

UNIVERSITY OF MANITOBA

A Comparison of Students' Achievement  
under the Semester System and the  
Non-semester System

by

Osmond T. Anderson

A Dissertation submitted to the Faculty of  
Graduate Studies in partial fulfillment for the  
Master's Degree

The Faculty of Education  
Winnipeg, Manitoba  
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1977

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## ABSTRACT

The object of this investigation is to compare students' academic performance under the semestered and the non-semestered school systems. The experimental design accepts the final marks obtained by students during a semester or during a traditional school year as the measures of academic achievements. The experiment is confined to Daniel McIntyre Collegiate Institute. Only courses in English, Mathematics, Chemistry, Physics, French, Geography, History, Biology and General Science, which are designated "00" University Entrance Courses are included in the study.

The universal population consists of all students who attended Daniel McIntyre Collegiate Institute between September 1972 and February 1977. This duration of time includes the three consecutive traditional school years between September 1972 and June 1975 and the three consecutive semesters between September 1975 and February 1977. Each semester is five months long.

The experimental population consists of approximately fifty students from each grade in each subject area for each semester and for each traditional school year. An equal distribution of males and females is maintained in the sample. The marks of each student are randomly selected by computer from the appropriate "master achievement mark sheets" of the Collegiate.



Using the analysis of covariance the mean scores were computerized and comparisons were made on the basis of these mean scores to the 0.05 level of confidence.

Ten null hypotheses were tested. The results of the investigation are very gratifying and they will be of significant value to educators. The general conclusions reached are: students tend to achieve at a higher level under the traditional school system than under the semestered school system; also, girls' achievements are significantly higher under the traditional system than the achievements of girls under the semestered system and are higher than the achievements of boys both under the traditional and the semestered school systems.

Since the investigation is confined to Daniel McIntyre Collegiate Institute, generalizations can only be made to comparable situations.

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## CHAPTER I

### INTRODUCTION

#### Purpose

The purpose of this study was to compare the achievement of students who studied under the semestered school system, and those who studied under the non-semestered school system at Daniel McIntyre Collegiate Institute, hereafter denoted as D.M.C.I. The comparison was made between the achievement of students who studied in three ten-month conventional years to those who studied in three semesters.

The subjects included in the investigation are the "00" courses in Mathematics, English, History, Geography, General Science, Biology, Chemistry, Physics and French.

#### Rationale for Study

Semestering has received wide acceptance in British Columbia, Alberta, Saskatchewan and Ontario. Presently it is a very popular educational innovation in Manitoba. This study is a response to the need for further investigation to clarify the effects of semestering on the academic achievement of high school students.

There are very few acceptable evaluative studies on the semester system. Usually the studies are done shortly after the new system has been instituted. They deal mainly with

the attitudes of administrators, teachers and students. The positive attitudes generally reported are not usually accompanied with evidence of validity. Many educators agree that the semester system is more flexible and adaptable to the needs of students. However, little is known regarding the academic performance of students who studied under the semester system relative to the academic performance of students who studied under the non-semester system. The contrasting claims to the superiority of one system over the other are continuing contentious issues.

This study seeks to analyze the academic achievement of students who studied under the non-semestered school system, and the academic achievement of students who studied under the semestered school system at D.M.C.I. between September 1972 and February 1977. Comparisons are made to determine the degree of differences in students' achievement which may have resulted from differences in the school's organizations. The data used is the final marks of representative samples of students who studied under the two kinds of school organizations. The comparisons are made on the basis of determined mean scores.

It is hoped that some comparative relationship will be established between the academic achievement of students who studied under the semestered and the non-semestered systems. It is further expected that the study will benefit and encourage more research to help clarify the issue. A better understanding of the academic performance of students under both school organizations will help teachers and students choose the school system more suitable for the attainment of their educational goals.



Questions of Interest to the Study

The questions of interest to the study are:-

- (1) What difference exists between the total mean achievement of all boys who studied under the semestered school system, and the total mean achievement of all boys who studied under the non-semestered school system at D.M.C.I.?
- (2) What difference exists between the total mean achievement of all girls who studied under the semestered school system, and the total mean achievement of all girls who studied under the non-semestered school system at D.M.C.I.?
- (3) What differences exist between the mean specific subject achievements of the boys who studied under the semestered school system, and the mean specific subject achievements of the boys who studied under the non-semestered school system at D.M.C.I.?
- (4) What differences exist between the mean specific subject achievements of the girls who studied under the semestered school system, and the mean specific subject achievements of the girls who studied under the non-semestered school system at D.M.C.I.?
- (5) What difference exists between the total mean achievement of all boys, and the total mean achievement of all girls, who studied under the semestered school system at D.M.C.I.?
- (6) What difference exists between the total mean achievement of all boys and the total mean achievement of all girls who studied under the non-semestered school system at D.M.C.I.?

- (7) What differences exist between the mean specific subject achievements of boys, and the mean specific subject achievements of girls, who studied under the semestered school system at D.M.C.I.?
- (8) What differences exist between the mean specific subject achievements of boys, and the mean specific subject achievements of girls, who studied under the non-semestered school system at D.M.C.I.?
- (9) What differences exist between the total mean specific subject achievements of all students who studied under the semestered school system, and the total mean specific subject achievements of all students who studied under the non-semestered school system at D.M.C.I.?
- (10) What difference exists between the overall achievement of all students who studied under the semestered school system, and the overall achievement of all students who studied under the non-semestered school system at D.M.C.I.?

#### The Null Hypotheses

The following null hypotheses were considered:-

- 1.1 There is no difference between the total mean achievement of all boys who studied under the semestered school system, and the total mean achievement of all boys who studied under the non-semestered school system at D.M.C.I.
- 1.2 There is no difference between the total mean achievement of all girls who studied under the semestered school system, and the total mean achievement of all girls who studied under the non-semestered school system at D.M.C.I.

- 1.3 There are no differences between the mean specific subject achievements of the boys who studied under the semestered school system, and the mean specific subject achievements of the boys who studied under the non-semestered school system at D.M.C.I.
- 1.4 There are no differences between the mean specific subject achievements of the girls who studied under the semestered school system, and the mean specific subject achievements of the girls who studied under the non-semestered school system at D.M.C.I.
- 1.5 There is no difference between the total mean achievement of all boys and the total mean achievement of all girls who studied under the semestered school system at D.M.C.I.
- 1.6 There is no difference between the total mean achievement of all boys, and the total mean achievement of all girls, who studied under the non-semestered school system at D.M.C.I.
- 1.7 There are no differences between the mean specific subject achievements of boys, and the mean specific subject achievements of girls, who studied under the semestered school system at D.M.C.I.
- 1.8 There are no differences between the mean specific subject achievements of boys, and the mean specific subject achievements of girls, who studied under the non-semestered school system at D.M.C.I.
- 1.9 There are no differences between the total mean specific subject achievements of all students who studied under the semestered school system, and the total mean specific

subject achievements of all students who studied under the non-semestered school system at D.M.C.I.

- 1.10 There is no difference between the overall achievement of all students who studied under the semestered school system, and the overall achievement of all students who studied under the non-semestered school system at D.M.C.I.

#### Assumptions

The following assumptions were made with sufficient support to confirm that they are valid:-

- (1) The final marks reported on the master examination mark sheets for each ten-month year, and for each semester, represent a valid measure of the students' academic achievement at D.M.C.I.
- (2) There were no significant changes in the objectives, philosophies, contents and teaching approach of the courses during the period of this investigation.
- (3) There were no significant differences in the evaluation of the students who studied under the semester system and those students who studied under the conventional ten-month year.
- (4) The use of random sampling helped to minimize the effect of the teachers' teaching styles and personalities, the varied capabilities and interests and other uncontrolled variables.

#### Limitations

- (1) The investigation was confined to D.M.C.I.

- (2) Only Grades Ten, Eleven and Twelve "00 Course" students were included in the study.
- (3) The achievement of students was defined as the final marks the students received at the end of each semester and at the end of each ten-month school year. The final mark represented the average academic achievement score of each student.

#### Definition and Explanation of Terms

Semestered Schools are characterized by a school year that is divided into two five-month semesters. The teaching day is divided into four or five periods. Each period varies from 60 to 80 minutes in duration. The student, in most cases, takes three or four courses each semester.

Non-Semestered or Traditional Schools refer to those schools that function on the traditional ten-month year plan. Generally, non-semestered schools operate on eight forty-minute periods daily. Each course runs for about forty weeks.

Subjects refer only to the "00" courses. These are the courses commonly defined as the "University Entrance Courses". The subjects included in this study are English, Mathematics, Grade X General Science, Biology, Physics, Chemistry, History, Geography and French.

Achievement is accepted herein as the measured growth in understanding and accomplishments in knowledge and comprehension of contents, concepts and processes. This measure is taken as the final mark obtained by all students at the end of a ten-

month year or at the end of a semester. The final mark is the average mark of all achievement tests written by students in a given subject during the school year or throughout the semester.

Daniel McIntyre Collegiate Institute is a senior high school located in the core area of the City of Winnipeg in the Province of Manitoba. Only Grades X, XI and XII are taught at Daniel McIntyre Collegiate Institute which has a population of less than 1,000 students. The school operated on the conventional ten-month plan until June 1975. The semester plan was introduced into the school in September 1975. The first semester begins in early September and terminates near the end of February or early March. There is a three day break for administrative work and then the second semester begins. The second semester terminates near the end of June.

Mean Specific Subject Achievement denotes the average mark calculated from the final marks of designated sub-populations of boys or girls of all grades, for a particular subject, for all semesters or non-semestered years.

Total Mean Specific Achievement means the average mark calculated from the final marks of all students, of all grades that studied a particular subject for all the semesters or all the non-semestered years.

Total Mean Achievement means the average mark calculated from the final marks of designated sub-populations of boys or girls of all grades, for all subjects and for all semesters or all non-semestered years.

Overall Achievement means the average mark calculated from the final marks of all students, for all grades, all subject areas, for all semesters or all non-semestered years.

## CHAPTER II

### REVIEW OF LITERATURE

#### Introduction

This chapter attempts to present a broad view of semestering with flashes of details wherever appropriate. Throughout the presentation an attempt is made to reveal the benefits and drawbacks of semestered schools.

The school is regarded as an integral part of the community, and as such, the school must respond to the changing educational needs of the society. References are made to the various factors which made it necessary to replace the rigid conventional school year schedule with a more flexible arrangement. Various innovative school organizations are discussed with special attention being paid to semestering. The literature indicates that semestered schools are found to be a suitable innovation to Canadian climatic conditions and lifestyles. The argument is made, that semestering or any other kind of innovative school organization should be implemented together with built-in monitoring procedures to ensure that the aims and objectives of the new school organization are being achieved. It is further expressed that the implementation of any new school organization must begin with a thorough analysis of the aims and objectives of the school.

Semestered school organization is described and compared to the traditional school plan.

At this point a brief history of semestering is introduced. It begins with the introduction of semestering in Alberta. It continues with its rapid dispersal throughout the Western Provinces and its movement into Ontario. Many reports are cited as proof of the general favourable acceptance of the semester system. A speculative account of the reasons for the introduction of semestering into Manitoba is presented. The discussion continues by detailing the mixed response of teachers, students and administrators to the semester system. Although semestering is considered to be satisfactory, it is not regarded as an ideal system. Academic achievement, retention and teachers' workload are discussed as the most controversial aspects of teaching and learning under the semestered school organization. At this point an exhaustive list of the advantages and disadvantages of the semester system is presented. The literature review then gives the views of a number of educators regarding semestering, including a strong suggestion for more research to determine its educational effectiveness relative to the traditional system. A brief look is taken at the existing condition of semestering in Manitoba and an attempt is made to predict the kinds of semestered school organizations that will emerge in the Province in the future. Some of these future organizational patterns are discussed along with their related timetable forms. The section concludes with a summary of the review of literature.



The Review

The School in a Changing Society

The public school is not an entity unto itself. By nature, it is an integral part of the society it serves. Many educators regard the school as a viable social institution, which must adjust continuously to the educational needs of the people. A central element of North American educational systems is the belief that social problems are caused mostly by the failure of the schools. It is believed also that whatever problems exist in society can be cured by the appropriate actions of the schools.

The period following the termination of the Second World War was one of supreme challenge for the schools. This was a period of rapid and continuous socio-economic changes. These changes were caused by a combination of factors. During this time many undeclared wars were fought. There was a more direct ideological confrontation between the East and the West. The super powers faced each other threateningly, and the world lingered in the gloomly shadow of a nuclear war. Out of fear and insecurity sprang a new moral consciousness. There arose the desire for a better universal human understanding and relationship. One of the consequences of all this was an increased interest in research in the various fields of learning. However, greater emphasis was placed on the research in science and technology. This resulted in an explosion of knowledge. The traditional content-orientated schools were now faced with two urgent questions: How should we teach? and

What should we teach? It was impossible to learn the voluminous bodies of knowledge that were being produced. Even if this knowledge could be learnt, the rate of production ensured, that most of it would become obsolete in a short time.

Schools could no longer be contented to teach what they consider the important areas of knowledge. Fundamentally, there are probably no important areas of knowledge anymore! John McLain, arguing for the need to adapt education to a changing society states that:

a good understanding of basic principles and relationships helps one develop broad generalization applicable to real problems, helps him to see the order and direction inherent in change and understand better the role of his own life in society.<sup>1</sup>

The school in responding to the changing educational needs must show its responsibility by teaching mastery of communication, computation and other basic skills. It must seek to develop in each learner the ability to use retrieval systems to get the relevant information needed to deal with specific issues and problems. Appropriate teaching techniques must be used to help children learn how to think, how to analyze and how to make decisions on a rational basis. The school must help students learn how to solve problems rather than to memorize solutions to problems of the past. Accordingly, McLain argued that

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<sup>1</sup>John D. McLain, Year-Round Education, Economic, Educational and Sociological Factors, (McCutchan Publishing Corp.), p. 85.

The appropriate technique is to teach each student the basic skills, concepts and principles needed to understand interrelationships, and how to draw conclusions and make generalizations about solutions of broad societal problems and understand his total environment.<sup>2</sup>

It can be concluded that the instructional aims of education have changed. The school is therefore obligated to formulate new appropriate instructional aims and to develop new organizational arrangements to ensure the realization of these aims.

The technological revolution which accompanied the increased research in science and technology helped to foster the unstable social and economic conditions. The newly developed, more sophisticated machines were replacing people in non-thinking repetitive jobs more rapidly. People gained more free time but they were ill prepared to use their increased leisure. Under such a condition, the school became the focus for much criticism. Many people became dissatisfied with the performance of the schools. However, the schools were performing in accordance with the time in which they existed. They provided generalized knowledge and skills. The schools of two decades ago were not standing still. They exhibited action for change, but much of the action was directed primarily towards expanding and improving what already existed. Satisfactory educational reforms must necessarily rest on information that reflects the times. Paradoxically, educational research never kept pace with

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<sup>2</sup>Ibid., p. 86.

research in science and technology. The schools were just trying to do their best. Today, technology, organization and process have combined to give deeper insight into better ways of achieving some of the higher purposes and aims in education that were not possible before the 1970's. Previously, programs were based almost completely on psychology. Contemporary programs are founded mainly on the generalized application of psycho-socio-anthropological findings. Educators now have a better insight into the behaviour of learners. They know more about perception and learning. They understand more about the intuitive forces that affect learning and the styles of learning. There are more and better informations on how to organize the learning settings. There are better ways of making pupil-teacher assignments to create greater opportunities for learning. There is a continuous process of creating original and more exciting instructional materials, which by comparison are superior to much of what existed in the past. The ingredients for educational changes exist. The direction of change is relatively clear. The true challenge which educators must face is to find the correct proportions in which these ingredients must be combined to satisfy the educational needs of the next one or two decades ahead.

"Accountability" is one of the powerful contemporary concepts which is having a significant effect on educational changes. The concept seems to defy definition. Everyone tends to define accountability in terms that fit his or her understanding. K. W. Bride describes "accountability" as the

". . . unsubstantiated finding which reveals that the public is clamouring for educational authorities to 'prove up' . . . or 'fold up'."<sup>3</sup> To some accountability means "a commitment to educate all students and to eliminate educational retardation in all its forms."<sup>4</sup> To others, it means "performance contracting". In a speech to a teachers' convention in Edmonton, Alberta, and reported in Element of April, 1972, Dr. John Hunt of the University of Montana asked Canadians to "totally resist the accountability movement."<sup>5</sup> He argued that the demand for accountability in the United States education has distorted values in education.<sup>6</sup> He said that "Accountability so far has meant testing, grading, judging, labelling and setting so-called academic standards, outlandish assignments, and memory work rather than thinking."<sup>7</sup> Dr. Hunt claimed that "accountability concentrates on those things which are most easily measured, to the exclusion of students' feelings and emotions."<sup>8</sup> At the Council on School Administration, Third Annual Conference at Banff in 1971 Dr. H. E. May of the University of Manitoba stated

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<sup>3</sup>K. W. Bride, "The Accountability Jungle", Alberta Teachers Magazine, March, 1972, p. 14.

<sup>4</sup>S. L. G. Chapman, "Accountability", Ontario Teachers Federation, Winter, 1972.

<sup>5</sup>Allen Berger, "Performance Contracting and Educational Accountability", Element, April, 1972.

<sup>6</sup>Loco cit.

<sup>7</sup>Loco cit.

<sup>8</sup>Loco cit.

that "accountability . . . is demonstrated in the movement to humanize the educational system and make it relevant."<sup>9</sup>

Accountability is not necessarily a simplistic demand to return to the traditional fact-learning educational programs; neither is it contrary to the modern innovative educational approaches. It is more or less a societal demand to synthesize the best of the old and the best of the new educational practices into a better system. Society wants a school system that is self-renewing, flexible and ready to change provided the change means improvement in education. Schools must be open to meaningful experimentations willing to examine old concepts and to try new ideas. The concept of accountability touches all facets of education. Donald D. Woodington, writing in Phi Delta Kappan, stated that

The result of accountability is the establishing of goals, setting specific objectives, discussing programs to meet the objectives, carrying out the programs, measuring their degree of success, comparing cost and performance under alternative programs, revising and trying again.<sup>10</sup>

Woodington described the operation of an ideal school. He has provided a model which could be very useful in the development of more efficient, effective and economical school organizations. Many educators believe that one of the best ways to meet the educational needs in a changing society is to reorganize the school year.

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<sup>9</sup>Council on School Administration, Third Annual Conference, Banff, October 8-10, 1971.

<sup>10</sup>Donald D. Woodington, "Accountability from the Viewpoint of a State Commissioner of Education", Phi Delta Kappan (October, 1972), p. 95.

### Year-Round Education

John McLain in Year-Round Education indicates that idle school buildings in summer infer economic inefficiency. When young people are out on the street getting into trouble it may mean that the existing school calendar has become obsolete. It happens that in time of tight money, increased enrolment and high building costs, people tend to consider that the school should operate on a year round basis. In the United States this happened between 1924 and 1931, and again between 1947 and 1953. The concept was rejected then because the anticipated financial savings could not be achieved and because of scheduling problems. However, the concept appeared again in 1961 with unprecedented interest among educators and the public.

