A COMPARISON OF DISTANCES TRAVELLED TO URBAN NIGHT SCHOOL CENTERS

by

DONALD PETER MCKINNON

B.Ed., University of British Columbia, 1962

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

Master of Education (Adult Education)

in the Faculty

of

EDUCATION

We accept this thesis as conforming to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

May, 1966

In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the Head of my Department or by his representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Department of Education

The University of British Columbia
Vancouver 8, Canada

Date May, 1966.

ABSTRACT

The purpose of this study is to analyse the distances travelled to three urban night school centers in order to determine whether each serves separate areas or whether each serves larger, overlapping areas. The sample population consisted of 486 adults enrolled in twenty-two courses offered as part of the 1962-1963 program. Some of these selected courses were in subjects offered at all three centers; some courses were offered at two of the centers and the remainder were offered at only one center. It was thus possible to compare the centers while controlling for the number of centers offering the same subject matter.

Distributions of distances travelled to each course and to each group of courses were prepared. The chi-square test of independence was used to compare the various distributions and the significance of the difference between mean distances travelled was used to provide additional comparisons. Maps were prepared illustrating the residences of participants and a correlation was made to determine the relationship between the distances travelled and the percentage of sessions attended by the participant.

The results indicated that half of the 486 participants travelled less than 2.8 miles. More lived between one and two miles from the center they attended than in any

other mile interval from the center. Only five percent of the participants travelled more than nine miles and less than one percent travelled more than fourteen miles.

The statistical tests indicated that there was an association between the distance travelled and the center attended. It was found that when courses were offered at one center only, there was no statistical difference between the patterns of distance travelled to the three centers. Participants seemed to travel from throughout the city of Vancouver to attend, no matter which center offered the course. Women who attend courses designed for women only travel shorter distances than men who attend courses designed for men only. For courses offered at all three centers, adults travelled further to John Oliver Night School and to Technical Night School than to Kitsilano Night School. Travel distance does not inhibit the subsequent attendance of those who enroll.

The opening of new night school centers during the past fifteen years was reviewed and it was found that a new center opened within two miles of a large well established center is unlikely to attract sufficient clientele to be economically successful.

ACKNOWLEDGMENTS

The author wishes to express his appreciation to Dr. B. E. Wales, Director of Adult Education for the Vancouver School Board, without whose co-operation the data for this study could not have been obtained.

The author also wishes to thank Dr. Coolie Verner, Professor of Adult Education, without whose guidance and assistance this study would not have been possible.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

CHAPTER I

INTRODUCTION

Adult education is one of the major forms of education in modern society and has shown a steady growth in the variety of learning opportunities provided adults, the number of institutions involved in adult education, and the number of adults seeking to further their education both through independent self-study and through participation in organized educational activities.

This growth in adult learning situations has been nowhere more evident than in the expansion of public school adult evening classes, which have increased their enrollment by 350% over the last decade.[1] Although these activities tend to be centered in public schools and the number of high schools that have been opened for night courses has greatly increased, there has been almost no information based on research to guide the adult educator when he must decide where to open new night school centers or where to locate courses.

Little has been known about the travel patterns which

---

1. A. L. Cartier, "Public School Adult Education," Journal of Education of the Faculty of Education of the University of British Columbia: Vancouver, X, (April, 1964), p. 29.

could help the night school administrator predict whether participants will come from the immediate neighborhood of a center only, or whether participants are willing to travel longer distances within the urban setting in order to get the courses they want. This kind of knowledge is essential for maximum efficiency since if courses attract clientele from the immediate neighborhood of a center only, then it will be necessary to offer courses in the same subject matter at many centers. If, however, participants tend to travel longer distances it may be necessary to offer courses at one center only in order to serve the entire urban community. It is also possible that travel distances vary from center to center.

In the sense that the patterns of distances travelled to a center delimit the area served by that center, any variations of travel distances between centers would be of concern to administrators in expanding night school organizations.

Previous studies of adult education participation indicate a relationship between the rate of participation and the distance from the residence of the participant to the center he attends. However, these studies have tended to consider distances as one of several factors influencing participation. As a result they have not examined travel patterns in detail and the general conclusion of association between distance and participation is of little assistance

to the administrator trying to determine the ecology of participation at any given center.

PURPOSE

The purpose of this study is to investigate the relationship between distance travelled to attend an adult night school course and the rate of participation in an urban situation.

