission was obtained from all the lecturers to distribute the questionnaire to the students. This step was carried out during the real study.

The questionnaire consists of two sections, section A is the background of the students and section B is the statements of students' perspective on cooperative learning. Students need to answer the both section. The questionnaires were distributed to the students on January 2005. The data collected was analyzed and evaluated to answer the research questions in this research.

### 3.6 Pilot Study

A pilot study was carried out to collect the information about the validity of the statements, clearness of the statements, language and understanding of the statements and to determine the time needed to answer the questionnaire.

The pilot study was carried out in January 2005 among the second year students from Faculty of Education. Thirty students were involved in the pilot study. From the pilot study, the time needed to answer the questionnaire was found to be about 10 minutes. Some of the statement in the questionnaire was corrected. The first statement was divided in to two statements. Correction to the typing error for statement number seven was done. Students also had problem to understand the number eleven and number forty two statements. The statements were corrected. The forty five statements were divided into six categories. It can cause halo effects to the students. So the questionnaire was rearranged randomly. All the corrections on the questionnaire were shown in Table 3.2.

The pilot study was carried out to test the reliability of the questionnaire. The reliability test used for the questionnaire is the Alpha Cronbach method. The Statistical Package for Social Science (SPSS) version 11.5 was used to determine the reliability of the questionnaire. This method focused on the level of internal consistency of an instrument used in a study. Thus, a certain level of reliability of the questionnaire had to be set so that the new test could be assessed and improved if needed to achieve high reliability standard. The value of reliability was 0.9591.

**Table 3.2: The corrections on questionnaire according to pilot study**

<b>Categories</b>	<b>Original</b>	<b>Correction (rearranged randomly)</b>
On attitude related to teamwork	1. I enjoy working with others in and outside the classroom (be it studying together, working on the problem, preparing for a test, taking a test or performing an experiment in the lab)	1. I enjoy working with others in the classroom  7. I enjoy working with others outside the classroom
On attitude related to teamwork	7. My grade should depend effort is a fair way to grade.	37. My grade should depend only on my own efforts.
On understanding the course	10. My class scores have been greater as a result of team effort.	8. My scores in exam have been greater as a result of team effort.
On problem solving skills	42. Teamwork has helped me develop my ability to define and apply a systematic approach.	39. Teamwork has helped me develop my ability to define and apply a systematic approach to solve a problem.

### 3.7 Data Analysis

This part discusses how the data was analysed to look at the students' perspective on cooperative learning for the six categories and also to look at any significant differences between male and female students on cooperative learning as well as for the difference between the students' perspective for the eight faculties on cooperative learning.

Data were analyzed using the SPSS statistical computer package (Statistical Package for Social Science). Frequency, percentage and mode scores were used to look

at the students' perspective on cooperative learning. The mode was used mainly to look at the students' perspective on cooperative learning because the questionnaire was in Likert 5-scale which is an ordinal scale. The mode is a measure of central tendency for data that is considered nominal or ordinal. The mode is the value that occurs most frequency in a given distribution of observations.

t-tests were used to determine if there is any significant difference between male and female students on cooperative learning. The alpha significant at 0.05 was used because most behavioral scientists agree that an alpha level of 0.05 is reasonable to be use in a research (Vernoy and Kyle, 2002). The one way ANOVA were conducted to determine any significant difference between the students' perspective for the eight faculties on cooperative learning. All the data was shown in the form of tables.

### **3.8 Summary**

This chapter discussed about the methodology of the research. This is a quantitative research because it involved the questionnaire for the students. The data collection method was questionnaire to look at the students' perspective on cooperative learning, which to collect the data on the students' perspective on cooperative learning, the difference between male and female students' perspective on cooperative learning and also the difference between the students' perspective for the eight faculties on cooperative learning.

## CHAPTER IV

### DATA ANALYSIS

#### 4.1 Introduction

This chapter presents the results and analysis of the data of the research. All the data in the research was obtained from the questionnaire on the students' perspective on cooperative learning answered by the students. The responses were collected and analyzed to answer the three research questions.

The data analysis was divided into four sections. Section 4.2 discusses the background of the respondents. Section 4.3 discusses the students' perspective on cooperative learning, followed by section 4.4 which discusses the difference between male and female students' perspective on cooperative learning. Section 4.5 discusses the difference between the students' perspective for the eight faculties on cooperative learning.

## 4.2 The Background of the Respondents

The background of the respondents involved in this research is shown in Table 4.1.

**Table 4.1: The background of the respondents**

Demography		Frequency	Percentage (%)
Gender	Male	147	50.50
	Female	140	48.10
Studying in year	First year	75	25.80
	Second year	60	20.60
	Third year	0	0.00
	Fourth year	42	14.40
	Fifth year	114	39.20
Faculties	FP	34	11.70
	FS	38	13.10
	FKM	41	14.10
	FKKKSA	37	12.70
	FAB	36	12.40
	FPPSM	24	8.20
	FKE	39	13.40
	FKA	42	14.40

n = 291

There were 147 male students (51%) and 140 female students (48%) involved in the study. They were from the eight faculties of the university. Most of them were in the fifth year 114 students (39%) followed by the first year 75 students (26%).

### 4.3 The Students' Perspective on Cooperative Learning

The students' perspective on cooperative learning is divided according to six categories: Attitude Related to Teamwork, Understanding the Course, Collaboration, Communication Skills, Interpersonal Skills and Problem Solving Skills.

#### 4.3.1 Attitude Related to Teamwork

In this category, there were nine statements in the questionnaire. All the responses obtained for the nine statements are shown in Table 4.2.