It was not only the obsolescence of the school calendar and the empty classroom that prompted a return to the concept of a year-round school calendar. It was also the belief that the rigid time schedule of the traditional school calendar inhibited the development of flexibility in the curriculum, essential if the school was to undergo the necessary reformation. There was a demand for economic efficiency and for the schools to help lead the way to a better world. It was necessary for schools to operate in accordance with the living conditions of the society. Many families were forced to change their place of residence several times. Changes in employment practises compelled people to take their vacations not at set times but at the convenient times. John McLain in a reference to year-round education emphasized that ". . . the school

schedule must . . . be compatible with family lifestyles and the community living patterns."<sup>11</sup> He further stated that

Adults . . . want the school schedule to meet their convenience, but will give up some convenience for quality education and economy. They want quality education for their children but will make "sacrifices" for economy and convenience. They want economy but are willing to pay<sub>2</sub> extra for convenience and quality education.<sup>12</sup>

Out of these arguments came the demands to reshape the school year. On the 7th of April, 1970, the "Second National Seminar on Year-Round Education"<sup>13</sup> met in Harrisburg, Pennsylvania, and discussed the basic issues of year-round education. The Seminar made many recommendations. Among the recommendations were, the need to encourage experimentation in year-round education, the examination of year-round educational models which are widely accepted in terms of well defined established criteria, and the adoption of those models which have demonstrated their value and acceptability. The Seminar also recognized and adopted the following ideas:-

- (1) Neither the 180-days traditional school year nor the year-round school programs were universally acceptable.
- (2) Acceptance of the year-round school plans vary from community to community. The most acceptable of the extended school year programs are those which provide flexibility or optional attendance.

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<sup>11</sup> John D. McLain, Year-Round Education - Economic, Educational and Sociological Factors, p. 4.

<sup>12</sup> Ibid., pp. 4-5.

<sup>13</sup> Ibid., p. 9.



- (3) Since every individual is unique the school curriculum must be individualized.
- (4) Financial resources must be allocated on a priority basis. Educational programs, including the school calendar, must provide optimum efficiency.
- (5) The time students spend in school must be adopted to the changing time schedules of individuals and families.

The year-round school calendar has not found wide acceptance in Canada. Teachers use the summers to improve their qualifications. King et al stated that "the two warm summer months are the first choice of vacation for a great majority of Canadian parents and children."<sup>14</sup>

A partial report on the study of the school year by a Special Committee of the Manitoba Teachers Society concluded "that 'at present' the climatic conditions and the traditional pattern of family life would militate against an effective compulsory year-round school operation in Manitoba."<sup>15</sup>

The Committee found that of all the schools which adopted the compulsory year-round plan in the United States all but one discontinued it by 1964. It was reported, also, that in order to have a large enough summer enrolment to prevent an

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<sup>14</sup>King/Clements/Enns/Lockerbie/Warren, Semestering the Secondary School (Ontario Institute for Studies in Education in Co-operation with Ontario Secondary School Teachers' Federation), p. 14.

<sup>15</sup>A. J. Shewchuk, A Brief Summary of Selected Semester and Trimester Systems in Manitoba Schools, including a Report prepared by a Special Committee on the School Year of Manitoba Teachers' Society, (no date).

increase in per pupil cost, it would be necessary for school authorities to assign students vacation periods and attendance for each term. The Committee supported the concept of year-round education but found some of the compulsory elements unpalatable for parents and students.

#### The Trimester Plan

The Special Committee of the Manitoba Teachers' Society recommended a split-trimester system for senior and junior high schools in Manitoba. The proposed trimester plan should consist of two five-month trimesters. The first trimester runs from September to January and the other from February to June. The split-semester is to be held during all or parts of July and August. The Committee advocated that the entry and exit points should coincide with the trimesters, and there should be a break between the end of the first and the second trimester. The break should be used for evaluation, inservice and administrative work. The split-trimester plan was first designed by the New York State Department of Education as a variation of the trimester plan. In The Rescheduled School Year it is explained that the split-trimester plan "is meant to be a compromise between the regular trimester plan and the traditional summer school plan."<sup>16</sup>

As the name implies, the trimester plan involves the division of the school year into three equal terms or trimesters. A variation of the trimester plan has been used in several

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<sup>16</sup>National Education Association, The Rescheduled School Year, 1968.

schools. In Manitoba and other Canadian provinces, each trimester is between 60 to 65 days long, and the school year varies from 180 to 195 days approximately. The extended trimester systems practiced in many American schools have school years of between 204 and 225 days. Each trimester lasts from 70 to 90 days. Reportedly, an extension of the school year combined with a small increase in the length of the class periods allows pupils to complete two regular semesters' work in two trimesters. Of interest is the New York trimester plan. Students are only required to attend for two trimesters. The third trimester, designated "E" for extra term, is used to stabilize enrolment flow. However, this E-term may be used by students to make up failed subjects, to do remedial work or to take specialized programs. It is stated in The Rescheduled School Year that "The use of 'E' term for further acceleration is not recommended."<sup>17</sup> Nova High School in Fort Lauderdale, Florida, experimented with the extended trimester system in September 1964. The school had a 220-day school year. There were five 70-minute periods daily. A non-graded program was implemented which allowed students to progress at their own rates through a series of gradually rising achievement levels in each subject. Students were regrouped at the end of each trimester. The absence of steep achievement levels allowed students to move smoothly throughout the school year from one achievement level to the next.

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<sup>17</sup> Ibid., p. 25.

### Extended School Year

The reorganization of the school calendar has been an ongoing preoccupation of many American educators. They have displayed a genuine desire to update and to maintain dynamic school organizations to harmonize with the ever changing economic and social order. Presently, the extended school year is probably the most popular innovative school organization operating in the United States. John McLain explained that

The term "extended school year" is frequently used to include all programs that extend the academic offering of the school for a longer part of the year than the regular school year.<sup>18</sup>

This includes summer school as well as the various year-round school plans. A multiplicity of names are used to describe the large number of extended school plans currently in existence. McLain cautioned that "there are no precise definitions that would clarify what is meant when these various terms are used."<sup>19</sup> "It is essential", he declared, ". . . to understand each of the plans and how they work before making any decision about their appropriateness for adoption in any particular community."<sup>20</sup> Many of these plans were conceived for use at the junior and senior high school levels. Two plans which are particularly appropriate for use at the secondary school level are the Extended Trimester Plan, which has been mentioned before, and the Extended Quadrimester or Four Quarter Plan.

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<sup>18</sup> McLain, Year-Round Education, Economic, Educational and Sociological Factors, p. 11.

<sup>19</sup> Ibid.

<sup>20</sup> Ibid., p. 11.

Under the Four-Quarter or Quadrimester Plan the school year is divided into four quarters or quadrimesters. Each quadrimester runs for about 60 days. The student body is divided into four sections; each section attends school for three quarters and gets its vacation about the same time each year. Thus, each pupil spends the same amount of time attending school as under the traditional nine-month school year arrangement, but the school is in operation throughout the entire year. There are a number of variations to the Four-Quarter Plan. The Rotating Four-Quarter Plan differs only in that the time of the vacation for each section is rotated so that each student has a chance to have his or her vacation in the summer his or her portion of the time. The Optional Quadrimester Plan gives students a choice of the session during which they want to attend school, and in what session they want to have vacation. The 45-15 Plan is probably the most popular plan in operation in the United States. Sometimes it is called the 9-3 Plan. Under this kind of organization the school operates for two hundred and forty days. The school population is divided into four groups. Each group attends school for one hundred and eighty days each year. There are four forty-five days or nine week terms in a calendar year. At the end of each term there is a fifteen day or three week vacation. Similar to the 45-15 Plan is the 12-4 Plan. The calendar year also consists of two hundred and forty days. The student body is divided into four groups and each group attends school for three twelve week sessions. At the end of

each session there is a four week vacation. Each student attends school for one hundred and eighty days each year. Under the 45-15 Plan and the 12-4 Plan there are three groups attending school at any one time with twenty-five percent of the student body away on vacation. Under these plans the existing building can be used to accommodate twenty-five percent more students than under the traditional school plan. They are of particular advantage in areas of high student population and little classroom space.

Probably the most idealistic and uniquely different of all the extended school plans is the "Flexible All Year School Plan".<sup>21</sup> Once a student enrolls under this plan, he or she is expected to remain in school except when a request for vacation is granted or he or she is given leave of absence. Vacation with parental consent may be given provided the minimum attendance requirement is met. The flexible all year school plan has a flexible built-in time structure. The curriculum is also flexible and is based on the individual needs of the students. The school operates on a year round plan. Students and parents can take their vacation together at the time most suitable to them. Besides, it does not cause a fragmentation of the student body as is the case with some of the other all year school plans.

The specific reasons for extending the school year are:

- (1) Economy - many believe that considerable saving could be realized by the full utilization of existing facilities

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<sup>21</sup> Ibid., p. 24.

instead of constructing new buildings to accommodate increasing school enrolment.

- (2) The improvement of the economic status and the morale of teachers.
- (3) To solve teacher shortage.
- (4) It would serve as a means of improving and enriching the education of pupils.
- (5) To facilitate pupil acceleration, and to reduce juvenile delinquency by keeping the youths busy and off the streets during the summer months.

Most communities which have operated under the four-quarter plan or have studied its feasibility have concluded that its disadvantages outweigh its advantages. It is stated in The National Education Association Research Summary of 1968 that "other systems are looking at modification of the plan which are more similar to a traditional nine-month school year."<sup>22</sup>

#### Traditional Schools

The traditional school, as operated in Canada, begins in early September and terminates at the end of June. The school year is ten months long with two months of summer vacation. The different Canadian provinces have regulations specifying the number of days that constitute a school year. The standard school week is five days, each day is five to five and a half hours in duration. The school year begins about the same time for all students in the fall and ends at the same

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<sup>22</sup>National Education Association, The Rescheduled School Year, p. 15.

time for all students in the spring. Students follow a lock-step program organized on the basis of the whole year. Achievement is determined at the end of each year on a pass or fail basis in each subject at the secondary level. At the elementary level a student's success or failure is based on the year's work.

The traditional educational system is very well described and compared to innovative education by R. H. Kite in his article, "The Horse and Buggy Education". Kite stated that

traditional education is characterized by an attitude which represents inflexibility tradition for tradition's sake, adherence to the status quo, and a false clinging to the old familiar practices to meet the needs of security. Even more significantly, it represents a lack of courage which we as educators need in order to face our present day world and fulfill our professional responsibility.<sup>23</sup>

He went on to say that Space Age education (innovative education) may be identified by an attitude of openness and experimentation, thoughtful study and evaluation, a willingness to change, and the courage to bring our professional knowledge to the reality of the educational program. Kite seems to be saying that traditional educational practices should not be supported only for the sake of tradition. At the same time he refused to advocate innovations only for the sake of innovations.

Whatever is the school organization, its basic goal is to ensure that students reach as high a level of literacy and computation as possible. High schools, at present, are subjected to widespread criticism, both from the public and

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<sup>23</sup>R. H. Kite, "Whoa or Zoom? Horse and Buggy Education Incompatible in the Jet Age", Clearing House, 42, pp. 62-63.



the universities, that they are not living up to their expectations. Most of the criticisms are levelled at some of our more innovative schools. The result is a returning and re-affirmation of faith in the traditional ways of education.

Traditional teaching practices are the culmination of those selective tentatives which have remained from a host that have been eliminated by experience. For many years, these methods have been tried, the better ones accepted, practiced, initiated and taught to practicing teachers. The principles of the traditional schools represent a valuable set of tested procedures that have served very well for over a hundred years. The traditional school has many good features, but it is not everything for all students. The system is being replaced but not completely. It is being modified but the essential ingredients will remain as the foundation of any new organization.

The most stinging criticisms of the traditional school organization are that it is a relic of the agrarian age and that it no longer meets the needs of people living in the industrial age. It has been labelled as an obstacle to the smooth transition from the industrial age to the age of cybernetics. Another argument used to justify the need for changes in the traditional school organization is that in a time of economic stress and increased school population there is the requirement for more efficient utilization of existing school buildings.

### Semestering: A Western Canadian Innovation

Canadian educators seem to be more cautious and conservative in their approach to school organization than their American counterparts. While semestering has been used in American schools and universities for over a hundred years, it is a comparatively recent innovation in Canadian educational institutions. A. J. C. King et al reported that Lindsay Thurber High School "was trimestered in 1946."<sup>24</sup> In a letter to Mr. D. K. Breckman, Director of Professional Development of the Manitoba Teachers' Society, Mr. W. D. Dawe, the then principal of Lindsay Thurber Composite School in Red Deer wrote

. . . in this school we do not have a semester system in the true meaning of the word, but rather a trimester or three term system. We introduced this in 1949. Therefore, I believe that we may claim to have pioneered the 'semester' idea in Alberta.<sup>25</sup>

Although there seems to be some conflict in the commencement date of the trimester system at Lindsay Thurber, semestering must be regarded as a Western Canadian educational innovation. In spite of the early interest shown in the experimentation with the trimester plan, the two-term plan is the one most commonly used in Alberta. It seems to be the preferred plan everywhere. In an attempt to give a reasoned account for the introduction of the semester system in Alberta, Dieter August Fehlberg, in his investigation of students' achievement under the Alberta Semestered School System, stated that

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<sup>24</sup>A. J. C. King et al, Semestering the Secondary School, p. 10.

<sup>25</sup>W. D. Dawe, Letter to D. K. Breckman, unpublished, April 28, 1969.

The requirement for gearing administrative procedures to the rapidly broadening scope of educational specialization, and the demand for more efficient staff and school plant utilization together with the increased emphasis on the development of human resources, have all been responsible for the massive shift towards introduction of the semester system into Alberta's high schools.<sup>26</sup>

The Alberta Department of Education undertook an intensive study of the semester system in 1951-52. It found that the semester system was preferable to the trimester arrangement. Since that time trimester system ceased to spread. T. G. Ellwood (1970) in the article, "The Challenge of Semestering", predicted that "Alberta would accept the semester approach in five years."<sup>27</sup> It was also stated that "semester programming only adds to the belief that widespread use of this form of school organization is inevitable."<sup>28</sup> Semestering is widely accepted but it is an innovation whose educational worth is not proven completely. It is spreading rapidly and it seems destined to become the most favoured school organization operating in Canadian schools in the near future. J. M. Church (1968) in "The Semester System: An Appraisal" noted that, "generally, students, teachers and school administrators prefer the semester system over the full year system."<sup>29</sup> Ellwood

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<sup>26</sup>Dieter August Fehlberg, Student Achievement under Alberta's Semester System, M.Ed. Thesis (University of Alberta, Edmonton, Alberta, 1968), p. 1.

<sup>27</sup>T. G. Ellwood, "The Challenge of Semestering", The B.C. Teacher, 1970.

<sup>28</sup>The School Trustee, The Semester and Variation, 1969, p. 14.

<sup>29</sup>J. M. Church, "The Semester System: An Appraisal", ATA Magazine, November/December, 1968, p. 41.

further stated that semester system was gathering support from a variety of sources. He expressed the idea that not only teachers and students who work under the semester system tend to support it, but it is supported by the findings of educational research. It is also supported by school boards and taxpayers, because it offers some economies and an opportunity for the full utilization of school facilities and resources.

Alberta formally introduced semestering between 1965 and 1969. During the school year 1967-68, 94 institutions offering high school instruction were semestered; 24,436 or about one-third of the total high school population of 72,467 attended semestered schools; 28 percent of the schools were involved and an additional 23 schools had requested or had approved semestering. The story of semestering is the same in almost all the provinces. Once it has been introduced it spreads at a phenomenal rate. Fehlberg (1968) made this notation in his M.Ed. thesis

One of the most serious problems was that the Department of Education, faced by a flood of applications from schools wanting to institute the semester system, found itself in the unfortunate position of having to approve a system of school term organization without adequate knowledge of the effects such system would have on achievement.<sup>30</sup>

Fehlberg indicates that, although semestering was popular, it was not fully confirmed that it was educationally better than the traditional system.

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<sup>30</sup>D. A. Fehlberg, M.Ed. Thesis, unpublished, pp. 1-2.

The documentation of semestering in British Columbia is sparse. Semestering was introduced in that province in 1968. A year later this organizational plan was operating in 25 schools. By 1972, some variation of semestering was introduced in 86 percent of the province's senior schools. In British Columbia, Alberta and Ontario the decision to implement semestering was made at the local school or board level. As a result, the number of schools that were early innovators of the semester plan in those provinces was small. The decision to experiment with the semester system in Saskatchewan was made at the provincial level. Some consultation, however, took place with schools at the local level. Consequently, a larger number of schools in Saskatchewan, relative to the number of schools in other Western Provinces, introduced semestering at the same time. It is stated in Semestering the Secondary School that ten schools were semestered during 1971 in Saskatchewan. "By 1972 there were 72 schools on semestering, and by 1973 there were 203."<sup>31</sup> The ten original schools provided the basis for the evaluation of the semester system. In reference to the growth of semestering in Ontario, it was stated in the same source that "there were only four schools with full-credit semestering."<sup>32</sup> during the 1971-72 school year in Ontario. It was noted also that a number of other schools "were experimenting with half-credit semestering, trimestering and flexible modular

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<sup>31</sup>King et al, Semestering the Secondary School, p. 15.

<sup>32</sup>Loco cit.

scheduling."<sup>33</sup> "In 1971-72 there were 24 schools using some form of a semestering program"<sup>34</sup> in Ontario. By 1972 there were an estimated forty-two schools on semestering. Of the forty-two schools, twenty-six were on full-credit semestering, twelve on half-credit semestering, six on trimestering and one was quadrimestered.

Ontario benefitted tremendously from the experimentation with semestering in the Western Provinces. Drawing on the very broad experimental background, it became clear that of the various organizational alternatives operating in Ontario, full-credit semestering was the most acceptable, and most attractive to schools contemplating the change. King et al in commenting on the spread of semestering in Canada, said that "what seems to be happening is that a particularly attractive innovation is sweeping rapidly across Canadian schools from West to East."<sup>35</sup>

The traditional Canadian school year does not lend itself to semestering readily. Generally, the school year consists of three terms: the Fall, Winter and Spring terms. Neither the Christmas nor the Easter vacation divides the school year into equal halves. The problem was how to impose the two-term semester plan on a three-session double-break year. The two-term semester plan has a serious disadvantage. The first semester extends from September to the end of January, the

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<sup>33</sup>Loco cit.

<sup>34</sup>Loco cit.

<sup>35</sup>King et al, Semestering the Secondary School, p. 5.

second semester begins in February and ends in June. Because there is no vacation between the first and second semesters, there is no natural break for students, neither are teachers afforded time to finalize first semester evaluation and to prepare for the next semester. Many attempts were made to remedy this problem. Of importance is the alternative semester plan presented by W. G. Schmidt in November, 1968, to the "Alberta School Trustee Association Annual Convention."<sup>36</sup> The plan involved the division of the school year into two equal parts, one before and the other after Christmas. The two-month July-August summer vacation would be shifted to June and July. There would be two weeks vacation at Christmas, a one week break in October and another in March. The school year would be of 191 days duration. Another reason for the desire to modify the two-semester plan was to secure a smooth progression from secondary to post-secondary institutions. This idea was expressed by Len Stahl. Len Stahl, writing about the "two-semester" said, "Although these plans do provide for greater flexibility in student programming, better utilization of staff and more diversified programs for students they have a very serious deficiency."<sup>37</sup> He went on to say that "since the end of the first semester comes in the latter part of January, these plans lose the advantage of smooth progression from secondary to post-secondary institutions . . . ." <sup>38</sup> Fenske

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<sup>36</sup>W. G. Schmidt, "Notes for Clinic on The Reorganization of the School Year", unpublished, November 3-6, 1968.

<sup>37</sup>Len Stahl, The School Trustee, February, 1969, p. 15.

<sup>38</sup>Ibid.

(1971) reported that the worst criticism of the semester plan in Alberta was that Christmas vacation intervenes just before the Grade XII departmental examination at the end of January.