HYPOTHESIS

The principal hypothesis investigated in this study is as follows:

Participation and attendance in adult night school classes are not influenced by the distance between the place of residence of the participant and the adult school in which the course is held.

To test this hypothesis a number of sub-hypotheses were formulated and tested statistically. These are considered to be accepted if there is no statistically significant difference at the .05 level of confidence.

Sub-hypotheses tested include the following:

1. There is no significant difference between the distributions of distance travelled to the three

centers when:

(a) courses are offered at one center only;
(b) courses are offered at two centers; and
(c) courses are offered at three centers.

2. There is no significant correlation between the distances travelled and the percentage of attendance.

REVIEW OF LITERATURE

The question of participation in adult education has been studied in a variety of ways and the existing research on the question has been reviewed recently. Brunner and associates have reviewed the research[2] so as to show the relationship between general social participation in adult education. This review indicates that certain identifiable socio-economic and ecological factors are associated with participation. There is no clear cut evidence that distance travelled is directly related to participation, however, Brunner notes that "There is some evidence that accessibility and proximity to centers for adult education increases participation."[3]

In his study of participation in Springfield, Mass.,

---

2. Edmund deS. Brunner et al., An Overview of Adult Education Research (Chicago: Adult Education Association of the U.S.A., 1959), pp. 98-102.

3. Ibid., p. 97.

Kaplan found that accessibility is psychological as well as physical, but that ". . . the percentage of participants tended to be greater in those areas more closely situated to the educational activities."[4] Kaplan further suggests that socio-economic characteristics may be more important than distance. Marble[5] found that the distance from residence to center was related to participation, but that other characteristics of census tracts were better predictors of future participation from those tracts. Lindenberger and Verner evaluated the relative importance of distance and socio-economic status, and concluded that distance travelled was not as important as socio-economic status in affecting participation in university evening classes.

In an exploratory study on distances travelled to rural educational activities dealing with agricultural production, Dent found that the method of adult education

---

4. Abraham Abbott Kaplan, Socio-Economic Circumstances and Adult Participation (Teachers College Contributions to Education, No. 889. New York: Teachers College, Columbia University, 1943), p. 57.

5. Duane F. Marble, Predicting Evening Class Registration Potential in Small Areas of the Seattle Metropolitan Area (University of Washington Bulletin, March, 1959).

6. Alice Lindenberger and Coolie Verner, "A Technique for Analyzing Extension Course Participants," Adult Education, XI (Autumn, 1960), pp. 29-34.

influenced the distances travelled.[7] Farmers seemed to travel much further to one-day tours than to meetings or workshops. The distances travelled to activities located in the four communities studied ranged from five to ten and one-half miles, and Dent concluded that except for individuals actively seeking information that community boundaries acted as barriers to participation. He also concluded that the month in which the activity was held seemed to have no influence on the distance travelled.

Melton[8] has investigated the influence of alternate course locations on the distances travelled to urban evening classes. He found some tendency for distances to be greater when the course was available at one center only.

The literature on commuting to work is extensive, but unfortunately only peripherally relevant. Adams and MacKesey[9] emphasized area-to-area variation in commuting distances, indicating that the findings of the present study may be

---

7. William J. Dent, "An Exploratory Study of the Distances Which Farmers Travel to Attend Various Types of Educational Activities Dealing With Agricultural Production" (Two Hills: Agricultural Extension Service, 1965), p. 7.

8. James Melton, "The Influence of Alternate Course Locations on Distances Travelled by Participants in Urban Adult Evening Classes" (unpublished Master's thesis, The University of British Columbia, Vancouver, 1966).

9. Leonard P. Adams and Thomas W. MacKesey, Commuting Patterns of Industrial Workers (Ithica: Cornell University Press, 1955), p. 51.

applicable to Vancouver only. Marble also stresses the localized nature of his study and cautions against the use of his method of predicting evening class registrations in other geographical areas. Both the studies of Adams and MacKesey and of Taaffe, Garner and Yeates[10] show that women generally do not travel as far to work as do men. The latter study shows that the type of residential district is a factor in commuting distances. This may be related to the Verner and Lindenberger[11] findings, but questionnaires and census tracts would be more useful in checking the influence of type of residential district than the methods used in this study. Distributions of commuting distances are common in that literature and it appears that commuting distances may be longer than evening class distances.