**Table 4.2: Level of Agreement regarding to Attitude Related to Teamwork**

Valid	Strongly disagree (1)	Disagree (2)	Do not feel strongly about it (3)	Agree (4)	Strongly agree (5)	Level of Agreement
<b>Items</b>	<b>Frequency and Percentage</b>					
<b>1</b>	3(1.0%)	2(0.7%)	47(16.2%)	<b>181(62.2%)</b>	58(19.9%)	Agree
<b>7</b>	4(1.4%)	5(1.7%)	65(22.3%)	<b>150(51.5%)</b>	67(23.0%)	Agree
<b>19</b>	4(1.4%)	23(7.9%)	80(27.5%)	<b>120(41.2%)</b>	64(22.0%)	Agree
<b>25</b>	4(1.4%)	8(2.7%)	59(20.3%)	<b>166(57.0%)</b>	54(18.6%)	Agree
<b>30</b>	4(1.4%)	11(3.8%)	92(31.6%)	<b>150(51.5%)</b>	33(11.3%)	Agree
<b>34</b>	5(1.7%)	8(2.7%)	81(27.8%)	<b>153(52.6%)</b>	44(15.1%)	Agree
<b>40</b>	4(1.4%)	25(8.6%)	99(34.0%)	<b>125(43.0%)</b>	38(13.1%)	Agree
<b>13</b>	37(12.4%)	77(26.5%)	119(40.9%)	46(15.8%)	11(3.8%)	DNFSA
<b>37</b>	26(8.9%)	79(27.1%)	115(39.5%)	54(18.6%)	17(5.8%)	DNFSA

n=291

DNFSA-do not feel strongly about it

It can be seen that most of the respondents' chose "agree" for seven of the statements (statements number 1, 7, 19, 25, 30, 34 and 40). For statements number 13 and 37, most of them responded "do not feel strongly about it".

### 4.3.2 Understanding of the Course

There were four statements for the understanding of the course category in the questionnaire. The responses are shown in Table 4.3.

**Table 4.3: Level of Agreement regarding to Category of Understanding the Course**

Valid	Strongly disagree (1)	Disagree (2)	Do not feel strongly about it (3)	Agree (4)	Strongly agree (5)	Level of Agreement
<b>Items</b>	<b>Frequency and Percentage</b>					
<b>2</b>	1(0.3%)	7(2.4%)	45(15.5%)	<b>158(54.3%)</b>	80(27.5%)	Agree
<b>8</b>	2(1.0%)	29(10.0%)	110(37.8)	<b>133(45.7%)</b>	16(5.5%)	Agree
<b>14</b>	1(0.3%)	11(3.8%)	69(23.7%)	<b>176(60.5%)</b>	32(11.0%)	Agree
<b>20</b>	1(0.3%)	6(2.1%)	63(21.6%)	<b>186(63.9%)</b>	35(12.0%)	Agree

n=291

For this category, most of the respondents responded "agree" to the four statements.

### 4.3.3 Collaboration

There were six statements in this category. Table 4.4 shows the responses by the students.

**Table 4.4: Level of Agreement regarding to Category of Collaboration**

Valid	Strongly disagree (1)	Disagree (2)	Do not feel strongly about it (3)	Agree (4)	Strongly agree (5)	Level of Agreement
Items	Frequency and Percentage					
<b>9</b>	3(1.0%)	6(2.1%)	95(32.6%)	<b>159</b> (54.6%)	26(8.9%)	Agree
<b>15</b>	0(0.0%)	5(1.7%)	52(17.9%)	<b>190</b> (65.3%)	41(14.1%)	Agree
<b>21</b>	2(0.7%)	4(1.4%)	87(29.9%)	<b>165</b> (56.7%)	32(11.0%)	Agree
<b>26</b>	2(0.7%)	6(2.1%)	72(24.7%)	<b>176</b> (60.5%)	35(12.0%)	Agree
<b>31</b>	0(0.0%)	0(0.0%)	71(24.4%)	<b>184</b> (63.2%)	36(12.4%)	Agree
<b>3</b>	3(1.0%)	31(10.7%)	126(43.3%)	102(35.1%)	28(9.6%)	DNFSA

n=291

DNFSA- do not feel strongly about it

Most of the respondents' chose "agree" to the five statements in this category. Only one statement (number 3) in which the respondents responded "do not feel strongly about it".

#### 4.3.4 Interpersonal Skills

Interpersonal skills are one of the important elements in cooperative learning. This category consists of ten statements. The responses by the students are shown in Table 4.5.

**Table 4.5: Level of Agreement regarding to Category of Interpersonal Skills**

Valid	Strongly disagree (1)	Disagree (2)	Do not feel strongly about it (3)	Agree (4)	Strongly agree (5)	Level of Agreement
Items	Frequency and Percentage					
<b>4</b>	1(0.3%)	5(1.7%)	47(16.2%)	<b>189(64.9%)</b>	47(16.2%)	Agree
<b>10</b>	0(0.0%)	9(3.1%)	60(20.6%)	<b>194(66.7%)</b>	27(9.3%)	Agree
<b>16</b>	0(0.0%)	5(1.7%)	50(17.2%)	<b>195(67.0%)</b>	41(14.1)	Agree
<b>22</b>	0(0.0%)	3(1.0%)	65(22.3%)	<b>187(64.3%)</b>	36(12.4%)	Agree
<b>27</b>	0(0.0%)	2(0.7%)	51(17.5%)	<b>177(60.8%)</b>	61(21.0%)	Agree
<b>32</b>	0(0.0%)	3(1.0%)	25(8.6%)	<b>205(70.4%)</b>	56(19.2%)	Agree
<b>35</b>	1(0.3%)	9(3.1%)	56(19.2%)	<b>194(66.7%)</b>	31(10.7%)	Agree
<b>38</b>	0(0.0%)	4(1.4%)	82(28.2%)	<b>175(60.1%)</b>	30(10.3%)	Agree
<b>41</b>	0(0.0%)	3(1.0%)	44(15.1%)	<b>202(69.4%)</b>	44(14.4%)	Agree
<b>43</b>	0(0.0%)	3(1.0%)	42(14.4%)	<b>201(69.1%)</b>	45(15.5%)	Agree

n=291

In this category, most of the respondents' chose "agree" for all statements. They do agree that interpersonal skills are important in the cooperative learning.

### 4.3.5 Communication Skills

There were five statements in this category. All the responses obtained for these five statements are shown in Table 4.6.