The only place where the Schmidt plan was implemented, as far as this researcher can ascertain, was in Lethbridge. It may be worthwhile to note that the two semester plan does not disturb the traditional vacational pattern of Canadian families. Some of the reasons for the cool reception of the Schmidt plan were: (1) the reluctance of families and industries to adjust to the change in the summer holidays from July and August to June and July; (2) the difficulties of the retail industry to adjust to meet the needs of the earlier school opening date; and (3) the required change in the family life-style. However, it is reported by Roth, Stobo and Ziegler that "no special administrative problems were found with either type of semestering in Alberta."<sup>39</sup>

#### Introduction of Semestering into Manitoba

Manitoba is semestering its secondary schools at a rapid rate. The Manitoba Teacher of November 1973 reported that ". . . the trend towards semestering and trimestering is gaining impetus."<sup>40</sup> The most obvious reason attributable to the rapid change from the traditional to the semester school organization is the "bandwagon phenomenon", commonly displayed

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<sup>39</sup>John Roth, Heather Stobo and Suzanne Ziegler, cited in The Semester System at Weston Collegiate (The Board of Education of the Borough of York), p. 2.

<sup>40</sup>Melvin Solar, "How One Junior High School Adopted the Semester System", The Manitoba Teacher, November, 1973, p. 6.



by many educators in recent times. This alone, however, cannot account for the change; there must be other contributing factors.

Manitoba remains primarily an agricultural province. Students still work on the farms though to a lesser extent than in 1900. There has been some population shift from the rural to the urban regions due to a decline in the number of family farms. However, this population shift is not reflected in any excessive demand for extra classroom space. Between 1967 and 1975 the number of students enrolled in public schools in Manitoba dropped from "231,650 to 229,552."<sup>41</sup> In 1976 the population of Manitoba was reported as "1,021,506."<sup>42</sup> "578,217,"<sup>43</sup> approximately 50 percent of the population live within the metropolitan region of Winnipeg. W. Robert Gordon in the article, "Statistics Reveal Changes in Enrolment Patterns", showed that there was a drop in enrolment in Grade I in all regions of Canada from 1960 to 1971. The Western regions of Canada experienced a "12.4 percent decrease from 1966 to 1971."<sup>44</sup> Gordon predicted that the enrolment experienced will gradually extend into the secondary levels during the second half of the 1970's. Between 1966 and 1976, data obtained from the Winnipeg School Division No. 1 showed that the high school population

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<sup>41</sup>Statistic Canada, "Elementary, Secondary School Enrolment", Cat. No. 81-210, 1975-76.

<sup>42</sup>Statistic Canada, "Population of Canada, Provinces, Census Metropolitan Areas and Municipalities of 500,000 and Over", 1976 Census of Canada, Cat. 11-001E, May 18, 1977.

<sup>43</sup>Loco cit.

<sup>44</sup>Robert W. Gordon, "Statistics Reveals Changes in Enrolment Patterns", The Manitoba Teacher, November, 1973.

of the Division dropped from 20,674 to 17,210. The following table shows the changes in enrolment in all the major school divisions in the metropolitan area of Winnipeg from 1968-76. The data is taken from the "Unitary School Division Summary", September 30, 1976, compiled by the Manitoba Department of Education.

TABLE 1: Unitary School Division Summary

|                       | <u>School Division</u> | <u>Enrolment</u> |              |                 |                 |
|-----------------------|------------------------|------------------|--------------|-----------------|-----------------|
|                       |                        | <u>1968</u>      | <u>1976</u>  | <u>Increase</u> | <u>Decrease</u> |
| * Winnipeg            | # 1                    | 49,340           | 38,770*      | -----           | 10,570          |
| St. James-Assiniboia  | # 2                    | 19,627           | 18,319       | -----           | 1,308           |
| Assiniboia South      | # 3                    | 3,189            | 5,661        | 2,472           | -----           |
| St. Boniface          | # 4                    | 8,423            | 8,654        | 231             | -----           |
| Fort Garry            | # 5                    | 5,945            | 6,544        | 599             | -----           |
| St. Vital             | # 6                    | 6,904            | 7,347        | 443             | -----           |
| Norwood               | # 8                    | 3,230            | 2,384        | -----           | 846             |
| River East            | # 9                    | 10,906           | 14,036       | 3,130           | -----           |
| Seven Oaks            | #10                    | 6,623            | 7,346        | 723             | -----           |
| Transcona Springfield | #12                    | <u>7,479</u>     | <u>8,546</u> | <u>1,067</u>    | <u>-----</u>    |
|                       | Totals                 | 121,666          | 117,607      | 8,665           | 12,724          |

The overall decrease in the enrolment of the school divisions shown in Table 1 is 4,059. In Winnipeg School Division No. 1 above, between 1968 and 1976, the enrolment decreased by 10,570 students\*. A number of factors are responsible for enrolment changes within particular communities. Among these are population shifts, economic activities,

transiency, changes in the birth rates and migration. The decline in school enrolment may be more widespread than is recognized generally. For instance, the elementary and secondary school enrolment in Ontario was estimated "in 1971 to be 2,039,996 . . . in 1977, 2,001,274 . . . and in 1981 to be 1,982,231."<sup>45</sup> Janice Palmer wrote in the New Dimensions of May and June, 1972, that "school enrolments are down and our constant past need for expanding classroom space is declining."<sup>46</sup> School boards in Ontario were also warned that they "should look very carefully before they provide another square foot of space."<sup>47</sup>

It is clear that increasing school population and lack of classroom space are not important factors in the semestering of Manitoba high schools.

The growing popularity of semestering in Manitoba seems to have been influenced by its success and favourable reception in Ontario and the other Western Provinces. The greatest virtue of semestering is, in all probability, its claim to greater flexibility and adaptability to the needs of a new generation of students. The growth of semestered schools in the Province can be attributed more directly to the desirability of replacing the rigid traditional school system with a more flexible arrangement and to a new educational

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<sup>45</sup>Ontario Department of Education, "Position Paper", New Dimensions, February, 1972, p. 5.

<sup>46</sup>Janice Palmer, "In Reply", New Dimensions, May/June, 1972.

<sup>47</sup>Ontario Department of Education, "Position Paper", p. 5.

philosophy. This new philosophy is reflected in the "Core Report" that was published by the Manitoba Department of Education in 1973. The report expressed the belief

that schools must accept responsibility for providing the learning environment that will seek to develop the full potential of students, and there is evidence that this development is best accomplished in institutions that operate in an open, flexible, adaptive and considerate way.<sup>48</sup>

The belief is also expressed that "schools may differ . . . in courses offered . . . in philosophy, in organization and instructional style."<sup>49</sup> Semestering seems to create the kind of environment that will serve the students in the future, and allow the realization of the best that is in them. It aims at providing the circumstances under which each student can realize self-respect, self-fulfillment and reliance in a changing society. In addition, semestering seems to provide greater opportunity for career planning than the traditional system. E. Dupas stated that "the semester plan has been accepted because the added flexibility allows students more opportunities to re-assess and reroute, if necessary, their academic program."<sup>50</sup>

#### Monitoring Educational Innovations

Canadian educators have drawn heavily on American experiences for their innovations. Glen Heather in Change and

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<sup>48</sup> Department of Education, The Secondary School Report of the Core Committee on the Re-organization of Secondary Schools, 1973, p. 14.

<sup>49</sup> Ibid.

<sup>50</sup> Emile Dupas, Semester Plan Prognosis, M.Ed. Thesis (University of Manitoba, 1972), p. 10.

Innovation reported that "few of the educational innovations currently being marketed have been fully developed, implemented and evaluated."<sup>51</sup> He stated that many of them were still in the pilot phase of development. This is true of semestering as it operates in many Canadian schools. King et al reported a "bandwagon" effect after full-credit semestering was introduced in one or two Ontario schools. They stated that "other schools quickly adopted the innovation without considering its implications for their particular need."<sup>52</sup> Semestering was being introduced in many schools before the credit system had been fully assessed. Schools were simply making plans and introducing the new system before first determining how well they were meeting their instructional objective, student needs, etc., with their present form of school organization.

Whatever is the contemplated outcome any deliberate change in school organization should be accompanied by some improvement in instruction. One way to ensure improved instruction is to start the re-organization with an analysis of the school aims and objectives, and to make an appraisal of how well these aims and objectives are being accomplished. Really, it is the school staff that should identify the need for change. King et al expressed the importance of developing ongoing procedures within the school for effectively coping with change. They

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<sup>51</sup>Maurie Hillson and Ronald T. Hyman, Change and Innovation in Elementary and Secondary Schools Organization (Holt, Rinehart & Winston, Inc., New York, Chicago, San Francisco, Atlanta, Dallas, Montreal, Toronto, London, Sydney).

<sup>52</sup>King et al, Semestering the Secondary School, p. 1.

recommended and strongly urged that schools develop two kinds of monitoring procedures before changing their school organization. The first monitoring procedure involved a continual analysis of the effects on students and teachers of the current education program. The objective would be to identify aspects of the program that might need modification. The second set of procedures should be designed to establish a climate in the school that is sensitive to current educational practices. They should have the capacity to identify and assess new educational changes as they develop. There are many instances that support the need for monitoring procedures in school organizations. However, there is one incident that is very relevant to this situation. It is reported by King et al that the rate at which students accumulate credit dropped below the rate of the previous system when some of Ontario's most innovative schools adopted the full-credit semester system. The result was more drop-outs and fewer graduates. The reasons given for a decrease in the rate of students' progress were:

- “(a) a lack of clear understanding of the relationship between subject promotion, the credit system, and student progress as measured by the accumulation of credits; (b) inefficient record-keeping and greater student freedom in program selection.<sup>53</sup>

Organizational changes should take place with a view to improve instruction and learning. Every organizational change must begin with a consideration of the broad organizational theme. In this case, there should be an exhaustive examination

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<sup>53</sup>King et al, Semestering the Secondary School, p. 2.

of semestering. This examination must be completed before visitation of different semestered schools, consideration of scheduling, curriculum changes, etc. Semestering of a school requires schedule modifications, re-assignment of teachers, curriculum changes, changes in the use of space and equipment, changes in communication patterns and staff re-education.

Hillman and Hyman believe that "the most crucial factor in making an innovation function at the instructional level is staff re-education."<sup>54</sup> The re-education must be intensive and continuous. This kind of re-education cannot be provided by occasional daily inservices, or short-term workshops. The training must be geared to provide teachers with competency in a variety of teaching strategies. It has been frequently expressed in the literature on semestering that the extended class period forced teachers to adopt new and a variety of teaching styles. This seems contrary to what has been observed. Teachers do not change their style of teaching simply because the school year is half and the duration of each class period is doubled. New teaching approaches do not come by dreaming about them. Well conceived, well designed teacher education must be provided. Many innovations failed because of the failure to provide school leaders and teachers with the education that would help them conduct instruction in accordance with the purpose of the innovation.

Hillman and Hyman noted that there are five major aims of instruction emphasized in the speeches and writings of

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<sup>54</sup>Hillman and Hyman, Changes and Innovations, p. 14.

leading education reformers. These aims require that instruction should:

- (1) Stress . . . the structure of a discipline . . . at all levels of instruction and to all students.
- (2) Teach methods of inquiry or problem solving thinking, as these methods are employed in gaining new knowledge . . . .
- (3) Teach competencies in independent study . . . .
- (4) Set standards of excellence or mastery . . . .
- (5) Individualize instruction by providing each student with a program of studies tailored to his learning needs and capabilities . . . .<sup>55</sup>

These eminent educators noted that "any school system that does not pursue these aims will soon become out of date."<sup>56</sup> This is based on the concept that the aims are valid.

#### Reactions to Semestering

The semester system has received some praise in Manitoba. A survey conducted at John Henderson Junior High in Winnipeg after five and a half months of semestering showed that "majority of the students and teachers of the school supported the system."<sup>57</sup> In a report to the St. James-Assiniboia School Trustees in February, 1972, the principals of Westwood and Silver Heights Collegiates, and Sturgeon Creek Regional School stated that "teachers and students were solidly in favour of the semester system."<sup>58</sup> In the same report Mr. Buchholz

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<sup>55</sup>Hillson and Hyman, Change and Innovation, pp. 16-17.

<sup>56</sup>Ibid., p. 17.

<sup>57</sup>Melvin Solar, The Manitoba Teacher.

<sup>58</sup>Doug Hallet, "Semester System Popular with Students and Staff", The Times, February 16, 1972.





stated that a survey taken at his school at Westwood Collegiate "showed 88% of the students and 87% of the teachers prefer the new system to the conventional ten-month term."<sup>59</sup> Mr. Krahn of Sturgeon Creek said there is no question that in general students perform better because of the ease of organization.

The 1968-70 survey by the Saskatchewan Department of Education<sup>60</sup> reported that ninety percent of the parents, eighty percent of the teachers and ninety-five percent of the students prefer the semester system. Church (1968) found that students and teachers in Alberta were enthusiastic about the semester system. Fenske (1971) also said that most students like the semester system because they prefer to work more intensively towards short-term goals. Church in a general reaction to semestering said

While the "halo" or "Hawthorne" effect may still be operative in the attitude of those who have had one or two years experience with semestering, others who have had many years of experience with the divided year still favour it.<sup>61</sup>

Probably the most interesting and varied reaction to the semester system comes from the students of Pinefall Collegiate in Manitoba. Some of the students expressed the feeling that the semester system is tedious; they complained about insufficient time to study. One student said "the semester system isn't too good because you get too much of one thing

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<sup>59</sup>Ibid.

<sup>60</sup>Saskatchewan Department of Education, Semester Study, April, 1969.

<sup>61</sup>E. J. M. Church, ATA Magazine, November/December, 1968, p. 41.

at one time."<sup>62</sup> Other students expressed utter indifference as exemplified in the statement of the student who said "I don't really care. School is school to me."<sup>63</sup> One student remarked that it was refreshing to deal with one subject, get rid of it and start on something else. A very interesting comment came from the student who said, "It is difficult to say what it is good for. It is good for Maths, but not good for Geography."<sup>64</sup> One student expressed the joy of having the freedom to take Physics and Biology, another student expressed displeasure at the monotony of having to take three of the same courses every day. Semestering is not everything for everyone in education. The continuing changes taking place and the variability in the many existing plans testify to its imperfection. It signifies a continuing search for the "ideal" plan. When one of the multiplicity of semester plans is selected for implementation care must be taken to make sure it is suited to the local conditions.

Church (1968) cautioned that it has not been proven that the semester system is superior to any other high school organization. The lack of concrete evidence forced people to rely partly upon direct observation and more extensively upon the opinion of those who have had experience with the semester system.

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<sup>62</sup> Shewchuk, A Brief Summary of Selected Semester and Trimester Systems in Manitoba Schools, p. 12.

<sup>63</sup> Ibid., p. 13.

<sup>64</sup> Ibid.

Teachers have serious reservations about whether or not all subjects are suited to the semester system. Roth, Stobo and Ziegler reported much enthusiasm among teachers of Mathematics, English and the Social and General Sciences in Alberta. At the same time and place, teachers of French, Business Education and Music expressed great reservation. In Manitoba, Physical Education, Music, French, Business Education subjects and English are very often not semestered. English seems particularly difficult to fit into the semester schedule because Provincial regulation requires that the subject receive 24 percent of teacher-student contact time. This is twice the time value of other subjects.

Although many have reacted favourably to the semester system, Roth, Stobo and Ziegler cautioned that these are only "subjective reactions."<sup>65</sup> Church (1968) also warned that much more evidence is needed before claims for or against the semester system can be varified. Concerns expressed from time to time regarding certain aspects of semestering prompted the Alberta Teachers' Association to engage the service of T. Rieger to investigate the pros and cons of semestering in June, 1975, in Alberta. The investigation took the form of an open ended questionnaire involving a representative sample of one hundred and sixty teachers. One hundred and fifteen questionnaires were returned. It showed that 69% of the senior high teachers were in favour of semestering, 20% were opposed and 11% were undecided. Only 33 teachers from the junior high

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<sup>65</sup>Roth, Stobo and Ziegler, The Semester System at Weston Collegiate Institute, p. 4.

schools responded to the questionnaire; 42% were in favour and 49% were opposed to the semester system. It was noted that "responses varied from enthusiastic . . . almost to a level of indifference or indecision."<sup>66</sup> Some of the responses were also negative. The following represent some of the teachers' comments:

- (1) Semestering is unsound. The advantages . . . are of a "convenience" nature for teachers, students and administrators.
- (2) Semestering - a five month cram course providing superficial examination of a subject with little retention . . . .
- (3) Under the semester system . . . we are doing a good job, but are we educating our students?
- (4) A semestered school . . . means a large impersonal building with the educational process becoming impersonal and promoting alienation among students.
- (5) There is very little . . . that prevents any large school . . . from adopting any combination of systems for its courses.
- (6) Semestering is a change from the traditional system, I welcome a change.
- (7) . . . semestering is one of the better things that have hit our educational system.
- (8) In semestering, staff feels more pressure but students really benefit in the long run . . .
- (9) I have seen greater flexibility of instruction, therefore happier kids under semestering.
- (10) I think semestering is great.<sup>67</sup>

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<sup>66</sup>ATA, "Special Issue: ATA Survey on Semestering", June 15, 1976, p. 4.

<sup>67</sup>Ibid., p. 7.

### Controversial Aspects

Probably the most controversial aspect of semestering lies in its implications for learning. Because of the breadth of this topic it is reasonable to limit one's self to the most debated topics of semestering:

- (1) academic achievement
- (2) retention
- (3) teacher workload

#### Teacher workload

There is almost unanimous agreement in the literature reviewed that teacher workload increased when a school changed from the traditional ten-month plan to the semester system. More work is required in terms of creativity and preparation to meet the longer class periods. Teachers are pressured for time and effort to prepare courses for the second semester which coincide with final evaluation at the end of the first semester and the busy changeover time. Because of the short period between semesters, some teachers have ongoing curriculum designing work. For many reasons, some teachers find they have to teach courses for which they are not prepared. Evaluation is more frequent and heavier under the semester system. Teachers tend to emphasize continuous evaluation.

One of the loftiest objectives of semestering is the provision of individualized instruction to meet the varied needs, interests, aptitudes and abilities of students. The extra workload of teachers is related to this objective and

to the maintenance of students' attention during the longer periods. Under the semester system teachers are pressured to vary their teaching style. Individualization under the semester plan is achieved mainly in the area of program selection. Students are allowed to select his or her programs from the array of courses offered at different levels of difficulty, thereby allowing students to progress at their own rate. There is general indecision in the literature on the questions of whether teachers are able to give to students, or whether students are receiving, more individual attention under the semester system. There seems to be little, except the opportunity for students to select individualized programs, to confirm the existence of extensive individualized instruction under the semester system. King et al said "that the grouping of students for learning rarely varies much from the format of one teacher per class of 25 to 30 students."<sup>68</sup> Classes of this size never lend themselves readily to individualization by one teacher. They went on to say that "although a widespread practice, usually very few students . . . are granted the privilege of independent study in the strictest sense."<sup>69</sup> One serious problem under semestering is to get students to use their spare time properly. This problem is related to a deficiency of basic skills in the student and the absence of programs to help students to utilize independent study well.

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<sup>68</sup>King et al, Semestering the Secondary School, p. 7.

<sup>69</sup>Loco cit.