In a study of urban transportation, Wingo[12] shows that the time a journey takes depends upon the time of day the journey is taken. Since night school classes tend to start between 7 and 8 p.m., and end between 9.30 and 10.30 p.m., there is no reason to suppose that time of day affects the travelling time and hence the travelling distance

---

10. Edward J. Taaffe, Barry J. Garner, and Maurice H. Yeates, The Peripheral Journey to Work (Evanston: Northwestern University Press, 1963), p. 17.

11. Lindenberger and Verner, op. cit.

12. Lowdon Wingo, Jr., Transportation and Urban Land (Washington: Resources For the Future Inc., 1961), p.46.

of one class more than another.

The study of the non-participant and the drop-out is also related to the participant. Booth[13] identified the socio-economic characteristics of the non-participant and showed how these differ from those of the participant in adult education. Drop-out research has been reviewed by Verner and Davis[14] which shows that in one study the mode of transportation influenced attendance but this study was done so long ago as to be virtually meaningless today. They do indicate, however, that the drop-out rate appears to be influenced by certain administratively controllable elements such as time of meeting, length of course, or transportation.

A recent study by Lee,[15] conducted in a provincial city in England, contains an examination of the travel patterns of college extension participants in an urban setting. Lee found that the proportion of the total adult population attending general interest courses did not vary from quarter-mile to quarter-mile up to a distance of two

---

13. Alan Booth, "A Demographic Consideration of the Non-Participant," Adult Education, XI (Summer, 1961), pp. 223-229.

14. Coolie Verner and George S. Davis, Jr., "Completions and Drop Outs: A Review of Research," Adult Education, XIV (Spring, 1964), p. 167.

15. Terence Lee, "A Null Relationship Between Ecology and Adult Education," The British Journal of Educational Psychology, XXXVI (February, 1966), p. 101.

and one-half miles from the center. He concludes that ". . . adult education facilities can be sited at least five miles apart without loss of potential students."[16] Lee cautions that alternative course locations sited closer than this, because of competition and necessarily restricted choice of activities, would tend to fail and cites the closing of many postwar centers in England as evidence of this.

Clearly, the influence of distance on participation is as yet unsettled. The existing research tends to emphasize socio-economic factors as being more influential than distance; only two studies have been found which are concerned solely with the question of distance. It would seem that a detailed analysis of travel patterns might lead to a better understanding between the rates of participation and the distances that participants travel.

It would seem essential to understand this relationship before it is possible to rank the various factors influencing participation.

DEFINITION OF TERMS

The following terms are used in this study:

Center - This term is used to designate the adult night

---

16. Lee, op. cit.

school in which the courses studied were located. The three centers are identified by the name of the high schools in which they are located.

1. John Oliver High School - hereinafter abbreviated to J.O.
2. Kitsilano High School - hereinafter abbreviated to Kits.
3. Vancouver Technical School - hereinafter abbreviated to Tech.

Course - This term identifies a particular class in a center concerned with a specific subject matter.

Participant - The adult who attends a particular course in a center.

Ring - The term 'ring' identifies the geographical area defined by circles drawn at one mile intervals from the center.

Type - This term is used to designate the various categories in which the courses were classified in terms of the number of centers in which they were offered. A Type One course is offered in one center only with a Type Two course indicating that it was operated in two of the three centers and a Type Three course was held in three centers.