**Table 4.6: Level of Agreement regarding to Category of Communication Skills**

Valid	Strongly disagree (1)	Disagree (2)	Do not feel strongly about it (3)	Agree (4)	Strongly agree (5)	Level of Agreement
Items	Frequency and Percentage					
<b>5</b>	1(0.3%)	3(1.0%)	56(19.2%)	<b>179(61.5%)</b>	51(17.5%)	Agree
<b>11</b>	0(0.0%)	11(3.8%)	69(23.7%)	<b>180(61.9%)</b>	31(10.7%)	Agree
<b>17</b>	0(0.0%)	5(1.7%)	43(14.8%)	<b>187(64.3%)</b>	56(19.2%)	Agree
<b>23</b>	2(0.7%)	13(4.5%)	54(18.6%)	<b>173(59.5%)</b>	49(16.8%)	Agree
<b>28</b>	0(0.0%)	7(2.4%)	58(19.9%)	<b>176(60.5%)</b>	50(17.2%)	Agree

n=291

Most of the students responded “agree” for all the five statements in this category. The students agreed that communication skills are one of the elements in the cooperative learning.

### 4.3.6 Problem Solving Skills

This category consists of eleven statements. All the data obtained for the eleven statements are shown in Table 4.7.

**Table 4.7: Level of Agreement regarding to Category of Problem Solving Skills**

Valid	Strongly disagree (1)	Disagree (2)	Do not feel strongly about it (3)	Agree (4)	Strongly agree (5)	Level of Agreement
Items	Frequency and Percentage					
<b>6</b>	1(0.3%)	14(4.8%)	68(23.4%)	<b>164(56.4%)</b>	43(14.8%)	Agree
<b>12</b>	1(0.3%)	13(4.5%)	59(20.3%)	<b>186(63.9%)</b>	31(10.7%)	Agree
<b>18</b>	0(0.0%)	8(2.7%)	50(17.2%)	<b>188(64.6%)</b>	45(15.5%)	Agree
<b>24</b>	1(0.3%)	11(3.8%)	64(22.0%)	<b>182(62.5%)</b>	33(11.3%)	Agree
<b>29</b>	0(0.0%)	6(2.1%)	60(20.6%)	<b>92(66.0%)</b>	33(11.3%)	Agree
<b>33</b>	1(0.3%)	3(1.0%)	28(9.6%)	<b>190(65.3%)</b>	69(23.7%)	Agree
<b>36</b>	1(0.3%)	7(2.4%)	53(18.2%)	<b>186(63.9%)</b>	44(15.1%)	Agree
<b>39</b>	1(0.3%)	5(1.7%)	60(20.6%)	<b>194(66.7%)</b>	30(10.3%)	Agree
<b>42</b>	1(0.3%)	5(1.7%)	60(20.6%)	<b>187(66.3%)</b>	38(13.1%)	Agree
<b>44</b>	2(0.7%)	2(0.7%)	65(22.3%)	<b>194(66.7%)</b>	28(9.6%)	Agree
<b>45</b>	1(0.3%)	6(2.1%)	50(17.2%)	<b>186(63.9%)</b>	48(16.5%)	Agree

n=291

Most of the respondents' chose "agree" for all the eleven statements in this category.

### 4.3.7 The Overall Students' Perspective on Cooperative Learning

Table 4.8 shows the overall level of agreement for the students' perspective on cooperative learning for all the forty five statements in the questionnaire.

**Table 4.8: Overall level of Agreement for Students' Perspective on Cooperative Learning**

Number of statements	Mean level of agreement
1 - 45	Agree
Total	Agree

The level of agreement for all the forty five statements is “agree”. The overall level of agreement for the students' perspective on cooperative learning was “agree”.

### 4.4 Male and Female Students' Perspective on Cooperative Learning

The second research question is to look at if there is any significant difference between the male and female students on cooperative learning. The data obtained in this section is analyzed into seven parts, based on the six categories of the questionnaires. The overall difference between the male and female students on cooperative learning are shown in part 4.4.7.

#### 4.4.1 Attitude Related to Teamwork

The results of t-test for this category are as shown in Table 4.9.

**Table 4.9: t-test for Male and Female Students on Category of Attitude Related to Teamwork**

	Gender	n	Mean	Std. Deviation	Sig (2-tailed) Alpha
Attitudes	Male	147	3.52	0.39	0.053
	Female	140	3.61	0.37	

Alpha Significant at 0.05

The result of t-test shows that there were no significant difference between male and female students' perspective on attitude related to teamwork. The alpha value obtained is 0.053.

#### 4.4.2 Understanding of the Course

Table 4.10 shows the result of t-test analysis for the category of understanding the course.

**Table 4.10: t-test for Male and Female Students on Category of Understanding the Course**

	Gender	n	Mean	Std. Deviation	Sig (2-tailed) Alpha
Understand	Male	147	3.70	0.55	0.004
	Female	140	3.87	0.44	

Alpha Significant at 0.05

There was significant difference between the male and female students' perspective on the understanding of the course. The alpha value is 0.004.

#### 4.4.3 Collaboration

There were six statements in this category. Table 4.11 shows the t-test analysis for this category.

**Table 4.11: t-test for Male and Female Students on Category of Collaboration**

	Gender	n	Mean	Std. Deviation	Sig (2-tailed) Alpha
Collaboration	Male	147	3.73	0.40	0.497
	Female	140	3.76	0.36	

Alpha significant at 0.05

There was no significant difference between the male and female students for this category. The alpha value is 0.497.

#### 4.4.4 Interpersonal Skills

The fourth category is the students' perspective on interpersonal skills. It consisted of ten statements. The result of t-test is as shown in Table 4.12.

**Table 4.12: t-test for Male and Female Students on Category of Interpersonal Skills**

	Gender	n	Mean	Std. Deviation	Sig(2-tailed) Alpha
Interpersonal	Male	147	3.88	0.42	0.070
	Female	140	3.97	0.37	

Alpha significant at 0.05

There was no significant difference between the male and female students for this category. The alpha value obtained was 0.07.

#### 4.4.5 Communication Skills

There were five statements in this category. There was no significant difference between the male and female students for this category. The alpha value obtained was 0.086. The result of t-test is as shown in Table 4.13.