Bishop Carroll High School in Calgary is experimenting with the newest Trump Plan, which provides for large and small group instruction and independent study. There is interdisciplinary and within discipline team teaching taking place in a few open-space schools, such as Bayside and A. Y. Jackson High Schools in Ontario. "In general variations from the traditional model are few and far between."<sup>70</sup> There is no indication in the available literature of the widespread use of Individually Prescribed Instruction, Learning Activity Packages, Computer Assisted Instruction, Programmed Instruction, Audio-Tutorial Instructional System, etc., in secondary school curricula in Canada. Individualized instruction exists only in spirit in the secondary schools. When it becomes a general practice we can expect the teacher workload to increase even more. The role of the teacher, however, will change significantly. It seems that the problem of teacher workload can be solved through timetabling procedures. Simply by using the timetable to provide as much as and preferably more preparation time than is allowed for in the traditional system. There are numerous evidences in the literature that there is less discontent among Saskatchewan teachers regarding excessive workload than among Alberta teachers. Teachers in Alberta had to teach four eighty-minute periods each day in the first semester and three periods in the second semester. The teachers complained that the four period day affected their health and their teaching adversely. The sixty minutes, five

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<sup>70</sup>Loco cit.

period per day schedule, used in Saskatchewan, made it easier than in Alberta to schedule preparation time for teachers.

### Retention

Under the traditional school system the time lapse between the end of one course and the beginning of the next course in a sequential subject area is between two and three months. However, under the semester system the time lapse can be as much as twelve months. It is not denied or confirmed in the literature reviewed whether retention is endangered or enhanced by semestering. It depends on such factors as the kind of subject, the student and the initial mastery of the subject. Brooks and Bassett (1928) showed that junior high students who completed a history course forget 23% of the material in one year. More than a half of the loss occurred in the first four months. In each of the succeeding four months there was a smaller loss of retention. In a very recent study by Bramwell and Mann (1972), no deleterious effects of semestering were observed in the learning and retention of mathematical concepts. In French, however, they reported significantly more forgetting over the January-September period than during the summer months. It is estimated in many studies that the amount of retention loss in many subject areas over the period of a year is approximately 30 percent. Easily organized meaningful materials are more successfully retained. Concepts, methods and applications, especially in Mathematics and Science seem to be particularly resistant to forgetting. Roth, Stobo and Ziegler expressed the fact that "highly integrated and meaningful materials will be



well retained while terminology and rote-learning materials will be lost."<sup>71</sup> This could account for the fact that teachers of Mathematics, English, General and Social Science are enthusiastic about the semester system, while teachers of Shorthand, Typing, Music, French and Physical Education show reservations. Inherent in Physical Education, Business Education subjects, French and Music are certain well defined skills. The maintenance of these skills at a high level is not only an essential requirement, it is a necessary part of the teaching of these subjects.

#### Achievement

A questionnaire which was given to students at Weston Collegiate in Ontario showed that 35 percent of the students disagreed that their workload got lighter under the semester system. Only 4 percent strongly agreed that their workload got lighter. Moodie (1970-71) reported that teachers believed learning performance skills, mastery of contents and understanding by students have been helped or remain the same under the semester system.

Greater all-round achievement was reported under the trimester system at "Lindsay Thurber High School"<sup>72</sup> in Red Deer. W. B. Dawe, principal of the school, reported that after two years of teaching under the semester system and under the

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<sup>71</sup>Roth, Stobo and Ziegler, The Semester System at Weston Collegiate Institute, p. 9.

<sup>72</sup>W. B. Dawe, An Examination of the Semester System 1949-62, Lindsay Thurber Composite School, Red Deer, Alberta; unpublished.

same teachers, students under the semester system achieved at a higher level than students in non-semestered schools on Grade XII departmental examination. The report went on to say that this Grade XII result remained constant throughout the years. The overall "B" or better for schools under the semesters is 75 percent for thirty-nine semesters. In June, 1962, the composite results . . . written for third semester subjects were 80.4% or some 20% above the provincial average of 60% . . . "One of the strongest arguments for semesters can be expressed in the words--Superior Results."<sup>73</sup> A comparative study carried out between 277 students from the Red Deer system and students from the traditional school in Alberta "showed no statistically significant difference in achievement, assimilation or retention."<sup>74</sup>

In the 1968-70 Saskatchewan survey, students indicated that their marks had not been adversely affected. A small majority of the students showed preference for the longer class periods and felt that their attitude towards school had improved. About a quarter of the students in the Weston Collegiate Institute questionnaire indicated improved attitude towards learning and 42% believed that they were working harder. Over a third of them believed motivation was higher and that students were more self-motivated. In the same questionnaire students did not believe that semestering affected their work habits or the acquisition of skills adversely. However, only

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<sup>73</sup>Ibid.

<sup>74</sup>Roth, Stobo and Ziegler, The Semester System at Weston Collegiate Institute, p. 29.

29% said that semestering facilitated understanding of concepts to a greater degree. Thirteen percent felt such understanding was negatively affected. In the Saskatchewan survey, a significant number of the teachers polled agreed that semestering improved student motivation; that it permitted greater concentration, greater reinforcement of concepts and allowed students to pursue the subject they liked. Moodie (1970-71) in his Vancouver study said "Teaching was either more effective in some areas, or less effective in others or more effective."<sup>75</sup> The students believed that it was easier to learn under the semester system, that teaching was more concentrated and that teaching methods had improved or remained the same. Courses were more interesting or the same, and students were enjoying more or approximately the same success in school. At Weston Collegiate 50% of the students experienced greater success with fewer subjects; 42% did not, and 8% did not respond to the particular question. Sixty-one percent of them completed a year's work in four or more subjects in one semester. Twenty-six percent completed two years' work in a subject within one school year. Forty-one percent of the students felt that the longer periods helped their learning. Thirty-seven percent said there were no differences. Sixty-one percent of them expressed the belief that the longer periods demanded excessive concentration while 77% said they were either bored by it or experienced fatigue from it. In

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<sup>75</sup> Allan G. Moodie, An Evaluation of Semestering in Vancouver Schools during 1970-71 School Year (ERIC ED OS7111), p. 4.

Saskatchewan, no significant change was noted in the failure rate. It was found, however, that imbalanced course load could impede satisfactory achievement.

#### Acceleration

One of the disappointing aspects of semestering is its effect on acceleration. While acceleration is one of the claimed advantages of semestering, there is no real evidence that it is realized to any greater extent than under the ten-month school plan. A comparison is woefully lacking in the literature reviewed. Any student who could manage an extra subject each year could complete high school half a year earlier than under the regular traditional system. Acceleration is affected by the failure rate--particularly, in the core subject areas--the flexibility of the school program and other conditions related to the accumulation of credits. King et al strongly expressed the idea that "No individual or small block of teachers should have the power to slow or prevent the progress of all students in a school by maintaining a disproportionately high failure rate in their courses."<sup>76</sup> Each school should have a policy regarding failure rates and credit accumulation. It may be necessary to set suitable general guidelines regarding failure rates. These guidelines should be consistent with the objectives of the school.

Some administrative procedures are not only cumbersome, they militate against acceleration of students. The administrative

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<sup>76</sup>King et al, Semestering the Secondary School, p. 4.

procedures of Silver Heights Collegiate stand out boldly in this regard. A Silver Heights student, who wished to accelerate, must first apply for the extra course before or at the beginning of the semester. The request was granted only after the student's academic history, his or her ability in the subject, and his or her attendance record had been studied and found to be satisfactory. The request must also be ratified by counselors, the teacher, the department head and the principal. Permission was only granted after it was confirmed that teachers were available and consideration was given to the employment conditions and University Entrance requirements.

#### Need for Research

Changes and innovations in school organization are attempts to provide society with quality education. Quality education is a variable term; it depends on the needs of the people and will vary as circumstances change. Individually, it is defined in terms of one's own perceived needs. The extent to which quality education is provided under the semester system relative to the conventional ten-month system is still very hazy. There is need for more and more extensive research to solve many of the problems associated with semestering. Many of the successes reported under semestering should be accepted with cautious suspicion.

R. E. Saunders stated that

although much has been written about the topic, very little of the literature examines thoroughly both the positive and negative aspects of

semestering and virtually none of it examines it from the viewpoint of the teacher as well as of administrator and student.<sup>77</sup>

Semestering, Saunders continued, is essentially a time device; a device that can be installed for a variety of reasons. To adequately assess the effects of a particular proposal in a school, one must analyze the time and workload factors inherent in the system. There are many references to the increased workload experienced by administrators, teachers and students under the semester system. Many educators are blaming the increased workload on the new time scheduling under the semester system. In particular, precious little is known of the effects of the longer periods on students of different capabilities under the semester system. Investigation to develop better understanding of the effects of increased workload, the effect on attention span, and the degree of student learning occurring in the longer semestered periods needs to be undertaken.

Dawe mentioned that "longer periods permit a subject to be studied in depth."<sup>78</sup> Although this idea has been often supported in the literature reviewed, it has been refuted equally as often. Also, it has been expressed often that the compression of courses that ran previously for ten months under the traditional system could lead to superficial learning under the semester system.

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<sup>77</sup>R. E. Saunders, Semestering, (O.S.S.T.F.) October, 1973.

<sup>78</sup>W. B. Dawe, "An Examination of the Semester System 1949-62".

Probably no other subject has suffered more than English under the new time scheduling of the semester system. Other subjects such as band, typing, choir, etc., might have suffered the same fate. In order to prevent superficial learning and to ensure coverage, as mentioned previously, English 300 is given twice the teacher-student contact time as other subjects in the Manitoba Secondary High School program. To highlight one of the major problems faced by English teachers under the semester system, Kathleen Fulcher wrote in the "Alberta English Notes",

One of the more serious problems which confronts teachers and students is the reading problem and short-time . . . there is no possibility of attaining a traditional plan for leisure reading . . . I discovered that a three-month period does not have enough hours for the extensive reading of novels, essays and other literature . . . The second problem is that of selecting the core material which will fit the time best.<sup>79</sup>

R. A. Shulz also pointed out that "the . . . pre-reading of novels involves in English courses"<sup>80</sup> is required under the semester system. These references point up the problems of accommodating English in the timetable of semestered schools.

An equally interesting, but a very difficult problem, is the retention regression experienced by students who take certain sequential courses under the semester system. The difficulties are partially inherent in timetabling and course

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<sup>79</sup>Kathleen Fulcher, Trimester Plan for English, The Curriculum Committee of the English Council, Alberta Teachers' Association, January, 1970.

<sup>80</sup>R. A. Schulz, Internal Evaluation of an Innovative Practice in a Secondary School; Examination of Process, M.Ed. Thesis (University of Manitoba, 1974), p. 40.

offerings. The problem of retention is very often explained away on the basis of memory theories. However, even to the very casual observer the problem remains. Its presence is very evident in the time lost in the intensive review required, before the teaching of more advance courses can begin at the start of each semester.

John Chalaturnyk wrote that "the basic purpose of semestering is to improve the quality of education."<sup>81</sup> In the same article, he implied that the introduction of semestering facilitates a shift from an emphasis on the acquisition of factual knowledge to process learning. Many people tend to equate the difference between the semester system and the traditional ten-month school year with the distinction between mass practice and the distributive learning practice in education. In response to these ideas, R. A. Dale wrote an article called "Semestering a Myth". Dale claimed that

semestering is not an educational innovation, it is an organization change. The same diet prevails, the same oriented subject approach persists; the same dull swallow vomit routine continues.<sup>82</sup>

Much doubt is cast on the concept that there is a shift from the learning of facts to process and that greater in-depth learning occurs simply by doubling the amount of subject matter timetabled for a single day. That the longer periods allow for greater diversified teaching approaches and individualized instruction may be just pleasing fantasies. No one seems to

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<sup>81</sup> John Chalaturnyk, "Why Change, Why Innovate?", Mass Info, (undated).

<sup>82</sup> R. A. Dale, "Semestering a Myth", Mass Info, (undated).



be able to state unequivocally that these hopes have been realized with satisfaction. The improved educational spin-off resulting from improved instructional practices is a matter that needs clarification. Semestering is essentially a time device; it does not change course contents, it simply apportions the same contents in a shorter time. R. A. Dale asked, "What significant curriculum changes have accompanied semestering? What significant humanistic teaching technique? What inservices to train teachers away from traditional approaches?"<sup>83</sup> "Everyone likes a change of routine."<sup>84</sup> Dale declared that "semestering is just that for high school students and teachers."<sup>85</sup> The current enthusiasm for semestering may in fact be due to the "Hawthorne" effect, or as Saunders expressed it: "They respond favourably because it is new."<sup>86</sup>

Semestering cannot solve all the problems connected with teaching and learning. However, the institution of major educational organizational changes on the principle of chance is inexcusable. J. W. Downey, Superintendent of Norwood School Division in Winnipeg noted that fifty-seven Manitoba schools were semestered on the basis of a complete lack of research into the impact of learning. He said that the decisions were made even when current literature indicated that "little is

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<sup>83</sup> Ibid.

<sup>84</sup> Ibid.

<sup>85</sup> Ibid.

<sup>86</sup> Saunders, O.S.S.T.F. Bulletin.

known about intensive (semestered) as contrasted to traditional (contiguous) learning."<sup>87</sup> The article continued to say that the action was "the stuff of heroes, to institute a major change in organization and pedagogy without research . . . ."<sup>88</sup> Mr. Downey said that a survey showed that 80% of the divisions which implemented semestering loved it. However, he qualified the statement by saying that "this is a survey and not research and was discovered after the fact."<sup>89</sup> Commenting further on the survey he said that "It does not research the psychological effect of studying two subjects intensively and exclusively. Nor does it show anything about the retention and the forgetting of the two systems."<sup>90</sup> It is very clear that many aspects of semestering need further research.

#### Advantages and Disadvantages

To attempt a complete and detailed coverage of the advantages and disadvantages of semestering cited in the large and varied literary sources would be monumental in space and time. The following, in the author's opinion, is the most comprehensive list of advantages and disadvantages of the semester system occurring anywhere in the literature.

The advantages claimed, are as follows:-

1. More effective learning and mastery plus higher student achievement should result from increased frequency of

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<sup>87</sup> J. W. Downey, "The Modern Ulysses", Mass Info, (undated).

<sup>88</sup> Ibid.

<sup>89</sup> Ibid.

<sup>90</sup> Ibid.

instruction and concentration of instruction.

2. The student's immediate course load at any one time is reduced by half, permitting him to give more attention to those subjects in which he is enrolled.
3. Students appear more motivated by the immediacy of their goals. The end of the course is in sight from the beginning.
4. Semesters provide more scope for student enrichment through more course offerings.
5. Semesters provide greater flexibility for remedial work and repeat classes.
6. The semester system offers greater flexibility in adjusting student programs.
7. The semester system appears to cause a decline in student discipline problems.
8. The semester system improves student attendance habits.
9. The semester system appears to improve instruction as a result of better teacher preparation and the removal of unnecessary trivia.
10. Students change their teachers every five months. This can be helpful if there is a personality clash between the student and the teacher.
11. Teachers get to know their students better because of reduced pupil loads and the increased frequency of meeting the students.
12. The semester system usually permits teachers to concentrate on fewer courses during a weekly cycle.

13. The semester appears to cause a decline in drop-outs and encourages some drop-outs to return to school.
14. The semester system significantly increases the utilization of facilities, equipment and materials.
15. The semester system removes traditional slack periods from the school year and, therefore, makes more efficient use of the time available.

The disadvantages of the semester system are claimed to be as follows:-

1. Excessive absenteeism by either the student or the teacher can create a most serious problem for the student.
2. There is a significantly increased workload for the administration.
3. Extended gaps between sequence courses may result in a greater retention loss.
4. There is an increased marking load for teachers.
5. Student transfers can be more difficult.
6. Scholarship examinations offered only at the end of the second semester discriminate against small and medium-sized schools.
7. Teachers may be discontented with receiving spares in only one semester.
8. The periods are too long for the attention span of some students.
9. Teachers are pressured to use a variety of methods.
10. There is a reduction in the coverage of courses.

These advantages and disadvantages are not unique to the semester system in comparison to the traditional system. "Chabot College in Hayward, California, began the semester system in 1961 and converted to the quarter system in 1966."<sup>91</sup> A study was conducted to determine whether or not Chabot should return to the semester system. The study showed that students, instructors, counselors and administrators prefer the quarter system. Instructors, however, were the least enthusiastic. They believed that the quarter system was too demanding on both faculty and students. Instructors felt that students needed more time to learn. The advantages and disadvantages reported are very similar to those recorded in this study. The feelings and attitudes expressed to explain why teachers, students, counselors and administrators prefer the quarter system over the semester were very close to the attitudes and feelings given to explain why teachers, students, counselors and administrators prefer the semester system over the ten-month conventional school year. Significantly interesting was the finding concerning academic achievement in the Chabot College Study. No clear evidence of better or worse academic performance under the semester or the quarter system was noticed. A modest increase in grade point average was reported under the quarter calendar. It was also stated that "Neither the high ability nor the low ability student group showed a significant difference in academic performance under the two

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<sup>91</sup> A Report on the Academic Calendar: Quarter System or Semester, Chabot College, Hayward, California, October 15, 1975, ERIC ED 115.350, pp. 1-3.

systems."<sup>92</sup> Mention has already been made concerning academic achievement under the traditional ten-month plan and the semester plan.

#### The Future of Semestering in Manitoba

With the exception of the Winnipeg Adult Education Centre, which operates on a year-round plan, only trimestered and semestered schools were operating in Manitoba at the end of the 1976-77 school year. Varying degrees of partially semestered and fully semestered schools were in existence then. In Teulon Collegiate some Grade XI and Grade XII subjects were semestered. D.M.C.I., Westwood Collegiate, Grant Park High School, Sturgeon Creek Comprehensive School, Nelson McIntyre Collegiate, East Kildonan Collegiate, and others are more or less fully semestered. A record of the number of semestered schools in Manitoba does not seem to exist. The number of semestered subjects in the different schools showed great variation. Physical Education, English 300, Music and the Business Education subjects were still the most commonly unsemestered subjects. Difficulties in timetabling were the most reasonable explanation for the variation. Timetabling difficulties have increased and are getting worse since the introduction in September, 1975, of the Credit System into Manitoba Secondary Schools. The increased problem is associated with the larger number of subjects being offered and the wider choice of subjects afforded the students. A credit is defined

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<sup>92</sup>Ibid.

as the "successful completion of 110-120 hours of organized learning."<sup>93</sup> Half-Credit and two credit courses are also available. A student requires 19-20 credits to graduate from secondary schools in Manitoba. Since all subjects, except English, in Manitoba Revised High School Program have equal student-teacher contact time per credit, period lengths and timetable cycling can now be varied more easily. The available information indicates that the semester system in Manitoba will evolve into four main types. These organizational types are similar to those presently operating in Ontario and are classified as:

- (1) Trimestered schools
- (2) Half-Credit semestered schools
- (3) Full-Credit semestered
- (4) Mixed, Full-Credit and Half-Credit semestering and Full-Year courses.<sup>94</sup>

The following table taken from Semestering the Secondary School, page 8, gives the characteristics of these school organizational patterns:

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<sup>93</sup>A Publication of the Curriculum Branch of the Department of Education, Province of Manitoba, Revised High School Program, 1974.

<sup>94</sup>King et al, Semestering the Secondary School, p. 8.