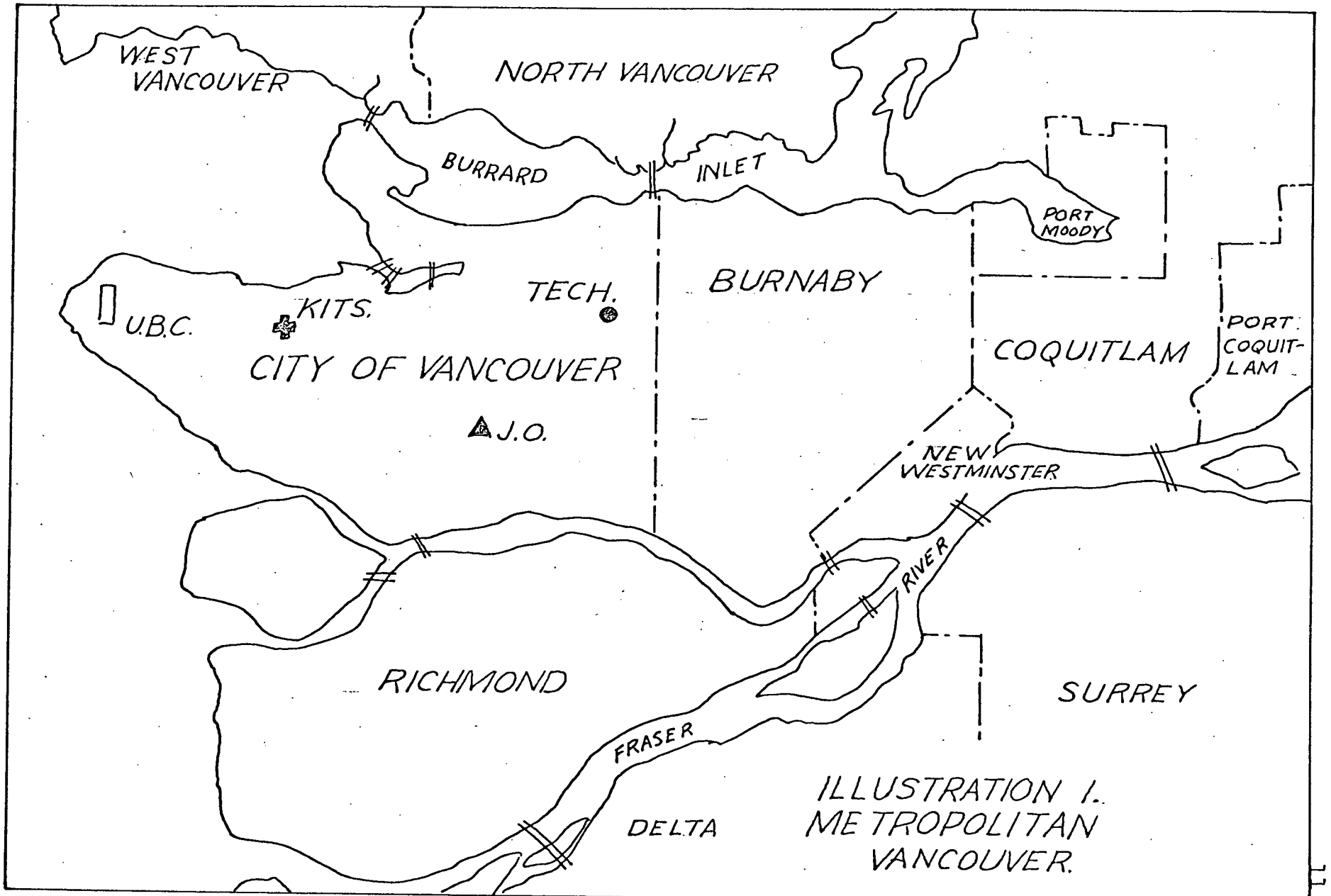


ILLUSTRATION 1.
METROPOLITAN VANCOUVER.

CHAPTER II

THE STUDY

SETTING

The Greater Vancouver metropolitan area, shown in Illustration I, is the largest urban complex in western Canada. This is situated twenty-five miles north of the Canada-United States border. The area surrounds the largest protected harbor in Canada and is bounded on the north by the Coastal Range of high snow-capped mountains with the Fraser River on the south. To the west of the area lies the Strait of Georgia. The metropolitan area of Vancouver is composed of fourteen separate municipalities of which the city of Vancouver is the largest and most centrally located. The city itself has a population of 385,000[17] and on the north shore of the harbor lie North and West Vancouver with a combined population of 75,000. These two suburbs are connected to the central city by two bridges crossing the harbor at the narrows. South of the central city is the municipality of Richmond and beyond it lies the municipality

---

17. Dominion Bureau of Statistics, 1961 Census of Canada, Population and Housing Characteristics by Census Tracts: Vancouver, Bulletin CT-22 (Ottawa: Queen's Printer, 1963), p. 4.

of Delta. These two municipalities are principally agricultural but urban sprawl is tending to occupy former agricultural land. From 1956 to 1961, the population of Richmond increased from 26,000 to 43,000.

The eastern edge of the central city is bordered by the municipality of Burnaby which is a residential area of some 100,000. Beyond Burnaby lie a complex of lesser municipalities that are part of the metropolitan complex. At the western edge of central Vancouver lies the University Endowment Lands which contain the University of British Columbia and a small residential area.