**Table 4.13: t-test for Male and Female Students on Category of Communication Skills**

	Gender	n	Mean	Std. Deviation	Sig (2-tailed) Alpha
Communication	Male	147	3.86	0.51	0.086
	Female	140	3.95	0.41	

Alpha significant at 0.05

#### 4.4.6 Problem Solving Skills

Problem solving skills is the final category in the students' perspective on the cooperative learning. It consisted of eleven statements. The following Table 4.14 shows the result of t-test analysis for this category.

**Table 4.14: t-test for Male and Female Students on Category of Problem Solving Skills**

	Gender	n	Mean	Std. Deviation	Sig (2-tailed) Alpha
Problem solving	Male	147	3.85	0.45	0.177
	Female	140	3.91	0.39	

Alpha significant at 0.05

There was no significant difference between male and female students in this category. The alpha value obtained was 0.177.

#### 4.4.7 The Overall Differences between Male and Female Students' Perspective on Cooperative Learning

Table 4.15 shows the overall mean and alpha for the differences between male and female students on cooperative learning.

**Table 4.15: Overall t-test for the male and female students**

	Gender	n	Mean	Std. Deviation	Sig (2-tailed) Alpha
Overall	Male	147	3.74	0.37	0.030
	Female	140	3.83	0.32	

Alpha significant at 0.05

Overall there was significant difference between male and female students on cooperative learning. The alpha value obtained was 0.03.

#### **4.5 The Students' Perspective for the Eight Faculties on Cooperative Learning**

The third research question is to look if there is any significant difference between the students' perspective for the eight faculties on cooperative learning. The data obtained in this section was analyzed using the one way ANOVA. The data obtained in this section divided into seven parts, based on the six categories in the questionnaire on cooperative learning. The overall one way ANOVA analysis for the difference between the students' perspective for the eight faculties on cooperative learning is as shown in Table 4.28.

##### **4.5.1 Attitude Related to Teamwork**

The mean of attitude related to teamwork and the result of one way ANOVA for the eight faculties in the study is as shown in Table 4.16 and Table 4.17 respectively.

**Table 4.16: The mean for the category of Attitude Related to Teamwork**

Faculties	n	Mean	Std. Deviation
Education	34	3.64	0.47
Science	38	3.74	0.43
Management	24	3.50	0.25
Mechanical engineering	41	3.51	0.39
Built environment	36	3.56	0.30
Civil engineering	42	3.55	0.36
Chemical	37	3.61	0.41
Electrical engineering	39	3.49	0.40
Total	291	3.57	0.39

**Table 4.17: One-way ANOVA for category of Attitude Related to Teamwork**

	Sum of Squares	df	Mean Square	F	Significant Alpha
Between Groups	1.679	7	0.240	1.609	0.132
Within Groups	42.184	283	0.149		
Total	43.863	290			

Alpha significant at 0.05

There was no significant difference between the students' perspective for the eight faculties for this category. The alpha value obtained was 0.132.

#### **4.5.2 Understanding of the Course**

Table 4.18 and Table 4.19 show the mean and the one way ANOVA analysis for the eight faculties for this category respectively.

**Table 4.18: The mean for the category of Understanding the Course**

Faculties	n	Mean	Std. Deviation
Education	34	3.97	0.54
Science	38	3.74	0.49
Management	24	3.80	0.27
Mechanical engineering	41	3.38	0.51
Built environment	36	3.87	0.42
Civil engineering	42	3.88	0.57
Chemical	37	3.89	0.45
Electrical engineering	39	3.81	0.51
Total	291	3.79	0.51

**Table 4.19: The one-way ANOVA for category of Understanding the Course**

	Sum of Squares	df	Mean Square	F	Significant Alpha
Between Groups	8.890	7	1.270	5.351	0.000
Within Groups	67.166	283	0.237		
Total	76.056	290			

Alpha significant at 0.05

There was significant difference between the students' perspective for the eight faculties for this category because the alpha value obtained was 0.00.

### 4.5.3 Collaboration

The third category is collaboration. The mean and one way ANOVA analysis for this category is as shown in Table 4.20 and Table 4.21 respectively.

**Table 4.20: The mean for the category of Collaboration**

Faculties	n	Mean	Std. Deviation
Education	34	3.84	0.36
Science	38	3.71	0.40
Management	24	3.74	0.35
Mechanical engineering	41	3.73	0.43
Built environment	36	3.71	0.30
Civil engineering	42	3.83	0.38
Chemical	37	3.70	0.40
Electrical engineering	39	3.72	0.40
Total	291	3.75	0.38

**Table 4.21: The one-way ANOVA for category of Collaboration**

	Sum of Squares	df	Mean Square	F	Significant Alpha
Between Groups	0.813	7	0.116	0.792	0.594
Within Groups	41.485	283	0.147		
Total	42.298	290			

Alpha significant at 0.05

There was no significant difference between the students' perspective for the eight faculties on category of collaboration because the alpha value obtained was 0.594.

#### 4.5.4 Interpersonal Skills

Table 4.22 shows the mean for the each faculty for the interpersonal skills. While Table 4.23 shows the one way ANOVA analysis for this category respectively. .

**Table 4.22: The mean for the category of Interpersonal Skills**

Faculties	n	Mean	Std. Deviation
Education	34	3.97	0.44
Science	38	3.93	0.43
Management	24	3.86	0.26
Mechanical engineering	41	3.86	0.37
Built environment	36	3.93	0.26
Civil engineering	42	3.95	0.47
Chemical	37	3.98	0.38
Electrical engineering	39	3.94	0.47
Total	291	3.93	0.40

**Table 4.23: The one-way ANOVA for the category of Interpersonal Skills**

	Sum of Squares	df	Mean Square	F	Significant Alpha
Between Groups	0.472	7	0.067	0.418	0.891
Within Groups	45.656	283	0.161		
Total	46.128	290			

Alpha significant at 0.05

The value of the mean was difference for the faculties but there were no significant difference between the students' perspective for the eight faculties for this category because the alpha value obtained was 0.891.

#### 4.5.5 Communication Skills

The fifth category is communication skills. The mean and one way ANOVA analysis for this category is as shown in table 4.24 and table 4.25 respectively.