TABLE TWO: Current Secondary School Organizational Patterns

| Type of Organization   | Main Advantages   | Main Disadvantages  |
|--|---|---|
| Half-Credit Semestering<br>40-minute periods<br>8 periods per day<br>20-week course duration   | <ul style="list-style-type: none"> <li>- Program flexibility</li> <li>- Resource flexibility</li> <li>- Two entry and exit points</li> <li>- Potential for acceleration</li> <li>- Courses can be repeated or changed</li> <li>- Short-term goals more motivating</li> </ul>  | <ul style="list-style-type: none"> <li>- Considerable fragmentation of program</li> <li>- Teacher workload increased</li> <li>- Difficulty in scheduling for course continuity</li> <li>- Administrative workload increased</li> <li>- Record-keeping complex</li> </ul>  |
| Trimestering<br>40-minute periods<br>8 periods per day<br>13-week course duration  | <ul style="list-style-type: none"> <li>- Very individualized programs</li> <li>- Excellent resource utilization</li> <li>- Three entry and exit points</li> <li>- Courses can be repeated or changed</li> <li>- Short-term goals more motivating</li> </ul>   | <ul style="list-style-type: none"> <li>- Extreme fragmentation of program</li> <li>- Greater difficulty in scheduling for course continuity</li> <li>- Administrative workload increased</li> <li>- Record-keeping very complex</li> <li>- Timetable changes difficult and time-consuming</li> </ul>  |
| Full-Credit Semestering<br>60 to 80 minute periods<br>4 or 5 periods per day<br>20-week course duration  | <ul style="list-style-type: none"> <li>- Close student-teacher contact</li> <li>- Greater variety in teaching/learning experience</li> <li>- Efficient resource utilization</li> <li>- Two entry and exit points</li> <li>- Potential for acceleration</li> <li>- Courses can be repeated or changed</li> <li>- Short-term goals more motivating</li> </ul> | <ul style="list-style-type: none"> <li>- Heavier teacher workload in student evaluation and course design</li> <li>- Less content can be covered in some courses</li> <li>- Administrative workload increased</li> <li>- Absence more likely to affect progress</li> <li>- Problems of knowledge retention over summer plus semester</li> </ul> |
| Mixed Full-Credit and Half-Credit Semestering and Full-Year Courses<br>70 to 80 minute and 35 to 40 minute periods<br>4 long (8 short) periods per day<br>20-week or 40-week course duration | <ul style="list-style-type: none"> <li>- Advantages of full-credit and full-year systems in some courses</li> <li>- Flexible time lengths as appropriate for each course</li> </ul>   | <ul style="list-style-type: none"> <li>- Disadvantages of full-credit, half-credit, and full-year systems in some courses</li> <li>- Complex, restrictive master timetable</li> </ul>   |



The half-credit semestering, like the other semestered school organization, is divided into two equal parts. Each course is counted only for half a credit. In practice it is difficult to accommodate students' timetable changes for the second term. Staff assignment, timetabling and maintenance of student records are very difficult under this kind of organization. Half-Credit Semestering is seen usually as a first step towards further changes. Half-Credit Semestering, as well as trimestering organization, aims at the promotion of individualization through increasing course offerings. The main advantages appear to be flexibility of student programs, the opportunity to change programs, and to repeat failed courses. The immense organizational effort required to sustain the flexibility and the social fragmentation that can result under both systems are given by King et al as reasons for little or no growth of these school organizations in Ontario. These reasons may account for the recent application by Murdock McKay Collegiate to the Transcona School Division to permit it to change from the trimester to the semester system. The application was denied.

The Full-Credit Semestering organization seems to be acceptable in Ontario, Alberta, British Columbia and Manitoba. The timetables 1, 2 and 3 are those most commonly used in Ontario, Manitoba and Alberta respectively. The timetables are taken from Semestering of the Secondary School, page 16.<sup>95</sup>

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<sup>95</sup> King et al, Semestering the Secondary School, p. 16.

FIGURE ONE: Timetable 1

Oak Bay Secondary School, Victoria, British Columbia

| Period Length (min.) | Day   |   |   |   |
|----------------------|-------|---|---|---|
|                      | 1     | 2 | 3 | 4 |
| 60                   | A     | B | C | D |
| 60                   | B     | C | D | A |
| 60                   | C     | D | A | B |
| 60                   | Lunch |   |   |   |
| 60                   | D     | A | B | C |
| 60                   | A     | B | C | D |

FIGURE TWO: Timetable 2

Sir Winston Churchill School, Lethbridge, Alberta

| Period Length (min.)                |   |
|-------------------------------------|---|
| 80                                  | A |
| 80                                  | B |
| 80*                                 | C |
| 80*                                 | C |
| 80                                  | D |
| *Lunch is one of these two periods. |   |

NB. Letters A, B, C, D represent periods.

FIGURE THREE: Timetable 3

Silver Heights Collegiate, St. James, Manitoba

| Period Length (min.) | Day                     |   |   |   |
|----------------------|-------------------------|---|---|---|
|                      | 1                       | 2 | 3 | 4 |
| 4                    | morning announcements   |   |   |   |
| 60                   | A                       | B | C | D |
| 60                   | B                       | C | D | A |
| 60                   | C                       | D | A | B |
| 80                   | lunch                   |   |   |   |
| 7                    | afternoon announcements |   |   |   |
| 65                   | D                       | A | B | C |
| 65                   | A                       | B | C | D |

On these timetables the periods are designated by letters. Alberta's semestered schools, generally, use the eighty-minute four-period day. Often the daily periods are cycled through four days so that each subject is taught at different times each day. British Columbia and Manitoba use mostly sixty-minute periods, they also use the four, five or six-day cycle in which the subject taught in the first period is taught again in the last period of the day. Semestered schools such as Silver Heights Collegiate and Oak Bay Secondary School have a fixed lunch period each day. Other schools have an extended lunch period. Sir Winston Churchill High School in Lethbridge, Alberta, has a lunch break that extends for two eighty-minute periods. Many schools take advantage of an extended lunch period to develop strong extracurricular programs. Sometimes an activity period is connected to the extended lunch period. This allows many more teachers to become involved in planning, supervisory duties, remedial classes, clubs, athletics, etc.

Students' unscheduled time has always been a timetable problem in semestered schools. There may be as much as 30 percent of unassigned time per student. This condition is maintained in order to gain the flexibility necessary to satisfy the varied course requirements of the students. Unscheduled time is meant for independent study, tutorial and remedial work. Some schools allow students to go home during their spare periods. Unassigned time is generally misused by students. Occasionally, it provides the opportunity for the initiation of many exciting educational activities.

Many Ontario full-credit semestered schools have been using timetabling procedures to vary period lengths. Teachers have expressed always, their concerns regarding the longer periods of semestered schools. However, there is no agreement on the length of time which makes an ideal period. It is accepted by many teachers that variations in period lengths increase the flexibility of the learning situation. Period lengths can be varied easily provided the change times of classes mesh, each subject is scheduled using the same variation in period lengths, and the half-year and full-year courses offered do not significantly complicate the scheduling of the next semester. Some Ontario schools have also managed to devise very interesting timetables by the inclusion of one split-period in their daily schedule. Usually the two halves of the split-period is separated by lunch. Whatever the case, a half of the split-period is held in the mornings and the other half in the afternoons.

Different schools employ the split-period differently. Some schools offer two subjects daily on the split-period basis. Others split one subject each day. Still others revolve different period lengths over a certain number of days, so that different subjects meet the split-period and the different period lengths each day. There is always a problem of employing different period lengths and to maintain the ability to give students their first choice subjects. Flexible modular scheduling is sometimes used to solve this problem. Timetables are built on basic modular units of ten to twenty minutes. Each subject is assigned a certain number of modules per cycle.

A perusal of the available literature has led to the conclusion that the main general advantages of full-credit semestering are:-

- (1) It tends to lead to more effective/learning experiences.
- (2) . . . it can offer a more efficient utilization of the school year by providing more entry and re-entry points, and greater opportunities for students to make up courses or accelerate their programs.
- (3) . . . materials, facilities, and staff resources can be utilized more effectively and efficiently.<sup>96</sup>

The full-credit semestering plan is acceptable to Manitoba generally. Many schools, however, may find it necessary to employ the mixed timetable model.

The mixed full-credit, half-credit semestering and the full-year course semestering scheduling is an attempt to combine the best features of all the existing timetable plans. Timetables A, B and C are examples of mixed timetable models.

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<sup>96</sup>King et al, Semestering the Secondary School, p. 17.

FIGURE FOUR:

Timetable A

Rideau District High School, full-year, half-credit semestered, and full-credit semestered courses

| Period Length (min.) | Full-Year or Half-Credit Semester | Full-Credit Semester |
|----------------------|-----------------------------------|----------------------|
| 5                    | homeroom                          | homeroom             |
| 40                   | A                                 | M                    |
| 40                   | B                                 |                      |
| 10                   | break                             | break                |
| 40                   | C                                 | N                    |
| 40                   | D                                 |                      |
| 40                   | E                                 | lunch                |
| 15                   | break                             | break                |
| 40                   | lunch                             | O                    |
| 40                   | F                                 |                      |
| 40                   | G                                 | P                    |
| 40                   | H                                 |                      |

FIGURE FIVE:

Timetable B

Nepean High School, full-year, half-credit semestered and full-credit semestered courses (four-day cycle)

| Period Length (min.) | Full-Year or Half-Credit Semester | Full-Credit Semester | Day |     |     |
|----------------------|-----------------------------------|----------------------|-----|-----|-----|
|                      |                                   |                      | 2   | 3   | 4   |
| 35                   | A                                 | M                    | G P | E O | C N |
| 35                   | B                                 |                      | H   | F   | D   |
| 35                   | C                                 | N                    | A M | G P | E O |
| 35                   | D                                 |                      | B   | H   | F   |
| 40                   | E                                 | O/2                  | C   | A   | G   |
|                      |                                   |                      | N/2 | M/2 | P/2 |
| 70                   | lunch                             |                      |     |     |     |
| 40                   | F                                 | O/2                  | D   | B   | H   |
|                      |                                   |                      | N/2 | M/2 | P/2 |
| 40                   | G                                 | P                    | E O | C N | A M |
| 40                   | H                                 |                      | F   | D   | B   |

FIGURE SIX:

Timetable C

Bawating Collegiate and Vocational School, full-year, half-credit semestered, and full-credit semestered courses (20 minute modules)

| Full-Year<br>or<br>Half-credit<br>Semester | Module | Full-Credit<br>Semester |
|--|--------|-------------------------|
| homeroom                                   | 1      | homeroom                |
| A  | 2      | M                       |
|  | 3      |                         |
| B  | 4      |                         |
|  | 5      | N                       |
| C  | 6      |                         |
|  | 7      |                         |
| D  | 8      | O                       |
|  | 9      |                         |
| E or lunch                                 | 10     |                         |
|  | 11     | lunch                   |
| E or lunch                                 | 12     |                         |
|  | 13     |                         |
| F  | 14     | P                       |
|  | 15     |                         |
| G  | 16     |                         |
|  | 17     | Q                       |
| H  | 18     |                         |
|  | 19     |                         |
| activity period                            | 20     | activity period         |
|  | 21     |                         |

Key to Timetables A, B & C

| <u>Periods</u>       | <u>Explanations</u>                         |
|----------------------|---|
| A - H                | Half-Credit and Full-Year courses are taken |
| M - P                | Full-Credit courses are taken               |
| M/2, N/2<br>O/2, P/2 | are split periods                           |

The use of the mixed timetable model is a response to the concerns of teachers in the different subject fields. Some teachers like the traditional forty-minute periods, others prefer the longer periods, while in many subject areas, e.g., Physical Education and Music, the teachers prefer the year long courses. Some Ontario schools have been using the mixed model semestered timetables for some time. Rideau District High School in Elgin has a timetable which has eighty-minute periods for full-credit courses and forty-minute periods for half-credit and full-year courses. Nepean<sup>n</sup> High School in Ottawa uses a similar schedule. The timetable has four full-credit periods each day. There are eight half periods for full-year and half-credit courses. The periods are rotated through a four-day cycle. Bawating Collegiate and Vocational School in Sault Ste. Marie timetable is built on twenty-minute modules. Full-Credit courses are offered in sixty-minute periods of three modules. The full-year and half-credit courses are offered in forty-minute periods of two modules.

King et al stated that "The full-credit, half-credit semestering and the full-year courses timetable model tries to avoid the disadvantage of straight-jacketing all subjects in a rigid format."<sup>97</sup> However, any advantage gained is sacrificed to a reduction in the flexibility of the timetable. It also creates a situation where students may not be able to get their first choice of subjects. The mixed model timetable is more

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<sup>97</sup>Ibid., p. 10.



difficult and more complicated to produce than timetables of full-credit semestered schools. Under this kind of school organization the students select their program and fit it into a master timetable plan for all the students. Such timetable master plans are better produced by computers. Blakelock High in Oakville, Ontario, was on a limited semestered program.<sup>98</sup> It enrolled 1,900 students. For the 1973-74 school year it received 17,775 student requests for courses. It offered 168 different courses, has 70 rooms and 101 teachers. It uses a computer to produce a complete and accurate individualized timetable by students, teacher and room in a weekend. The same job took the vice-principal, the department heads and the guidance personnel more than a month to produce.

#### Summary

In summary, the school is recognized as a social institution that provides education in accordance with the changing social order. The period which follows the Second World War was one of rapid and continuous socio-economic changes. It was also a period marked by a combination of fear, insecurity and a desire for better human understanding and relationship. It was a period of tremendous research in all fields of learning. The massive production of knowledge which resulted, together with better educational techniques and know-how, provide the schools with the means to shift from almost purely content teaching to one mainly of concept and process. Accountability

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<sup>98</sup>Course Master Timetabling Saves School Time, Educational Digest, November, 1973.

was seen as a controversial concept that was driving schools to become more efficient, effective and economical. Many educators believed that the way to accomplish this was by the re-organization of the school year. The public demanded and educators recognized the need for a more flexible kind of school organization. Other factors which led to the rescheduling of the school year were (a) the demand for greater use of school facilities and personnel; (b) the need for greater flexibility of the school organization to synchronize with the changing lifestyle of families; (c) the demand for quality education; and (d) the bandwagon phenomenon.

The trimestered and the quadrimestered innovative school organizations were seen to be the most popular forms operating in the United States. Their varied structure and function were described at length. Semestering was one of the many American innovative school organizations that were found suitable to Canadian lifestyles and climatic condition. A semester was described as a period of five months in school, during which students studied three or four subjects daily in periods of sixty to eighty minutes each. This was compared with the traditional ten-month school year during which students followed a lock-step program and studied many more subjects in eight forty-minute periods daily.

At this juncture, many suggestions were made with respect to the implementation of innovative school organization. It was mentioned that before any organizational changes were made in schools there should have been an exhaustive examination of

the organizational theme, for example, semestering. An analysis of the aims and objectives should precede the implementation of any new school organization. Besides, there should have been built-in ongoing monitoring procedures to continually evaluate and to determine whether or not these aims and objectives were achieved. If improved instruction was the major aim of any school re-organization, then much attention should be devoted to the re-education of teachers.

In Canada the semester system was first introduced in Alberta. From there it spread into the other Western Provinces and Ontario. Most of the early experimentation with semestering occurred in the West. Educators and the public found semestering generally acceptable. Reference was made of the attempts of W. G. Schmidt to reform the two-term semester system to make it more acceptable to Canadian conditions.

A retrospective glance was taken at the virtues and failings of the traditional school system. The introduction and acceptance of semestering into Manitoba was credited to the need for a more flexible school arrangement and a new philosophy of education. This new philosophy was exemplified in the Core Report prepared by the Manitoba Department of Education and was published in 1973. Various literary reports referred to substantiated the fact that semestering seemed to have received only mixed reception in Manitoba.

Semestering is regarded as a good system but by no means ideal. At this point there was a fairly detailed discussion of academic achievement, retention, and teacher workload. These

seemed to have been the most controversial topics under the semester system. No significant difference was found between students' academic achievement under the semester system and under the traditional system. Also, there was no evidence that retention was either helped or harmed under either of the two systems. The workload of teachers definitely increased when a school changed from the traditional to the semester system. However, it had been strongly suggested that this problem could be solved by using timetabling procedures to provide teachers with enough preparation time.

It seemed evident that most of the argument supporting the semester system was based on subjective evaluation. Many of the concerns for education under the semester system as they appeared in the literature reviewed were described. Accompanying these concerns were strong suggestions that more research should be done to establish the educational effectiveness of semestering more satisfactorily. At this point a very comprehensive list of the advantages and disadvantages of semestering was presented.

The review of literature looked into semestering as it existed in Manitoba. It was predicted that the semester system in Manitoba would evolve into organizational patterns similar to those operating in Ontario. It terminated with a discussion of these organizational forms and some of the related timetables.

## CHAPTER III

### EXPERIMENTAL DESIGN

#### Description of Population

The experimental population consisted of the total school population of D.M.C.I. from September 1973 to February 1977. The period covered three consecutive ten-month school years, followed by three consecutive semesters. The representative population sample for each semester and for each conventional school year varied from one hundred to one hundred and fifty randomly selected students from each subject area. In cases where the number of students taking a certain subject was low, for example, French, the representative population was less than a hundred students. Three grades and nine subject areas were involved in the study.

#### Analysis of Variance

Analysis of Variance was the statistical method used in the processing of the data. This technique was particularly suitable to the study because it allows for the observation and quantification of facts about the various groups of students under consideration. Specifically, it allows for the determination and comparison of the mean achievement scores of the different groups. Analysis of Variance makes it possible to separate the variance into parts and study the variabilities attributable to

specific sources. It makes it possible to study the different populations and the variables simultaneously; it allows the use of pooled variance. As a statistical technique, Analysis of Variance has the distinction of being able to take into consideration those uncontrollable variables that cannot be incorporated directly into the study. Significantly for this study, it allowed the researcher to say whether or not the similarities or differences in achievement of the various groups of students was due to differences in sex, semestering or non-semestering.



TABLE 3

Key Explaining Experimental Design

|      |                            |   |  |
|------|----------------------------|---|--|
| (1)  | $\bar{x}$                  | = | mean score   |
| (2)  | sb                         | = | specific subject for semestered boys   |
| (3)  | sg                         | = | specific subject for semestered girls  |
| (4)  | nb                         | = | specific subject for non-semestered boys   |
| (5)  | ng                         | = | specific subject for non-semestered girls  |
| (6)  | st                         | = | total specific subject for all semestered students   |
| (7)  | nt                         | = | total specific subject for all non-semestered students   |
| (8)  | so                         | = | overall for all students for all semesters   |
| (9)  | no                         | = | overall for all students for all non-semesters   |
| (10) | Subscript 5                | = | overall total for semestered boys and girls respectively and non-semestered boys and girls respectively  |
| (11) | 1, 2, 3, 4                 | = | refer to specific subjects   |
| (12) | letters with super scripts | = | refer to separate population of students, e.g., $b^{23}$ means the population of students in column 2 row 3 who studied subject 2 in the semestered school |



TABLE 4

TABLE OF COMPARISONS

| <u>No.</u> | <u>Comparisons</u>   | <u>Explanations</u>   |
|------------|--|---|
| 1          | $X^{-sb} : X^{-sg}$  | Comparison of the total achievement between boys and girls under the semestered school system                         |
| 2          | $X^{-nb} : X^{-ng}$  | Comparison of the total achievement between boys and girls under the non-semestered school system                     |
| 3          | $X^{-sb} : X^{-nb}$  | Comparison of the total achievement between boys under the semestered and the non-semestered school systems           |
| 4          | $X^{-sg} : X^{-ng}$  | Comparison of the total achievement between girls under the semestered and the non-semestered school systems          |
| 5          | $X_1^{-sb} : X_1^{-sg}$<br>$X_2^{-sb} : X_2^{-sg}$<br>$X_3^{-sb} : X_3^{-sg}$<br>$X_4^{-sb} : X_4^{-sg}$ | Comparison for specific subject achievements between girls and boys under the semestered system                       |
| 6          | $X_1^{-nb} : X_1^{-ng}$<br>$X_2^{-nb} : X_2^{-ng}$<br>$X_3^{-nb} : X_3^{-ng}$<br>$X_4^{-nb} : X_4^{-ng}$ | Comparison for specific subject achievements between girls and boys under the non-semestered school system            |
| 7          | $X_1^{-sb} : X_1^{-nb}$<br>$X_2^{-sb} : X_2^{-nb}$<br>$X_3^{-sb} : X_3^{-nb}$<br>$X_4^{-sb} : X_4^{-nb}$ | Comparison for specific subject achievements between boys under the semestered and the non-semestered school systems  |
| 8          | $X_1^{-sg} : X_1^{-ng}$<br>$X_2^{-sg} : X_2^{-ng}$<br>$X_3^{-sg} : X_3^{-ng}$<br>$X_4^{-sg} : X_4^{-ng}$ | Comparison for specific subject achievements between girls under the semestered and the non-semestered school systems |

TABLE OF COMPARISONS cont'd.

| <u>No.</u> | <u>Comparisons</u>   | <u>Explanation</u>  |
|------------|--|---|
| 9          | $X_1^{-st} : X_1^{-nt}$<br>$X_2^{-st} : X_2^{-nt}$<br>$X_3^{-st} : X_3^{-nt}$<br>$X_4^{-st} : X_4^{-nt}$ | Comparison for total specific subject achievement between students under the semestered and the non-semestered school systems                     |
| 10         | $X^{-so} : X^{-no}$  | Comparison of overall achievement between all students under the semestered school system and all students under the non-semestered school system |

### Testing the Hypotheses

The student population was first stratified into grades for each semester and for each ten-month year, and randomized. Randomization was done mainly by computer. A balance was maintained between the number of boys and the number of girls selected for each sample.