**Table 4.24: The mean for the category of Communication Skills**

Faculties	n	Mean	Std. Deviation
Education	34	3.94	0.50
Science	38	3.93	0.48
Management	24	3.81	0.31
Mechanical engineering	41	3.79	0.45
Built environment	36	3.96	0.31
Civil engineering	42	3.98	0.56
Chemical	37	3.83	0.49
Electrical engineering	39	4.02	0.53
Total	291	3.91	0.47

**Table 4.25: The one-way ANOVA for the category of Communication Skills**

	Sum of Squares	df	Mean Square	F	Significant Alpha
Between Groups	1.868	7	0.267	1.200	0.303
Within Groups	62.921	283	0.222		
Total	64.789	290			

Alpha significant at 0.05

There was no significant difference between the students' perspective for the eight faculties for communication skills because the alpha value obtained is 0.303.

#### **4.5.6 Problem Solving Skills**

The mean and one way ANOVA for problem solving skills is as shown in table 4.26 and table 4.27 respectively.

**Table 4.26: The mean for the category of Problem Solving Skills**

Faculties	n	Mean	Std. Deviation
Education	34	3.93	0.47
Science	38	3.92	0.40
Management	24	3.83	0.35
Mechanical engineering	41	3.77	0.42
Built environment	36	3.89	0.27
Civil engineering	42	3.92	0.48
Chemical	37	3.92	0.44
Electrical engineering	39	3.92	0.49
Total	291	3.89	0.43

**Table 4.27: The one-way ANOVA for the category of Problem Solving Skills**

	Sum of Squares	Mean Square	F	Significant Alpha
Between Groups	0.903	0.129	0.708	0.665
Within Groups	51.575	0.182		
Total	52.478			

Alpha significant at 0.05

For this final category, there was difference for the value of mean but the one way ANOVA shows no significant difference between the students' perspective for the eight faculties for this category because the alpha value obtained was 0.665.

#### **4.5.7 The Overall one way ANOVA for the Differences between the Faculties on Cooperative Learning**

Table 4.28 shows the overall alpha value obtained for the differences between the faculties on cooperative learning

**Table 4.28: The overall one way ANOVA for the faculties**

	Sum of Squares	df	Mean Square	F	Significant Alpha
Between Groups	0.806	7	0.115	0.924	0.488
Within Groups	35.259	283	0.125		
Total	36.065	290			

Overall it shows that there was no significant difference between the students' perspective for the eight faculties on cooperative learning. The alpha value obtained was 0.488.

#### **4.6 Summary**

This chapter discussed the analysis of data which include the students' perspective on cooperative learning for the six categories: Attitude Related to Teamwork, Understanding the Course, Collaboration, Interpersonal Skills, Communication Skills and Problem Solving Skills. The second section discussed about the significant difference between the male and female students for the six categories of cooperative learning and the third section discussed the analysis of data about the significant difference between the students' perspective for the eight faculties for the six categories.

The result shows that the students' perspectives on cooperative learning were positive because most of the respondents' chose "agree" for most of the statements for all the six categories in the questionnaire. For the differences between male and female students for the six categories, only for the category of understanding the course shows significant difference and other five categories no significant difference. For the

differences between the eight faculties for the six categories, only for the category of understanding the course shows significant difference compared to other five categories no significant differences although the mean is different.

Overall it shows that there is significant difference between the male and female students on cooperative learning while no significant difference between the students' perspective for the eight faculties on cooperative learning.

## **CHAPTER V**

### **DISCUSSION, CONCLUSION AND SUGGESTIONS FOR FURTHER RESEARCH**

#### **5.1 Introduction**

As mentioned previously this study was carried out to determine the students' perspective on cooperative learning and if there exist any significant difference between male and female students on the cooperative learning. It was also to determine if there exist any significant differences between the students' perspective for the eight faculties which practice cooperative learning. The study was carried out on 291 students from eight faculties in UTM who were involved in cooperative learning in the classroom.

This chapter is divided into four sections. Section 5.2, students' perspective on cooperative learning, the difference between the male and female students' perspective on cooperative learning and the difference between the students' perspective for the eight faculties perspective on cooperative learning were discussed. The conclusion and implication of the study on students learning were made in Section 5.3 while section 5.4

discusses suggestion for further studies that could be carried out. This chapter ended with the summary in Section 5.5.

## **5.2 Discussion**

The discussion is divided into 4 main sections. The first section discusses the background of the respondents and followed by the discussion on the students' perspective on cooperative learning for the six categories. The third section discusses the significant difference between the male and female students' perspective on cooperative learning and the last section discusses about the difference between the students' perspective for the eight faculties on cooperative learning.

### **5.2.1 The Background of the Respondents**

There were 147 male students (51%) and 140 female students (48%) involved in this study. The fifth year students were 114 students (39%) followed by the first year 75 students (26%). The rest were from second year (21%) and fourth year (14%) students. This is shown in Table 4.1.

The respondents were from the eight faculties in UTM. The respondents from Faculty of Mechanical and Civil Engineering were 14% followed by the Faculty of Electrical Engineering, Faculty of Chemical and Natural Resources Engineering and Faculty of Science 13%. 12% of the respondents were from Faculty of Education and

Faculty of Built Environment. The Faculty of Management and Human Development shows the lowest percentage 8%.

### **5.2.2 The Students' Perspective on Cooperative Learning**

The overall data obtained from the questionnaire shows that students' perspective on cooperative learning is positive. Most of the students chose "agree" for most of the statements in the six categories of the questionnaire.

The category of Attitude that was Related to Teamwork consisted of nine statements. Seven of these statements showed the respondents chose "agree". This finding was supported by Wright (1996) who concluded that the means for the statements of "I enjoyed the group projects than regular lab experiment" was high. This is one of the statements Attitudes that was Related to Teamwork category. The finding is also supported by Morgan and Bobbette (2003), who found out that 100% of the students he surveyed, described the cooperative learning as less stressful than individual learning and the students also expressed feeling of support by their teammates.

Two of the statements showed the respondents chose "do not feel strongly about it". The statements were number 13 "I prefer to work independently" and the statement number 30 "Knew that teammates work affects my grades makes my partners try harder". Similar finding was found by Morgan and Bobbette (2003) who concluded that although the students were doing all the work but they did not trust their partners. This could be due to the fact although they prefer to work in a team they also preferred to work independently as well.