#### Hypothesis 1.1

There is no difference between the total mean achievement of all boys who studied under the semestered school system, and the total mean achievement of all boys who studied under the non-semestered school system at D.M.C.I.

#### Collection and treatment of data

The marks of approximately twenty-five boys from each grade for each subject area and for each semester were selected. The same was done for each of the ten-month conventional years. The total mean score for all the boys who studied under the semestered school system, and the total mean score for all the boys who studied under the non-semestered school system were determined. The F. value was compared for significance at the 0.05 level of confidence.

#### Hypothesis 1.2

There is no difference between the total mean achievement of all girls who studied under the semestered school system, and the total mean achievement of all girls who studied under the non-semestered school system at D.M.C.I.

### Collection and treatment of data

The marks of approximately twenty-five girls from each grade for each subject area and for each semester were selected. The same was done for each of the ten-month conventional years. The total mean score for all the girls who studied under the semestered school system, and the total mean score for all the girls who studied under the non-semestered school system were determined. The F. value was compared for significance at the 0.05 level of confidence.

### Hypothesis 1.3

There are no differences between the mean specific subject achievements of all the boys who studied under the semestered school system, and the mean specific subject achievements of all the boys who studied under the non-semestered school system at D.M.C.I.

### Collection and treatment of data

The marks of approximately twenty-five boys from each grade for each subject and for each semester were taken from the correct mark sheets. The same was done for the boys who studied under the non-semestered school system. The mean score was determined for each subject studied by the boys under the semestered school system and for each subject studied by the boys under the non-semestered school system. The F. value for each specific subject studied by the boys under the semestered and the non-semestered school systems was compared for significance at the 0.05 level of confidence.

#### Hypothesis 1.4

There are no differences between the mean specific subject achievements of the girls who studied under the semestered school system and the mean specific subject achievements of the girls who studied under the non-semestered school system at D.M.C.I.

#### Collection and treatment of data

The marks of approximately twenty-five girls from each grade for each subject and for each semester were selected from the correct mark sheets. The same was done for those girls who studied under the non-semestered school system. The mean score was determined for each subject studied by the girls under the semestered school system, and for each subject studied by the girls under the non-semestered school system. The F. value for each specific subject studied by the girls under the semestered and the non-semestered school systems were compared for significance to the 0.05 level of confidence.

#### Hypothesis 1.5

There is no difference between the total mean achievement of all boys, and the total mean achievement of all girls who studied under the semestered school system at D.M.C.I.

#### Collection and treatment of data

The marks of approximately twenty-five boys and the marks of approximately twenty-five girls respectively, were selected from the correct mark sheets for each grade, for each subject area and for each semester. The total mean score for all the boys,

and the total mean score for all the girls respectively were determined. The F. value was compared for significance at the 0.05 level of confidence.

#### Hypothesis 1.6

There is no difference between the total mean achievement of all boys, and the total mean achievement of all girls who studied under the non-semestered school system at D.M.C.I.

#### Collection and treatment of data

The marks of approximately twenty-five boys, and the marks of approximately twenty-five girls respectively, were selected from the correct mark sheets for each grade, for each subject area and for each ten-month conventional school year. The total mean score for all the boys, and the total mean score for all the girls respectively, were determined. The F. value was compared for significance at the 0.05 level of significance.

#### Hypothesis 1.7

There are no differences between the mean specific subject achievements of boys and the mean specific subject achievements of girls who studied under the semestered school system at D.M.C.I.

#### Collection and treatment of data

The marks of approximately twenty-five boys from each grade, for each subject and for each semester were selected from the correct mark sheets. Similarly, the marks of approximately twenty-five girls from each grade for each subject and for each

semester were taken from the correct mark sheets. The mean scores for each specific subject were determined for the boys and for the girls. The F. value for each specific subject for the boys and for the girls was compared for significance at the 0.05 level of confidence.

#### Hypothesis 1.8

There are no differences between the mean specific subject achievements of boys, and the mean specific subject achievements of girls who studied under the non-semestered school system at D.M.C.I.

#### Collection and treatment of data

The marks of approximately twenty-five boys and the marks of approximately twenty-five girls respectively from each grade for each subject and for each ten-month conventional school year were selected from the correct mark sheets. The mean scores for each specific subject were determined for both the boys and the girls. The F. value for each specific subject studied by the boys and by the girls was compared for significance at the 0.05 level of confidence.

#### Hypothesis 1.9

There are no differences between the total mean specific subject achievements of all students who studied under the semestered school system, and the total mean specific subject achievements of all students who studied under the non-semestered school system at D.M.C.I.

### Collection and treatment of data

The marks for approximately fifty students from each grade for each specific subject and for each semester were selected from the appropriate mark sheets. Similarly the marks of fifty students from each grade for each subject and for each ten-month conventional school year were selected. The total mean score for each specific subject for the students who studied both under the semestered and the non-semestered systems were calculated. The F. value for each specific subject was compared for significance at the 0.05 level of confidence.

### Hypothesis 1.10

There is no difference between the overall achievement of all students who studied under the semestered school system, and the overall achievement of all students who studied under the non-semestered school system at D.M.C.I.

### Collection and treatment of data

The marks of approximately fifty students from each grade for each specific subject area and for each semester were selected. Similarly, the marks of approximately fifty students from each grade for each specific subject area and for each of the ten-month conventional school years were selected. The mean score for all students in all the grades in all subject areas and in all the semesters was determined. In the same way, the mean score for the students who studied under the non-semestered school system was determined. The F. value for all students who studied under the semestered school system and all students who studied under the non-semestered school system was compared for significance at the 0.05 level of confidence.



## CHAPTER IV

### ANALYSIS OF DATA

#### Introduction

The purpose of this study is to compare the academic achievements of students under the semestered system with the academic achievement of students under the non-semestered system at D.M.C.I. The dependent variables are sex and the University Entrance "00" Courses of English, Mathematics, Chemistry, Physics, French, Geography, History, Biology and General Science (Grade X I.P.S.).

In this chapter the results of the analysis of covariance for the study are presented. The statistics were processed by the computer 370/168 using the Statistical Package for the Social Sciences (S.P.S.S.) for OS/360 Version H. Release 7.0 March, 1977.

#### Population Breakdown

The entire experimental population is made up of 2,252 cases. This consists of 1,201 students who studied under the semestered system and 1,051 students who studied under the traditional system. The population from the semestered system consists of 47.38% boys and 52.62% girls. The population from the traditional system consists of 51.19% boys and 48.81% girls. Tables A - I describe the various sub-populations by organizational types, grades, and sexes in terms of individual subjects.

Each subject analysis is accompanied by a between groups, and a within groups analysis of variance. These data are tied in with the study throughout the rest of the analysis and do not require any further explanation at this time.

DESCRIPTION OF SUB-POPULATIONS  
(Organizational type, grade, and sex by subjects)

TABLE 5 - A:

Sub-population for English

| Organizational Type | Grade | Sex | No. of Students (N) | Mean Achievement |
|---------------------|-------|-----|---------------------|------------------|
| Semester            | 10    | M   | 89                  | 61.5730          |
|                     | 10    | F   | 80                  | 65.5125          |
|                     | 11    | M   | 85                  | 61.4824          |
|                     | 11    | F   | 102                 | 64.9314          |
|                     | 12    | M   | 88                  | 61.5000          |
|                     | 12    | F   | 85                  | 67.4353          |
| Traditional         | 10    | M   | 84                  | 60.5952          |
|                     | 10    | F   | 91                  | 65.0989          |
|                     | 11    | M   | 98                  | 63.8367          |
|                     | 11    | F   | 90                  | 69.3556          |
|                     | 12    | M   | 91                  | 62.3516          |
|                     | 12    | F   | 88                  | 67.1818          |

TABLE 5 - A-1:

Analysis of Variance for English

| Source         | Sum of Squares | D.F. | Mean Square | F.    | Sig. of F |
|----------------|----------------|------|-------------|-------|-----------|
| Between groups | 281.202        | 1    | 281.202     | 1.746 | 0.1867    |
| Within groups  | 172201.735     | 1069 | 161.087     |       |           |

TABLE 5 - B:

Sub-populations for Mathematics

| Organizational Type | Grade | Sex | No. of Students (N) | Mean Achievement |
|---------------------|-------|-----|---------------------|------------------|
| Semester            | 10    | M   | 79                  | 70.6835          |
|                     | 10    | F   | 73                  | 74.8493          |
|                     | 11    | M   | 80                  | 70.7000          |
|                     | 11    | F   | 66                  | 71.6212          |
|                     | 12    | M   | 89                  | 68.3146          |
|                     | 12    | F   | 70                  | 70.8714          |
| Traditional         | 10    | M   | 91                  | 65.8901          |
|                     | 10    | F   | 84                  | 72.5238          |
|                     | 11    | M   | 93                  | 72.9570          |
|                     | 11    | F   | 85                  | 76.0353          |
|                     | 12    | M   | 102                 | 67.6078          |
|                     | 12    | F   | 82                  | 71.0366          |

TABLE 5 - B-1:

Analysis of Variance for Mathematics

| Source         | Sum of Squares | D.F. | Mean Square | F.    | Sig. of F |
|----------------|----------------|------|-------------|-------|-----------|
| Between groups | 8.455          | 1    | 8.455       | 0.030 | 0.8619    |
| Within groups  | 276968.508     | 992  | 279.202     |       |           |

TABLE 5 - C:

Sub-populations for History

| Organizational Type | Grade | Sex | No. of Students (N) | Mean Achievement |
|---------------------|-------|-----|---------------------|------------------|
| Semester            | 11    | M   | 99                  | 63.5152          |
|                     | 11    | F   | 88                  | 68.2045          |
|                     | 12    | M   | 61                  | 65.8361          |
|                     | 12    | F   | 63                  | 67.3175          |
| Traditional         | 11    | M   | 102                 | 67.1667          |
|                     | 11    | F   | 92                  | 70.9348          |
|                     | 12    | M   | 91                  | 66.2308          |
|                     | 12    | F   | 62                  | 68.8710          |

TABLE 5 - C-1:

Analysis of Variance for History

| Source         | Sum of Squares | D.F. | Mean Square | F.    | Sig. of F |
|----------------|----------------|------|-------------|-------|-----------|
| Between groups | 763.254        | 1    | 763.254     | 4.143 | 0.0422*   |
| Within groups  | 120856.049     | 656  | 184.232     |       |           |

TABLE 5 - D:

Sub-populations for Geography

| Organizational Type | Grade | Sex | No. of Students (N) | Mean Achievement |
|---------------------|-------|-----|---------------------|------------------|
| Semester            | 10    | M   | 94                  | 67.6383          |
|                     | 10    | F   | 77                  | 66.7532          |
|                     | 11    | M   | 40                  | 65.7000          |
|                     | 11    | F   | 31                  | 67.2903          |
|                     | 12    | M   | 83                  | 67.2718          |
|                     | 12    | F   | 74                  | 71.2297          |
| Tradition           | 10    | M   | 100                 | 64.8400          |
|                     | 10    | F   | 92                  | 68.9783          |
|                     | 11    | M   | 53                  | 68.0755          |
|                     | 11    | F   | 25                  | 70.6000          |
|                     | 12    | M   | 82                  | 75.4024          |
|                     | 12    | F   | 77                  | 77.9221          |

TABLE 5 - D-1:

Analysis of Variance for Geography

| Source         | Sum of Squares | D.F. | Mean Square | F.     | Sig. of F |
|----------------|----------------|------|-------------|--------|-----------|
| Between groups | 1877.068       | 1    | 1877.068    | 10.229 | 0.0014*   |
| Within groups  | 151937.650     | 828  | 183.500     |        |           |

TABLE 5 - E:

Sub-populations for French

| Organizational Type | Grade | Sex | No. of Students (N) | Mean Achievement |
|---------------------|-------|-----|---------------------|------------------|
| Semester            | 10    | M   | 27                  | 66.8519          |
|                     | 10    | F   | 49                  | 74.9388          |
|                     | 11    | M   | 13                  | 70.4615          |
|                     | 11    | F   | 42                  | 69.2381          |
|                     | 12    | M   | 16                  | 69.3125          |
|                     | 12    | F   | 36                  | 73.9167          |
| Traditional         | 10    | M   | 79                  | 69.9620          |
|                     | 10    | F   | 99                  | 76.5859          |
|                     | 11    | M   | 41                  | 67.6829          |
|                     | 11    | F   | 84                  | 73.1071          |
|                     | 12    | M   | 25                  | 74.4800          |
|                     | 12    | F   | 52                  | 74.0769          |

TABLE 5 - E-1:

Analysis of Variance for French

| Source         | Sum of Squares | D.F. | Mean Square | F.    | Sig. of F |
|----------------|----------------|------|-------------|-------|-----------|
| Between groups | 304.899        | 1    | 304.899     | 1.701 | 0.1926    |
| Within groups  | 100529.751     | 561  | 179.197     |       |           |

TABLE 5 - F:

Sub-populations for Physics

| Organizational Type | Grade | Sex | No. of Students (N) | Mean Achievement |
|---------------------|-------|-----|---------------------|------------------|
| Semester            | 10    | M   | 2                   | 44.5000          |
|                     | 10    | F   | 4                   | 66.2500          |
|                     | 11    | M   | 115                 | 64.6435          |
|                     | 11    | F   | 48                  | 70.9792          |
|                     | 12    | M   | 94                  | 63.2553          |
|                     | 12    | F   | 43                  | 71.5349          |
| Traditional         | 11    | M   | 116                 | 68.3103          |
|                     | 11    | F   | 50                  | 77.4400          |
|                     | 12    | M   | 100                 | 65.8500          |
|                     | 12    | F   | 41                  | 72.5122          |

TABLE 5 - F-1:

Analysis of Variance for Physics

| Source         | Sum of Squares | D.F. | Mean Square | F.    | Sig. of F |
|----------------|----------------|------|-------------|-------|-----------|
| Between groups | 1864.858       | 1    | 1864.858    | 7.161 | 0.0077    |
| Within groups  | 159121.311     | 611  | 260.428     |       |           |

TABLE 5 - G:

Sub-populations for Chemistry

| Organizational Type | Grade | Sex | No. of Students (N) | Mean Achievement |
|---------------------|-------|-----|---------------------|------------------|
| Semester            | 11    | M   | 83                  | 67.5783          |
|                     | 11    | F   | 78                  | 62.7051          |
|                     | 12    | M   | 81                  | 69.5926          |
|                     | 12    | F   | 76                  | 71.6711          |
| Traditional         | 11    | M   | 116                 | 65.8793          |
|                     | 11    | F   | 82                  | 69.4634          |
|                     | 12    | M   | 95                  | 68.8526          |
|                     | 12    | F   | 62                  | 70.8710          |

TABLE 5 - G-1:

Analysis of Variance for Chemistry

| Source         | Sum of Squares | D.F. | Mean Square | F.    | Sig. of F |
|----------------|----------------|------|-------------|-------|-----------|
| Between groups | 42.008         | 1    | 42.008      | 0.184 | 0.6680    |
| Within groups  | 153098.140     | 671  | 228.164     |       |           |



TABLE 5 - H:

Sub-populations for Biology

| Organizational Type | Grade | Sex | No. of Students (N) | Mean Achievement |
|---------------------|-------|-----|---------------------|------------------|
| Semester            | 11    | M   | 74                  | 62.6081          |
|                     | 11    | F   | 89                  | 61.8539          |
|                     | 12    | M   | 79                  | 61.5696          |
|                     | 12    | F   | 96                  | 70.4688          |
| Traditional         | 11    | M   | 71                  | 65.5070          |
|                     | 11    | F   | 81                  | 69.2963          |
|                     | 12    | M   | 84                  | 64.6190          |
|                     | 12    | F   | 102                 | 67.5980          |

TABLE 5 - H-1:

Analysis of Variance for Biology

| Source         | Sum of Squares | D.F. | Mean Square | F.    | Sig. of F |
|----------------|----------------|------|-------------|-------|-----------|
| Between groups | 994.675        | 1    | 994.675     | 4.108 | 0.0431*   |
| Within groups  | 163195.781     | 674  | 242.130     |       |           |

TABLE 5 - I:

Sub-populations for General Science

| Organizational Type | Grade | Sex | No. of Students (N) | Mean Achievement |
|---------------------|-------|-----|---------------------|------------------|
| Semester            | 10    | M   | 90                  | 59.7222          |
|                     | 10    | F   | 70                  | 56.2571          |
| Traditional         | 10    | M   | 95                  | 61.9895          |
|                     | 10    | F   | 89                  | 61.6067          |

TABLE 5 - I-1:

Analysis of Variance for General Science

| Source         | Sum of Squares | D.F. | Mean Square | F.    | Sig. of F |
|----------------|----------------|------|-------------|-------|-----------|
| Between groups | 1107.963       | 1    | 1107.963    | 6.208 | 0.0132*   |
| Within groups  | 61039.150      | 342  | 178.477     |       |           |

Evidences and Findings

Hypothesis 1.1 - Data and Findings

Hypothesis 1.1 states that there is no difference between the total mean achievement of all boys who studied under the semestered school system and the total mean achievement of all boys who studied under the non-semestered school system at D.M.C.I.

Analysis of variance

TABLE 6:

Data showing the total mean achievement of all boys under the semestered and non-semestered systems

| Organization | N   | Mean  | F. Ratio | Significance of F. |
|--------------|-----|-------|----------|--------------------|
| Semestered   | 632 | 64.31 | 2.266    | 0.133              |
| Traditional  | 538 | 65.57 |          |                    |

The data presented in Table 6 show no significant difference in the total mean achievement of the boys who studied under the semestered and the non-semestered school systems respectively. Hypothesis 1.1 is therefore accepted.