The second category is the Understanding the Course. This category consisted of four statements. The data obtained showed most of the respondents chose “agree”. This finding is supported by Ross and Fulton (1994), who concluded that the students’ confidence in their ability to understand complex concepts were more effective in cooperative groups. Research by Mourtos and Allen (2000) too showed that the cooperative learning has helped the students in the understanding of their lesson. Finding by Felder (1996), Wright (1996), Towns and Grant (1997), Kogut (1997), Mohd Zaki and Talib (2003) and Gupta (2004) showed that cooperative learning could increase the students’ understanding of materials and was effectively helped the students to learn.

The third category is the Collaboration. It consisted of six statements. Analysis of the data shows most of the respondents “agreed” to the five statements and “do not feel strongly about it” for one statement. This is supported by Felder (1996), who observed that the students, since they were juniors, studied together, partied together and complained with unusual unanimity when they were unhappy about something in the curriculum. Research by Gupta (2004), showed that 89% of the students “agreed” that their group members provided support and encouraged their efforts in learning.

The fourth category is the Interpersonal Skills. This is one of the main five elements in cooperative learning. It consisted of ten statements. All the statements showed the respondents chose “agree”. This finding is supported by Mourtos and Allen (2000), whose research showed that students of all levels “agree” that cooperative learning has helped them develop interpersonal skills. Research by Morgan and Bobbette (2003), too showed that students expressed trust in their peers. Research by Ross and Fulton (1994) supported this finding. They found that students instead of competing with one another, engaged in a truly cooperative venture as they attempt to help each other to master learning the materials. Finding by Towns and Grant (1997) and Gupta (2004), showed that both male and female students found the interactive aspects

of sharing ideas and receiving feedback, beneficial and supported and encouraged other members' efforts.

The fifth category is the Communication Skills. It consisted of five statements. Most of the respondents chose "agree" for the statements. This is indeed not surprising because cooperative learning requires the students to spend significant amount of time discussing concepts and problems among themselves. Research by Ross and Fulton (1994), showed that the classroom presentations and final oral exams taught the students to think and to listen more carefully, formulate questions and answers more carefully and are better able to defend their answers. This finding is similar to Gupta (2004), who concluded that most of the students "agree" that cooperative learning activities had improved their ability to interact with other students.

The last category is Problem Solving Skills. It consisted of eleven statements. From the data analysis, all the statements shows good results in which most of the respondents has chosen "agree". Research by Ross and Fulton (1994), found that the students' thinking and problem solving skills improve significantly by using cooperative learning in the classroom. Wright (1996), found that students who got the opportunity working with problems that were more representative of real life, exercise creativity in the problem solving. Finding by Gupta (2004) also concluded that cooperative learning activities helped the students improve their problem solving skills.

Overall the results obtained shows that the students' perspective on cooperative learning was positive because the overall mode is 4.

### 5.2.3 Male and Female Students' Perspective on Cooperative Learning

Data analysis by using t-test, shows that there is significant difference between the male and female students' perspective on cooperative learning. The overall mean for male and female students' perspective are 3.74 and 3.83 respectively. The alpha obtained was 0.03. Several studies had showed that females and males learn differently. Female students when working cooperatively with a partner, were more interested in exchanging ideas, and were more positive about their own performances compared to those who worked individually (Savard *et al.*, 1995). This is supported by Keri (2002), who studied that males' and females' learning differences have concluded that more females students are relational learners, whereas the males students are independent learners. Furthermore female students prefer to learn new technologies with technical help, and with their peers, whereas most male students prefer learning these technologies on their own ( Indhu Rajagopal and Nis Bojin, 2003).

In the classroom, females students preferred to use a conversational style that fosters group consensus and builds ideas on top of each other; the interrelationship of thoughts and actions is paramount. Males, conversely, learned through argument and individual activity behaviors fostered early (Ong, 1981). This finding is also supported by Allen and Van Sickle (1987), who concluded that, females preferred collaborative and participative learning styles and experienced communication apprehension in the classroom. Researches (Seegars & Boekaerts, 1996; Goodwin & Stevens, 1993; Piper, 1994) found that female students preferred a teacher that established a cooperative classroom environment, instead of a competitive classroom environment.

#### **5.2.4 The Students' Perspective for the Eight Faculties on Cooperative Learning**

The overall data obtained for this section, shows that there were no significant difference between the students' perspective for the eight faculties on cooperative learning. From the one-way ANOVA the alpha obtained was 0.924. It shows there were no significant differences between the students' perspective for the eight faculties on cooperative learning. This is because the road shows on CL in UTM are held at all faculties to create awareness on the need for change in the teaching and learning techniques and what is CL. Evidence of implementations and outcomes in the form of students' performance and response were also shared during the road shows. Other than road shows, the lecturers were exposed to workshops on the necessary skills of using CL methods in the teaching and learning process. So even though the students were from difference faculties, the students' perspective on cooperative learning was same because the CL methods and techniques distributed by the university in workshops to all the lecturers are the same.

### **5.3 Conclusion and Implication**

Overall the research showed that the students' perspective on cooperative learning was positive. The lecturers can continue using the cooperative learning in the classroom. Other lecturers who still involved with traditional learning could start to apply cooperative learning among their students. It is the lecturer's responsibility to provide opportunities for the students to practice and develop cooperative learning. But group work activities need better planning and execution. Lecturers at the faculty especially those wished to apply cooperative learning need more exposure and sharing of information on the best approach of group work activities (Mohd Zaki and Talib, 2003).

The cooperative learning benefits the students in many ways. In this study, it shows that for the six categories, the Attitude Related to Teamwork, Understanding of the Course, Collaboration, Interpersonal Skills, Communication Skills and Problem Solving Skills, students chose “agree” from the Likert 5 scales. Students learned easily from one another. Difficult materials, concepts and points can be taught and learned effectively in a group. Group work helped the students to learn and care about others (Mohd Zaki and Talib, 2003). The category of Attitude Related to Teamwork helps the students to feel less stressful working in a group and make them to work harder to scores points for themselves and for their teammates.

The category of Understanding of the Course helps the students learn to work with each other to understand the materials in the classroom. The students’ score in exams are also higher when working in a team and the students were able to help themselves and their teammates to learn the material. The next categories of cooperative learning are collaboration. This category helps the students to respond politely to disagreement in the team, encourages the students to feel committed to the team, gives reasons to the questions asked by any of the teammates which will help them to understand more and also helps the students to learn to negotiate and reach agreement in the team.

The next category is the Interpersonal Skills. Cooperative learning helps the students to negotiate agreements when handling conflicts in a team. It also help the students develop their ability for open discussion and understand other peoples’ feelings. Interpersonal skills also help the students to be able to listen to the ideas of others with open mind.

The last two categories are the Communication Skills and the Problem Solving Skills. Cooperative learning develops higher thinking skills (Webb, 1982). When

students work in pairs or group, one person is listening while others is discussing the question under investigation. Both are developing valuable problem solving skills by formulating their ideas, discussing them, receiving immediate feedback, and responding to questions and comments (Peterson and Swing, 1985). Cooperative learning developed students' oral communication skills (Johnson and Johnson, 1985). When students work together, one partner verbalizes his or her idea while the other listens, asks questions or comments on what she or he has heard.

The research result showed there were significant difference between the male and female students on cooperative learning. A student's learning style reflects the manner in which he or she assimilates, processes, and recalls information (Whittington and Raven, 1995), and lecturers must recognize learning styles as a significant source of diversity in the classroom. The lecturers need to incorporate a variety of teaching methods, curriculum materials, and assessment techniques to foster and support the process of learning (Torres and Cano, 1994). This is because some students seem to develop appropriate learning styles and strategies without much formal instruction; others are limited in their styles and tend to rely on strategies that are not necessarily appropriate for all learning activities. Some students may actually be knowledgeable about different styles and strategies but are not motivated to use them in variety of courses (Zapalska and Dabb, 1999). The lecturers should be willing to change their teaching strategies and techniques based on an appreciation of the variety of student learning styles. "Teachers should try to ensure that their methods, materials, and resources fit the ways in which their students learn and maximize the learning potential of each student" (Sarasin, 1998).

Research result also shows that there was no significant difference between the students' perspective for the eight faculties on cooperative learning because the lecturers were exposed by the same workshops on CL by the university. Lecturers can encourage their colleagues to use cooperative learning. Several faculties in a different department

should try the cooperative learning method in different classes. The lecturers by meeting periodically can talk over one another experiences and exchange ideas (Herreid and Freeman, 1998).

#### **5.4 Suggestions for Further Research**

This study can be consolidated with further research to obtain clearer picture of the students' perspective on cooperative learning. The following are the suggestions:

1. This study was carried out in the Universiti Teknologi Malaysia. A larger scale should be carried out to compare the students' perspective on cooperative learning from other universities in Malaysia.
2. A qualitative study could also be carried out to look at the students' perspective on cooperative learning. Data could be collected by interviewing the respondents to obtain detail information on cooperative learning particularly in group activities. These activities should be recorded. Thus allowing us to observe the actual cooperative learning being carried out by the lecturers.
3. A study can be also carried out by taking into consideration the other five elements in cooperative learning. The five elements are the positive interdependence, face to face interaction, individual and group accountability, interpersonal skills and group processing.
4. A correlation study could be carried out to see if there is any relation between cooperative learning and the student achievements in Science.

## 5.5 Summary

This research determines the students' perspective on cooperative learning. The research results show that overall the students have a positive perspective on cooperative learning and there is significant difference between the male and female students' perspective on cooperative learning. While there is no significant difference between the students' perspective for the eight faculties on cooperative learning.

The cooperative learning helps the students to improve and build a lot of skills which will be helpful for them in their learning. The results of this study shows that the students prefer the cooperative learning in the classroom. This should motivate the lecturers to continually use the cooperative learning techniques in the classroom. The university could continue by encouraging active learning techniques especially cooperative learning, to enhance teaching and learning process.

The cooperative learning could help the university produce graduates who are relevant in today's highly competitive world. Last but not least, both faculty and students have indicated that they enjoy their classes more when cooperative learning is used in the classroom.

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## APPENDIX A

<b>From:</b>	"Nikos Mourtos" <njmourtos@sjsu.edu>  Add to Address Book  Add Mobile Alert
<b>To:</b>	"kavitha gunasagaran" <kavie_guna@yahoo.com>
<b>Subject:</b>	Re: Hello Prof Nikos J.Mourtos
<b>Date:</b>	Tue, 6 Sep 2005 14:05:14 -0700

---

---

Dear Kavitha,

You are more than welcome to use my survey in your study and modify it as you see fit.

Regards!

Nikos J. Mourtos  
Professor  
Mechanical & Aerospace Engineering  
www.engr.sjsu.edu/nikos/  
(408) 924-3867

----- Original Message -----

From: "kavitha gunasagaran" <kavie\_guna@yahoo.com>  
To: <njmourtos@sjsu.edu>  
Sent: Wednesday, August 31, 2005 4:41 AM  
Subject: Hello Prof Nikos J.Mourtos

## APPENDIX B



UNIVERSITI TEKNOLOGI MALAYSIA

### THE UTM STUDENTS' PERSPECTIVE ON COOPERATIVE LEARNING

**The purpose of this study is to:**

Look at the students' perspective on cooperative learning among the students in Universiti Teknologi Malaysia.

**Dear Respondents,**

1. It is sincerely hoped that you will give your cooperation in answering this questions as truthfully as possible.
2. All the data will be used solely for this research and will be kept private and confidential.
3. I thank you personally for your cooperation for answering the questions.