Hypothesis 1.2 - Data and Findings

Hypothesis 1.2 states that there is no difference between the total mean achievement of all girls who studied under the semestered school system, and the total mean achievement of all girls who studied under the non-semestered school system at D.M.C.I.

Analysis of variance

TABLE 7:

Data showing the total mean achievement of all girls under the semestered and non-semestered systems

| Organization | N   | Mean  | F. Ratio | Significance of F. |
|--------------|-----|-------|----------|--------------------|
| Semestered   | 569 | 66.70 | 9.88     | 0.002*             |
| Traditional  | 513 | 69.23 |          |                    |

The data in Table 7 show that Hypothesis 1.2 is rejected. There is a significant difference between the total mean achievement of all girls who studied under the semestered school system and the total mean achievement of all girls who studied under the non-semestered school system at D.M.C.I. Girls under the traditional system achieved significantly higher than girls under the semestered system. The F. Ratio and the significance of F. for the 2-way interactions between the school organizations and grades are 2.007 and 0.135 respectively. These indicate that there are no interactions between the organizational systems, grades or sex. The overall effect can be ascribed to the school organizations.

#### Hypothesis 1.3 - Data and Findings

Hypothesis 1.3 states that there are no differences between the mean specific subject achievements of boys who studied under the semestered school system, and the mean specific subject achievements of boys who studied under the non-semestered school system at D.M.C.I.

Analysis of variance

TABLE 8: Data showing the specific subject achievements of boys for semestered and traditional systems

| Subjects                         | Sum of Squares | D.F. | Mean Square | Semestered<br>N | Mean  | Traditional<br>N | Mean  | F. Ratio | Sig. of F. |
|----------------------------------|----------------|------|-------------|-----------------|-------|------------------|-------|----------|------------|
| English                          | 79.510         | 1    | 79.510      | 262             | 61.52 | 273              | 62.34 | 0.442    | 0.506      |
| Mathematics                      | 145.954        | 1    | 145.954     | 248             | 69.28 | 286              | 68.80 | 0.522    | 0.471      |
| Chemistry                        | 142.475        | 1    | 142.475     | 164             | 68.57 | 211              | 67.22 | 0.625    | 0.430      |
| Physics                          | 1072.406       | 1    | 1072.406    | 211             | 63.83 | 216              | 67.17 | 4.097    | 0.044      |
| French                           | 624.037        | 3    | 208.012     | 56              | 68.39 | 145              | 70.09 | 1.074    | 0.361      |
| Geography                        | 600.208        | 1    | 600.208     | 219             | 67.11 | 235              | 69.25 | 3.249    | 0.072      |
| History                          | 451.246        | 1    | 451.246     | 160             | 64.40 | 193              | 66.72 | 2.600    | 0.108      |
| Biology                          | 682.652        | 1    | 682.652     | 153             | 62.07 | 155              | 65.03 | 3.174    | 0.076      |
| General Science<br>(Grade X IPS) | 237.571        | 1    | 237.571     | 90              | 59.73 | 95               | 61.89 | 1.864    | 0.262      |

D.F. = Degrees of Freedom  
 N = Number of cases or students  
 Sig. of F. = Significance of F.

With the exception of Physics, the data presented in Table 8 show no significant differences in the mean specific subject achievements of boys who studied under the semestered school system, and the mean specific subject achievements of boys who studied under the non-semestered school system at D.M.C.I. Hypothesis 1.3 is accepted.

#### Hypothesis 1.4 - Data and Findings

Hypothesis 1.4 states that there are no differences between the mean specific subject achievements of the girls who studied under the semestered school system, and the mean specific subject achievements of the girls who studied under the non-semestered school system at D.M.C.I.

Analysis of variance

TABLE 9: Data showing the specific subject achievements for girls for semestered and traditional systems

| Subjects                      | Sum of Squares | D.F. | Mean Square | Semestered N | Semestered Mean | Traditional N | Traditional Mean | F. Ratio | Sig. of F. |
|-------------------------------|----------------|------|-------------|--------------|-----------------|---------------|------------------|----------|------------|
| English                       | 250.524        | 1    | 250.524     | 267          | 65.91           | 269           | 67.21            | 1.904    | 0.168      |
| Mathematics                   | 55.318         | 1    | 55.318      | 209          | 72.50           | 251           | 73.23            | 0.207    | 0.649      |
| Chemistry                     | 795.643        | 1    | 795.643     | 154          | 67.13           | 144           | 70.07            | 3.664    | 0.057      |
| Physics                       | 702.467        | 1    | 702.467     | 95           | 71.03           | 91            | 75.22            | 3.237    | 0.074      |
| French                        | 344.749        | 1    | 344.749     | 127          | 72.77           | 235           | 74.79            | 2.062    | 0.152      |
| Geography                     | 1640.313       | 1    | 1640.313    | 182          | 68.67           | 194           | 72.74            | 10.444   | 0.001*     |
| History                       | 383.155        | 1    | 383.155     | 151          | 67.83           | 154           | 70.10            | 2.000    | 0.158      |
| Biology                       | 328.188        | 1    | 328.188     | 185          | 66.32           | 183           | 68.35            | 1.302    | 0.255      |
| General Science (Grade X IFS) | 1121.329       | 1    | 1121.329    | 70           | 56.26           | 89            | 61.59            | 6.729    | 0.010*     |

\* means significant difference

The data presented in Table 9 show that, with the exception of Geography and General Science, Hypothesis 1.4 is accepted. No significant differences exist between the mean specific subject achievements of girls who studied English, Mathematics, Chemistry, Physics, French, History and Biology under the non-semestered school system, and the mean specific subject achievements of girls who studied the same subjects under the semestered school system at D.M.C.I. There are no interactions between sexes and grades. General Science involves a single grade--Grade X--therefore, no interactions can occur between grade and school organization. The calculated F. Ratio and the Significance of F. for the two-way interaction between school organizations and grades for Geography are 0.273 and 1.302 respectively. These values are not significant. It can be concluded that the overall effect on the mean specific subject achievement of the girls was due to the differences in the type of school organizations. The mean specific subject achievements of the girls who studied Geography and General Science under the traditional system are higher than the mean specific subject achievement of the girls who studied these two subjects under the semestered school system.

#### Hypothesis 1.5 - Data and Findings

Hypothesis 1.5 states that there is no difference between the total mean achievement of all boys and the total mean achievement of all girls who studied under the semestered school system at D.M.C.I.



Analysis of variance

TABLE 10:

Data showing the total mean achievement of all boys and all girls under the semestered system

| Source of Variation | Sum of Squares | D.F. | Mean Square | Male<br>N | Male<br>Mean | Female<br>N | Female<br>Mean | F.<br>Ratio | Sig.<br>of F. |
|---------------------|----------------|------|-------------|-----------|--------------|-------------|----------------|-------------|---------------|
| Sexes               | 1749.656       | 1    | 1749.656    | 632       | 64.31        | 569         | 66.70          | 10.387      | 0.001*        |

There is a significant difference between the total mean achievement of all boys and the total mean achievement of all girls who studied under the semestered school system at D.M.C.I. Hypothesis 1.5 is therefore rejected. The total mean achievement of girls is higher than the total mean achievement of boys. The difference in the total mean achievement between girls and boys is not affected by grade or sex. The F. Ratio and the Significance of F. computed for two-way interactions for grade and sex are 1.075 and 0.342 respectively. These values are not significant; the accepted level of significance is 0.05. Sex and grade have uniform effects on students' achievements both under the semestered and the non-semestered school systems. This means that the overall effects, which are responsible for the difference in the total mean achievement of girls and boys, can be attributed to differences between the semestered and non-semestered school organizations.

#### Hypothesis 1.6 - Data and Findings

Hypothesis 1.6 states that there is no difference between the total mean achievement of all boys and the total mean achievement of all girls who studied under the non-semestered school system at D.M.C.I.

Analysis of variance

TABLE 11:

Data showing the total mean achievement of all boys and all girls under the non-semestered system

| Source of Variation | Sum of Squares | D.F. | Mean Square | Male<br>N | Male<br>Mean | Female<br>N | Female<br>Mean | F.<br>Ratio | Sig.<br>of F. |
|---------------------|----------------|------|-------------|-----------|--------------|-------------|----------------|-------------|---------------|
| Sex                 | 3585.911       | 1    | 3585.911    | 538       | 65.68        | 513         | 69.23          | 21.521      | 0.000*        |

There is a significant difference between the total mean achievement of all boys and the total mean achievement of all girls who studied under the non-semestered school system at D.M.C.I. Hypothesis 1.6 is therefore rejected. Girls achieve at a significantly higher level than boys as is shown in Table 11. The F. Ratio and the Significance of F. calculated for the two-way interaction between sex and grade are 0.798 and 0.450 respectively. These are not significant; the acceptable level of significance is 0.05. There is no interaction between sex and grade. The overall effect is due to the differences between the semestered and the non-semestered school organizations.

#### Hypothesis 1.7 - Data and Findings

Hypothesis 1.7 states that there are no differences between the mean specific subject achievements of boys and the mean specific subject achievements of girls who studied under the semestered school system at D.M.C.I.

Analysis of variance

TABLE 12: Data showing the mean specific subject achievements of boys and the mean specific subject achievement of girls under the semestered school system

| Subjects                         | Sum of Squares | D.F. | Mean Square | Male<br>N | Male<br>Mean | Female<br>N | Female<br>Mean | F.<br>Ratio | Sig.<br>of F. |
|----------------------------------|----------------|------|-------------|-----------|--------------|-------------|----------------|-------------|---------------|
| English                          | 2575.788       | 1    | 2575.788    | 262       | 61.52        | 267         | 65.90          | 17.322      | 0.000*        |
| Mathematics                      | 750.316        | 1    | 750.316     | 248       | 69.83        | 209         | 72.49          | 2.713       | 0.100         |
| Chemistry                        | 164.956        | 1    | 164.956     | 164       | 68.57        | 154         | 67.13          | 0.803       | 0.371         |
| Physics                          | 3393.458       | 1    | 3393.458    | 211       | 63.84        | 95          | 71.03          | 13.798      | 0.000*        |
| French                           | 840.029        | 1    | 840.029     | 56        | 68.40        | 127         | 72.77          | 4.455       | 0.036*        |
| Geography                        | 224.246        | 1    | 224.246     | 219       | 67.12        | 182         | 68.66          | 1.296       | 0.256         |
| History                          | 900.975        | 1    | 900.975     | 160       | 64.40        | 151         | 67.84          | 5.218       | 0.023*        |
| Biology                          | 1506.533       | 1    | 1506.533    | 153       | 62.07        | 185         | 66.32          | 5.342       | 0.021*        |
| General Science<br>(Grade X IPS) | 472.767        | 1    | 472.767     | 90        | 59.73        | 70          | 56.26          | 3.111       | 0.080         |

TABLE 12-A:

Data showing sex and grade two-way interaction  
for the subjects in Table 12 which show  
significant differences

| Subjects | Sum of Squares | D.F. | Mean Square | F. Ratio | Sig. of F. |
|----------|----------------|------|-------------|----------|------------|
| English  | 152.717        | 2    | 76.358      | 0.514    | 0.599      |
| Physics  | 277.191        | 2    | 138.595     | 0.558    | 0.573      |
| French   | 548.092        | 2    | 274.046     | 1.453    | 0.237      |
| History  | 191.532        | 1    | 191.532     | 1.109    | 0.293      |
| Biology  | 1948.508       | 1    | 1948.508    | 6.910    | 0.009      |

Hypothesis 1.7 is accepted for Mathematics, Chemistry, Geography and General Science. It is rejected for English, Physics, French, History and Biology for boys who studied under the semestered school system and the mean achievements in these same subjects for girls who studied under the semestered school system at D.M.C.I. The mean achievements for girls are significantly higher than the mean achievements for boys in these subjects. With the exception of Biology, the differences in the mean achievements between girls and boys are due to differences in the organizational types of schools. No interaction between grade and sex is indicated. Only in the case of Biology is the mean achievement affected by a two-way interaction of sex and grade.

#### Hypothesis 1.8 - Data and Findings

Hypothesis 1.8 states that there are no differences between the mean specific subject achievement of boys and the mean specific subject achievement of girls who studied under the non-semestered school system at D.M.C.I.

Analysis of variance

TABLE 1.3: Data showing the mean specific subject achievements of boys and the mean specific subject achievement of girls under the traditional system

| Subjects                         | Sum of Squares | D.F. | Mean Square | Male<br>N | Male<br>Mean | Female<br>N | Female<br>Mean | F.<br>Ratio | Sig.<br>of F. |
|----------------------------------|----------------|------|-------------|-----------|--------------|-------------|----------------|-------------|---------------|
| English                          | 3334.114       | 1    | 3334.114    | 273       | 62.35        | 269         | 67.21          | 20.523      | 0.000*        |
| Mathematics                      | 2539.219       | 1    | 2539.219    | 286       | 68.80        | 251         | 73.23          | 9.349       | 0.002*        |
| Chemistry                        | 718.310        | 1    | 718.310     | 211       | 67.21        | 144         | 70.06          | 3.005       | 0.084         |
| Physics                          | 4147.484       | 1    | 4147.484    | 216       | 67.11        | 91          | 75.16          | 16.468      | 0.000*        |
| French                           | 2128.246       | 1    | 2128.246    | 145       | 70.01        | 235         | 74.79          | 12.797      | 0.000*        |
| Geography                        | 1113.036       | 1    | 1113.036    | 235       | 69.26        | 194         | 72.74          | 6.491       | 0.011*        |
| History                          | 917.236        | 1    | 917.236     | 193       | 66.72        | 154         | 70.10          | 4.802       | 0.029*        |
| Biology                          | 938.416        | 1    | 938.416     | 155       | 65.03        | 183         | 68.35          | 4.980       | 0.026*        |
| General Science<br>(Grade X IPS) | 6.731          | 1    | 6.731       | 94        | 61.99        | 89          | 61.60          | 0.034       | 0.855         |



TABLE 13-A:

Data showing two-way sex-grade interaction  
for the subjects in Table 13 showing  
significant differences

| Subject     | Sum of Squares | D.F. | Mean Square | F. Ratio | Sig. of F. |
|-------------|----------------|------|-------------|----------|------------|
| English     | 24.499         | 2    | 12.250      | 0.075    | 0.927      |
| Mathematics | 338.190        | 2    | 169.095     | 0.623    | 0.537      |
| Physics     | 277.191        | 2    | 138.595     | 0.558    | 0.573      |
| French      | 612.931        | 2    | 306.466     | 1.843    | 0.160      |
| Geography   | 67.915         | 2    | 33.958      | 0.198    | 0.820      |
| History     | 26.620         | 1    | 26.620      | 0.139    | 0.709      |
| Biology     | 13.638         | 1    | 13.638      | 0.072    | 0.788      |

Except for Chemistry and General Science Hypothesis 1.8 is rejected. There are significant differences between the mean specific subject achievements of boys and the mean specific subject achievement of girls who studied English, Mathematics, Physics, French, Geography, History and Biology under the non-semestered school system at D.M.C.I. The data in Table 13-A show that the two-way interaction between sex and grade have no significant effect on the students' achievement in these specific subject areas. Sex and grade have uniform effects on the mean specific subject achievements of girls and boys who studied under the non-semestered school system. The school organizations are responsible for the differences in achievements. The mean specific subject achievements for girls are generally higher than the mean specific subject achievements for boys who studied under the traditional school system at D.M.C.I.

#### Hypothesis 1.9 - Data and Findings

Hypothesis 1.9 states that there are no differences between the total mean specific subject achievements of all students who studied under the semestered school system, and the total mean specific subject achievements of all students who studied under the non-semestered school system at D.M.C.I.

Analysis of variance

TABLE 14: Data showing the total mean specific subject achievements of all students who studied under the semestered and the non-semestered systems

| Subjects                         | Sum of Squares | D.F. | Mean Square | Semestered<br>N | Traditional<br>N | F. Ratio | Sig. of F. |
|----------------------------------|----------------|------|-------------|-----------------|------------------|----------|------------|
| English                          | 306.639        | 1    | 306.639     | 529             | 542              | 1.970    | 0.161      |
| Mathematics                      | 16.045         | 1    | 16.045      | 457             | 537              | 0.059    | 0.809      |
| Chemistry                        | 95.781         | 1    | 95.781      | 318             | 355              | 0.429    | 0.513      |
| Physics                          | 1760.264       | 1    | 1760.264    | 306             | 307              | 7.089    | 0.008*     |
| French                           | 500.489        | 1    | 500.489     | 138             | 380              | 2.886    | 0.090      |
| Geography                        | 2070.450       | 1    | 2070.450    | 401             | 429              | 12.024   | 0.001*     |
| History                          | 876.995        | 1    | 876.995     | 311             | 347              | 4.810    | 0.029 *    |
| Biology                          | 972.819        | 1    | 972.819     | 338             | 338              | 4.136    | 0.042*     |
| General Science<br>(Grade X IPS) | 1157.437       | 1    | 1157.437    | 160             | 184              | 6.498    | 0.011*     |

TABLE 14-A: Data showing two-way and three-way interaction between organization, sex and grade for the subjects in Table 14 which show significant differences

| Subjects        | Source of Variation - Interactions       | Sum of Squares | D.F. | Mean Square | F. Ratio | Sig. of F. |
|-----------------|--|----------------|------|-------------|----------|------------|
| Physics         | <u>Two-way</u><br>organization - grade   | 216.216        | 1    | 216.216     | 0.871    | 0.351      |
|                 | organization - sex                       | 18.639         | 1    | 18.639      | 0.075    | 0.784      |
|                 | grade - sex                              | 277.191        | 2    | 138.595     | 0.558    | 0.573      |
|                 | <u>Three-way</u><br>organization - grade |                |      |             |          |            |
|                 | - sex                                    | 153.915        | 1    | 153.915     | 0.620    | 0.431      |
| Geography       | <u>Two-way</u><br>organization - grade   | 2661.135       | 2    | 1330.568    | 7.727    | 0.000      |
|                 | organization - sex                       | 163.569        | 1    | 163.569     | 0.950    | 0.330      |
|                 | grade - sex                              | 140.100        | 2    | 52.050      | 0.302    | 0.739      |
|                 | <u>Three-way</u><br>organization - grade |                |      |             |          |            |
|                 | - sex                                    | 455.549        | 2    | 227.775     | 1.323    | 0.267      |
| History         | <u>Two-way</u><br>organization - grade   | 207.230        | 1    | 207.218     | 1.136    | 0.287      |
|                 | organization - sex                       | 0.136          | 1    | 0.136       | 0.001    | 0.978      |
|                 | grade - sex                              | 175.534        | 1    | 175.534     | 0.963    | 0.327      |
|                 | <u>Three-way</u><br>organization - grade |                |      |             |          |            |
|                 | - sex                                    | 42.618         | 1    | 42.618      | 0.234    | 0.629      |
| Biology         | <u>Two-way</u><br>organization - grade   | 1287.692       | 1    | 1287.692    | 5.475    | 0.020      |
|                 | organization - sex                       | 45.030         | 1    | 45.030      | 0.191    | 0.662      |
|                 | grade - sex                              | 821.232        | 1    | 821.232     | 3.492    | 0.062      |
|                 | <u>Three-way</u><br>organization - grade |                |      |             |          |            |
|                 | - sex                                    | 1140.920       | 1    | 1140.920    | 4.851    | 0.028      |
| General Science | <u>Two-way</u><br>organization - sex     | 201.464        | 1    | 201.464     | 1.131    | 0.288      |

Hypothesis 1.9 is accepted for English, Mathematics, Chemistry and French. It is rejected for Physics, Geography, History, Biology and General Science. There are no significant differences between the total mean specific subject achievements of all the students who studied English, Mathematics, Chemistry and French respectively under the traditional school system, and the total mean specific subject achievements of all the students who studied similar subjects under the semestered school system at D.M.C.I. However, there are significant differences between the total mean specific subject achievements of all the students who studied Physics, Geography, History, Biology and General Science respectively under the traditional school system and the total mean specific subject achievements of all the students who studied these same subjects under the semestered school system at D.M.C.I. The data in Table 14-A indicate no two-way or three-way interactions between school organizations, grades and sexes for Physics, History and General Science. The differences in the achievements of the students are the effects of differences in the type of school organizations. There are two-way and three-way interactions between school organizations, grades and sexes for Biology. For Geography, there is also an interaction between school organizations and grades. Grades do not have the same effect on students who studied Biology and Geography under the semestered and the traditional school systems at D.M.C.I. The total mean specific subject achievements for Physics, Geography, History, Biology and General Science are

higher for students who studied under the traditional system than for students who studied under the semestered school system at D.M.C.I.

Hypothesis 1.10 - Data and Findings

Hypothesis 1.10 states that there is no difference between the overall achievements of all students who studied under the semestered school system, and the overall achievements of all students who studied under the non-semestered school system at D.M.C.I.

TABLE 15:

Description of sub-populations by grade and sex for organizational types

| Organizational Types | Grade | Sex   | N   | Mean    |
|----------------------|-------|-------|-----|---------|
| Semester             | 10    | M & F | 369 | 64.7746 |
|                      | 10    | M     | 196 | 63.7381 |
|                      | 10    | F     | 173 | 65.9489 |
|                      | 11    | M & F | 418 | 64.6920 |
|                      | 11    | M     | 215 | 64.1052 |
|                      | 11    | F     | 203 | 65.3135 |
|                      | 12    | M & F | 414 | 66.7964 |
|                      | 12    | M     | 221 | 65.0109 |
|                      | 12    | F     | 193 | 68.8410 |
| Traditional          | 10    | M & F | 282 | 66.5418 |
|                      | 10    | M     | 133 | 63.9188 |
|                      | 10    | F     | 149 | 68.8832 |
|                      | 11    | M & F | 357 | 67.2351 |
|                      | 11    | M     | 193 | 65.3655 |
|                      | 11    | F     | 164 | 69.4354 |
|                      | 12    | M & F | 412 | 68.0303 |
|                      | 12    | M     | 212 | 66.8056 |
|                      | 12    | F     | 200 | 69.3285 |

M = Male

F = Female

TABLE 15-A: Data showing analysis of variance for the entire population

| Variable            | Sum         | Mean    | Standard Deviation | Sum of Squares | N.   |
|---------------------|-------------|---------|--------------------|----------------|------|
| Semester            | 78596.8264  | 65.4428 | 13.0570            | 204582.5574    | 1201 |
| Traditional         | 70796.2282  | 67.3608 | 13.0339            | 178377.9036    | 1051 |
| Within Groups Total | 149393.0546 | 66.3379 | 13.0463            | 382960.4610    | 2252 |

TABLE 15-B: Data showing analysis of variance for between and within groups for entire population

| Source         | Sum of Squares | D.F. | Mean Square | F. Ratio | Sig. of F. |
|----------------|----------------|------|-------------|----------|------------|
| Between Groups | 2061.947       | 1    | 2061.947    | 12.115   | 0.0005*    |
| Within Groups  | 382960.461     | 2250 | 170.205     |          |            |

TABLE 15-C:

Data showing two-way and three-way interactions between school organization, grade and sex

| Source of Variations          | Sum of Squares | D.F. | Mean Squares | F. Ratio | Sig. of F. |
|-------------------------------|----------------|------|--------------|----------|------------|
| <u>Organizations</u>          |                |      |              |          |            |
| (semester & traditional)      | 1789.125       | 1    | 1789.125     | 10.676   | 0.0001*    |
| Grade 10, 11, 12              | 1419.807       | 2    | 709.903      | 4.236    | 0.015*     |
| Sex                           | 5056.152       | 1    | 5056.152     | 30.169   | 0.000*     |
| <u>Two-way interactions</u>   |                |      |              |          |            |
| Organization - grade          | 528.207        | 5    | 105.641      | 0.630    | 0.677      |
| Organization - sex            | 220.832        | 2    | 110.416      | 0.659    | 0.518      |
| Grade - sex                   | 234.082        | 1    | 234.082      | 1.397    | 0.237      |
|                               | 77.235         | 2    | 38.618       | 0.230    | 0.794      |
| <u>Three-way interactions</u> |                |      |              |          |            |
| Organization - grade - sex    | 553.871        | 2    | 276.936      | 1.652    | 0.192      |



The data presented in Table 15-C indicate a significant difference between the overall achievement of all students who studied under the semestered school system and the overall achievement of all students who studied under the traditional school system at D.M.C.I. The effects of grades and sexes are uniform on both the semestered and the non-semestered school organizations. No two-way or three-way interaction between school organizations, grades and sexes have been observed. The overall achievement of students who studied under the traditional system is higher than the overall achievement of the students who studied under the semestered school system at D.M.C.I. Hypothesis 1.10 is rejected.

## CHAPTER V

### SUMMARY AND CONCLUSIONS

#### Introduction

This chapter contains a resume of the purpose and experimental design of the study, the major findings, the conclusions and suggestions.

#### Resume

The major purpose of this investigation was to compare the academic achievement of students who studied under the semester school system and the traditional school system. Secondly, it seeks to find out if there was any difference in the academic achievement of girls and boys under the traditional and the semester systems.

The study is confined to D.M.C.I. Only the Grades X, XI and XII "00" University Entrance Courses of English, Mathematics, Physics, Chemistry, Biology, Geography, History, French and General Science (IPS Grade X) are involved in the study.

The universal sample consists of the total population of D.M.C.I. between September 1972 and February 1977. This period covers three consecutive traditional school years from September 1972 to June 1975, and three consecutive semesters from September 1975 to February 1977. The various experimental samples were randomly selected by traditional years, semesters,

subjects, grades and sexes. All statistical analyses were done by computer. The Statistical Package for Social Science (S.P.S.S.) for OS/360, Version H. Release 7.0, March 1977 was used in the analysis. Analysis of covariance is the technique employed in the statistical computations. All comparisons were made on the basis of the determined F. Ratio and the mean scores to the 0.05 level of significance.

### The Findings

The total mean achievement and the mean specific subject achievements for boys who studied under the semestered school system are about the same as the total mean achievement and the mean specific subject achievements for boys who studied under the traditional school system. Similarly, there are no significant differences between the mean specific subject achievements of girls who studied under the semestered and non-semestered school systems. Geography and General Science are exceptions. Girls who studied Geography and General Science under the traditional system have superior mean specific subject achievements to those of girls who studied under the semestered system. The total mean achievement of all girls who studied under the traditional system is also significantly higher than the total mean achievement of all girls who studied under the semestered school system. The total mean achievement of girls who studied under the traditional system is significantly higher than the total mean achievement of boys who studied under the semestered system. The total mean achievement of girls is also higher

than the total mean achievement of boys under the semestered school system.

The mean specific subject achievements are higher for girls than the mean specific subject achievements for boys who studied English, Physics, French, History and Biology under the semestered and the non-semestered systems. The mean specific subject achievements for girls and the mean specific subject achievements for boys who studied General Science and Chemistry show no significant difference under both the semester and the non-semester system. However, for Geography and Mathematics the mean specific subject achievements for girls are higher than the mean specific subject achievements for boys who studied under the traditional system. Under the semester system the mean specific subject achievements for boys and girls are about the same for Mathematics and Geography.

No significant differences exist between the total mean specific subject achievements of all students who studied English, Mathematics, Chemistry and French under the semestered school system and the total mean specific subject achievements of all the students who studied those subjects under the non-semestered system. However, those students who studied Physics, Geography, History, Biology and General Science under the traditional system have significantly higher total mean specific subject achievements than the students who studied those same subjects under the semestered system.

The overall achievements of students who studied under the traditional system are significantly higher than the overall achievements of students who studied under the semester system.

SUMMARY OF THE FINDINGS

| Hypothesis # | Subjects | Means of Sexes  |       | F     | Sig. of F. | Means of Organizations |             | F. Ratio | Sig. of F. |
|--------------|----------|-----------------|-------|-------|------------|------------------------|-------------|----------|------------|
|              |          | M               | F     |       |            | Semester               | Traditional |          |            |
| 1.1          | accepted | All             | ---   | ---   | 0.133      | 64.31                  | 65.57       | 2.266    | 0.133      |
| 1.2          | rejected | All             | ---   | ---   | 0.002*     | 66.70                  | 69.23       | 9.88     | 0.002*     |
| 1.3          | accepted | English         | M     |       | 0.507      | 61.52                  | 62.34       | 0.442    | 0.507      |
|              | accepted | Mathematics     | M     |       | 0.471      | 69.28                  | 68.80       | 0.522    | 0.471      |
|              | accepted | Chemistry       | M     |       | 0.430      | 68.57                  | 76.22       | 0.625    | 0.430      |
|              | accepted | Physics         | M     |       | 0.044*     | 63.83                  | 67.17       | 4.097    | 0.044*     |
|              | accepted | French          | M     |       | 0.361      | 68.39                  | 70.09       | 1.074    | 0.361      |
|              | accepted | Geography       | M     |       | 0.072      | 67.11                  | 69.25       | 3.249    | 0.072      |
|              | accepted | History         | M     |       | 0.108      | 64.40                  | 66.72       | 2.600    | 0.108      |
|              | accepted | Biology         | M     |       | 0.076      | 62.07                  | 65.03       | 3.174    | 0.076      |
|              | accepted | General Science | M     |       | 0.262      | 59.73                  | 61.89       | 1.864    | 0.262      |
| 1.4          | accepted | English         | F     |       | 0.168      | 65.91                  | 67.21       | 1.404    | 0.168      |
|              | accepted | Mathematics     | F     |       | 0.649      | 72.50                  | 73.23       | 0.207    | 0.649      |
|              | accepted | Chemistry       | F     |       | 0.057      | 67.13                  | 70.07       | 3.664    | 0.057      |
|              | accepted | Physics         | F     |       | 0.074      | 71.03                  | 75.22       | 3.237    | 0.074      |
|              | rejected | French          | F     |       | 0.152      | 72.77                  | 74.79       | 2.062    | 0.152      |
|              | accepted | Geography       | F     |       | 0.001*     | 68.67                  | 72.77       | 10.444   | 0.001*     |
|              | accepted | History         | F     |       | 0.158      | 67.83                  | 70.10       | 2.000    | 0.158      |
|              | accepted | Biology         | F     |       | 0.255      | 66.32                  | 68.38       | 1.301    | 0.255      |
|              | rejected | General Science | F     |       | 0.010*     | 56.26                  | 61.59       | 6.729    | 0.010*     |
| 1.5          | rejected | All             | 64.31 | 66.70 | 0.001*     | 64.31                  | 66.70       | 10.387   | 0.001*     |

SUMMARY OF THE FINDINGS cont'd.

| Hypothesis # | Subjects        | Means of Sexes  |       | Semester | Means of<br>Organizations<br>Traditional | F.<br>Ratio | Sig.<br>of F. |
|--------------|-----------------|-----------------|-------|----------|--|-------------|---------------|
|              |                 | M               | F     |          |  |             |               |
| 1.6          | rejected        | 65.58           | 69.23 |          | Traditional                              | 21.521      | 0.000*        |
| 1.7          | rejected        | 61.52           | 65.90 | Semester |  | 17.322      | 0.000*        |
|              | accepted        | 69.83           | 72.49 | Semester |  | 2.713       | 0.100         |
|              | accepted        | 68.57           | 67.13 | Semester |  | 0.803       | 0.371         |
|              | rejected        | 63.84           | 71.03 | Semester |  | 13.798      | 0.000*        |
|              | rejected        | 68.40           | 72.77 | Semester |  | 4.455       | 0.036*        |
|              | accepted        | 67.12           | 68.66 | Semester |  | 1.296       | 0.256         |
|              | rejected        | 64.40           | 67.84 | Semester |  | 5.218       | 0.023*        |
|              | rejected        | 62.07           | 66.32 | Semester |  | 3.342       | 0.021*        |
| accepted     | General Science | 59.73           | 56.26 | Semester |  | 3.111       | 0.080         |
| 1.8          | rejected        | 62.35           | 67.21 |          | Traditional                              | 20.523      | 0.000*        |
|              | rejected        | 68.80           | 73.23 |          | Traditional                              | 9.349       | 0.002*        |
|              | accepted        | 67.21           | 70.06 |          | Traditional                              | 3.005       | 0.084         |
|              | rejected        | 67.11           | 75.16 |          | Traditional                              | 16.468      | 0.000*        |
|              | rejected        | 70.01           | 74.79 |          | Traditional                              | 12.797      | 0.000*        |
|              | rejected        | 69.26           | 72.74 |          | Traditional                              | 6.491       | 0.011*        |
|              | rejected        | 66.72           | 70.10 |          | Traditional                              | 4.802       | 0.029*        |
|              | rejected        | 65.03           | 68.35 |          | Traditional                              | 4.980       | 0.026*        |
|              | rejected        | 61.99           | 61.60 |          | Traditional                              | 0.034       | 0.855         |
|              | accepted        | General Science |       |          |  |             |               |

SUMMARY OF THE FINDINGS cont'd.

| Hypothesis #  | Subjects        | Means of Sexes |   | Semester | Means of Organizations |             | F. Ratio | Sig. of F. |
|---------------|-----------------|----------------|---|----------|------------------------|-------------|----------|------------|
|               |                 | M              | F |          | Traditional            | Traditional |          |            |
| 1.9 accepted  | English         |                |   | 63.73    |                        | 65.03       | 1.970    | 0.161      |
| accepted      | Mathematics     |                |   | 71.05    |                        | 70.86       | 0.059    | 0.809      |
| accepted      | Chemistry       |                |   | 67.88    |                        | 68.34       | 0.429    | 0.513      |
| rejected      | Physics         |                |   | 66.07    |                        | 69.58       | 7.089    | 0.008*     |
| accepted      | French          |                |   | 71.43    |                        | 73.00       | 2.886    | 0.090      |
| rejected      | Geography       |                |   | 67.82    |                        | 70.83       | 12.024   | 0.001*     |
| rejected      | History         |                |   | 66.07    |                        | 68.23       | 4.810    | 0.029*     |
| rejected      | Biology         |                |   | 64.40    |                        | 66.82       | 4.136    | 0.042*     |
| rejected      | General Science |                |   | 58.21    |                        | 61.80       | 6.498    | 0.011*     |
| 1.10 rejected | All             |                |   | 65.44    |                        | 67.36       | 12.115   | 0.0005*    |

\* means significant

### Conclusions

The purpose of this study was to compare the impact of the traditional school organization and the semestered school organization on the academic achievement of students. A secondary objective was to determine if there were any differences between the academic achievements of boys and girls under the semestered and the non-semestered school systems. Only the "00" University Entrance Courses of English, Mathematics, Chemistry, Physics, Biology, French, Geography, History and General Science (I.P.S. Grade X) were included in the study.

The study was designed to use the final achievement marks of students who studied under the traditional system between September 1972 and June 1975 and the final achievement marks of students who studied under the semestered school system between September 1975 and February 1977 at D.M.C.I. Analysis of Covariance was the only statistical technique used in the analysis of the data.

The parameters set by the experimental design make it highly probable that comparisons are made only between the effects of the semestered school system and the effects of the traditional system on students' achievements. It was indicated in the analysis of the data that only in the case of Biology was there some interaction between grade, sex and school organization. Except for Biology, all factors being equal the effects of students' achievement was due only to that of the school organizations.



Because of difficulties within the social and educational systems variables such as the newness of the semester system, teacher motivation and interest, attention span, retention and other factors which are known to affect achievement were left uncontrolled. However, it is reasonable to expect that the influences of these uncontrolled variables on the achievements of students are minimized by randomization of the data and the use of analysis of covariance to analyze the data.

The data supports the following conclusions; There is no significant difference between the mean specific subject achievements of boys who studied under the semestered and the non-semestered school systems. Boys show no noticeable difference between their total achievements under the semestered and the non-semestered school systems.

The mean specific subject achievements of girls who studied under the semestered school system compare favourably with the mean specific subject achievements of girls who studied under the traditional system. Notable exceptions are Geography and General Science. The mean achievements of girls in these subjects are higher under the traditional system than under the semestered system. Of particular interest to the study is the consistent and outstanding academic performance shown by girls under the traditional system. The total mean achievements of girls are significantly higher under the traditional school system than the total mean achievements of girls under the semestered school system. Although there are no noticeable differences in the achievements between boys who studied under

the semestered and the non-semestered systems; girls under the traditional system achieve at a higher level than girls under the semester system, and higher than boys both under the semestered and non-semestered school systems.

In the case of English, Physics, French, History and Biology the mean specific subject achievements of girls are significantly higher than the mean specific subject achievements of boys both under the semestered and the non-semestered school systems. The specific subject achievements for Chemistry and General Science are not significantly different for boys and for girls under both school systems. No differences exist between the mean specific achievements of girls and the mean specific achievements of boys who studied Mathematics and Geography under the semestered school system. Girls, however, achieved significantly higher than boys in these two subjects under the non-semestered school system.

Generally, the achievement of students under the traditional system is higher than the achievement of students under the semestered school system. Students' overall achievement under the traditional system is higher than the overall achievement of students who studied under the semestered system. In terms of individual subjects, students, who studied under the semestered school system, enjoyed total mean subject achievements in English, Mathematics, Chemistry and French which are not significantly different from the total mean subject achievements of students who studied those subjects under the semestered school system. However, there is a strong indication that Physics, Geography,

History, Biology and General Science are better studied under the traditional system than under the semestered system. The other subjects included in the investigation can be successfully studied under either of the two school systems. The total mean specific subject achievements for students who studied Physics, Geography, History, Biology and General Science are significantly higher than the mean specific subject achievements of students who studied the same subjects under the semestered school system.

In essence the results show that, in all cases, students' achievement under the non-semestered system is equal to, slightly better than, or superior to student achievement under the semestered system. Many educators will find this conclusion valuable, particularly those who are contemplating changing from the non-semestered to the semestered system.

Claims touted in the literature concerning greater course interests, increase frequency of instruction, greater motivation, reduced course work, more in depth learning and other factors resulting in increased achievement under the semestered system relative to the non-semestered system are not supported by this investigation. When consideration is given to the lack of understanding of retention regression, the loss of in class time due to unassigned students' time, the reduction in the amount of homework and course coverage under the semester system, the quantitative difference in achievement under the non-semestered school system relative to the semestered school system may be even greater.

These conclusions pertain strictly to D.M.C.I. However, generalization of the data can be satisfactorily extended to school systems that are similar.

Suggestions for Further Research

It is suggested:-

- (1) that a wider investigation based on a similar experimental design, but using a number of semestered and non-semestered schools be undertaken.
- (2) that a study involving academic, commercial and vocational subjects be undertaken to determine what groups of subjects are more effectively taught under the semestered and the non-semestered systems.
- (3) that a study be undertaken to substantiate the facts reported in this study, and to establish more fully whether or not there are sexual differences in achievement under the semestered and the non-semestered school systems.
- (4) that a study be undertaken to investigate why academic achievement in some subject areas does not suffer when a school changes its organization from the traditional to the semester system. Also, to determine if there are differences in academic achievement due to changes in teaching strategies and the restructuring of the contents, concepts, and processes of courses under the semester and traditional systems.

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