Kavitha Gunasagaran  
Master of Education (Chemistry)  
Faculty of Education  
Universiti Teknologi Malaysia

## SECTION A

### BACKGROUND OF THE RESPONDENTS

**Instruction: For each of the following questions, please mark (/) the suitable answer.**

1. Gender:
  - Male ( )
  - Female ( )
2. Races:
  - Malay ( )
  - India ( )
  - Chinese ( )
  - Others (please specify) \_\_\_\_\_
3. Studying in:
  - First year ( )
  - Second year ( )
  - Third year ( )
  - Fourth year ( )
  - Fifth year ( )
4. Faculties:
  - Faculty of Education ( )
  - Faculty of Science ( )
  - Faculty of Mechanical Engineering ( )
  - Faculty of Management and Human Resource Development ( )
  - Faculty of Civil Engineering ( )
  - Faculty of Electrical Engineering ( )
  - Faculty of Chemical and Natural Resources Engineering ( )
  - Faculty of Built Environment ( )
  - Faculty of Computer Science & Information System ( )

**SECTION B**  
**THE STUDENTS' PERSPECTIVE**

**Instruction: For each of the following statements, please mark (/) the scale that best corresponds to your position.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Do not feel strongly about it</b>	<b>Agree</b>	<b>Strongly Agree</b>

Example:

	Statements	1	2	3	4	5
1	I feel committed to my team			/		

The statements:

	Statements	1	2	3	4	5
1	I enjoy working with others in the classroom (be it studying together, working on a problem, preparing for a test, taking a test or performing an experiment in the lab).					
2	Working with others has greatly improved my understanding of the material in the class.					
3	I tried to meet with my teammates but they would not cooperate.					
4	Teamwork ha helped me develop my ability to reinforce and support ideas.					
5	Teamwork ha helped me develop my ability to clearly describe problems and ideas orally.					
6	Teamwork ha helped me develop my ability to plan my work and set goals.					
7	I enjoy working with others outside the classroom (be it studying together, working on a problem, preparing for a test, taking a test or performing an experiment in the lab).					

	<b>Statements</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
8	My class scores have been greater as a result of team effort.					
9	I responded politely to disagreement.					
10	Teamwork ha helped me develop my ability to negotiate agreements and handle conflicts.					
11	Teamwork ha helped me develop my ability to clearly describe problems and ideas in writing.					
12	Teamwork ha helped me develop my ability to stay on task while working on a problem.					
13	I prefer to work independently.					
14	My teammates were able to help me learn the material in the course.					
15	I felt committed to my team.					
16	Teamwork ha helped me develop my ability to encourage open discussion of ideas.					
17	Teamwork ha helped me develop my ability to actively listen and respond to the ideas of other people.					
18	Teamwork ha helped me develop my ability to organize information to make it easier to process.					
19	Working with others feel much less stressful than if I was to perform similar tasks alone.					
20	I was able to help my teammates learn the material in the course.					
21	I encouraged my teammates to participate in learning the material.					
22	Teamwork ha helped me develop my ability to work for and accept compromises.					
23	Teamwork ha helped me develop my ability to use technology in presentation.					
24	Teamwork ha helped me develop my ability to apply abstract concepts/ideas to real problems/situations.					
25	Knowing that my work affects my partners' grades, makes me try harder.					
26	I gave reasons to question asked by teammates.					

	<b>Statements</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
27	Teamwork ha helped me develop my ability to be aware of other peoples' feelings.					
28	Teamwork ha helped me develop my ability to make clear and confident presentation appropriate to audience.					
29	Teamwork ha helped me develop my ability to divide problems into manageable components.					
30	Knowing that teammates work affects my grades makes my partners try harder.					
31	I negotiate and reach agreement in the team.					
32	Teamwork ha helped me develop my ability to listen to the ideas of others with open mind.					
33	Teamwork ha helped me develop my ability to understand that a problem may have multiple solutions.					
34	Shared credit for shared effort is a fair way to grade.					
35	Teamwork ha helped me develop my ability to ask probing questions that clarify facts, concepts and relationships.					
36	Teamwork ha helped me develop my ability to develop several methods to solve a problem.					
37	My grade should depend only on my own efforts.					
38	Teamwork ha helped me develop my ability to evaluate arguments and evidence so that the strengths and weaknesses of competing alternatives can be judged.					
39	Teamwork ha helped me develop my ability to define and apply a systematic approach to solve a problem.					
40	I am concerned that my team members are costing me points by not doing their share of the work.					
41	Teamwork ha helped me develop my ability to be patient and tolerate ideas or solutions proposed by others.					

	<b>Statements</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
42	Teamwork ha helped me develop my ability to recognize contradictions/inconsistencies in ideas, data, etc.					
43	Teamwork ha helped me develop my ability to use discussion strategies to analyze and solve a problem.					
44	Teamwork ha helped me develop my ability to use established criteria to evaluate and prioritize solutions.					
45	Teamwork ha helped me develop my ability to recognize false in my own thinking.					

**THANK YOU**



FAKULTI PENDIDIKAN

Universiti Teknologi Malaysia • 81310 UTM, Skudai, Johor Darul Ta'zim, Malaysia



UTM.31/13.10/4 Jld. 18 ( 37 )

10 November 2005

RUJUKAN KAMI (OUR REF) :  
RUJUKAN TUAN (YOUR REF) :

**KEPADA SESIAPA YANG BERKENAAN**

Tuan,

**PENGESAHAN STATUS PELAJAR**

**NAMA : KAVITHA A/P GUNASAGARAN**  
**NO. K/P : 820527-14-5964**  
**NO. METRIK : MP042038**

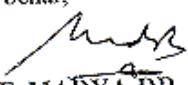
Dengan hormatnya disahkan bahawa penama yang tersebut di atas merupakan pelajar Fakulti Pendidikan, Universiti Teknologi Malaysia yang mengikuti kursus Sarjana Pendidikan (Pendidikan Kimia).

Sehubungan dengan itu sukacita sekiranya pihak tuan dapat memberikan kerjasama dan bantuan yang sewajarnya kepada beliau dalam usahanya untuk mendapatkan bahan rujukan dan maklumat bagi memenuhi kerja kursus yang dijalankan.

Sekian, dimaklumkan. Kerjasama pihak tuan sangat dihargai dan didahului dengan ucapan ribuan terima kasih.

**“ BERKHIDMAT UNTUK NEGARA “**

Yang benar,

  
**PROF. MADYA DR. MD NOR BIN BAKAR**  
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