The metropolitan area of Vancouver has been growing rapidly. Between 1956 and 1961 the total population of the area increased from 665,000 to 790,000. Because of the topography of the area and the fact that it surrounds a major inlet, the distances from one part of the area to another are often extensive. The extreme east to west distance is approximately twenty-five miles and from north to south the necessity of crossing one of the bridges over the inlet may make road travel distances as great as thirty-five miles from one point of the area to another.

The adult population of the municipal area is about 514,000. Of those, ten percent reported one or more years of university education, thirty-seven percent had between three and five years of high school, twenty-four percent had one or two years of high school, and twenty-nine percent reported

attendance of less than a full year of high school.

ADULT EDUCATION

Adult education is provided the residents of the metropolitan area by the University of British Columbia, by the local municipal school boards, and by numerous voluntary agencies such as the YMCA and YWCA, the Public Libraries, and various other agencies. The largest and most varied programs are offered by the Vancouver School Board and the Extension Department of the University.

In 1962-1963 the Extension Department had an enrollment of 5,000 or slightly less than one percent of the metropolitan adult population. Most of these participants travelled to the university campus at the extreme western edge of the city.[18] Many of the courses offered by the Extension Department are similar in subject matter to those offered by the night schools. Thus, the two organizations compete for participants.

---

18. Melton, op. cit.

THE NIGHT SCHOOL PROGRAM

The Adult Education Department of the Vancouver School Board has a long history.[19] The first night classes were offered in 1909 and attracted 996 participants to four centers. By 1918 courses were offered in day school academic subjects, art, music, technical subjects, domestic science, commercial subjects and physical culture. Participation between 1915 (2,200 participants) and 1942 (2,141 participants) was quite irregular. The high point occurred in 1937 when 4,400 adults enrolled and the low in 1922 when only 1,126 adults participated. The growth since 1942, however, has been steady and in the 1964-1965 school year there were over 38,000 participants.[20]

During the period of this study, the total participation at school board evening classes was 32,049, or about six percent of the metropolitan adult population. Of these participants 6,700 were enrolled in academic courses for credit, 7,300 were in vocational courses and 17,650 were enrolled in non-credit, non-vocational courses. The five largest adult centers enrolled 73% of the participants.

---

19. Bertram Edwards Wales, "The Development of Adult Education in British Columbia" (unpublished Ed.D. thesis, Oregon State College, Corvallis, 1958), pp. 156-179.

20. Data obtained from records of the Vancouver School Board Adult Education Department.

Four of these centers were located in buildings used as high schools during the day and the fifth is a vocational school.[21] The six remaining centers, also located in high schools, enrolled between 450 and 1,200 participants each for a total of only 4,400 adults which is less than fourteen percent of the participants. Clearly the five large centers dominate participation; however, two of these centers are somewhat specialized. The Vancouver Vocational Institute specializes in technical subjects and the King Edward center specializes in credit courses. Enrollments for each center are in Table I.

Ever since the night school program began in 1909 with four centers, the problem of where to locate night school courses has been recurrent. In the early fifties centers were opened on an experimental basis at Gladstone, Byng and Britannia High Schools but all these were subsequently closed for lack of clientele. Wales[22] notes that limited nature of the programs offered and the lack of transportation probably accounts for the lack of sufficient participation to maintain the centers. The location of centers can be seen in Illustration 2. In 1957 the policy of the

---

21. This includes King Edward which subsequently became a full time adult center.

22. Wales, op. cit., p. 178.

School Board was "to develop one large, well located night school in each part of the city."[23]

A night school center was opened in Churchill Secondary School in 1959 and the enrollment in the first six years of operation has ranged from 500 to 770. (Table I) This center is located about two miles south of John Oliver night school in an area dominated by expensive residences. In 1960 a second center was opened at Thompson Secondary School. This center is about one mile south-east of the well established center at John Oliver. The enrollment for each of the first two years was about 500 but has subsequently dwindled until in the year 1964-1965 only 176 adults attended. Killarney High School was opened for night school courses in 1962-1963 and attracted 612 participants but participation here too seems to be dwindling. Killarney is in the south-east corner of the city about two miles from both Technical School and John Oliver. Killarney and Thompson are within one and one-half miles of each other. The most recently opened center, Templeton Secondary, was opened in the fall of 1964 and is already experiencing participation problems. Templeton is in a working class area in the north-east of the city and is within about a mile and a half of the Technical School.

Whether these last four centers opened since 1959 will

---

23. Wales, op. cit., p. 178.

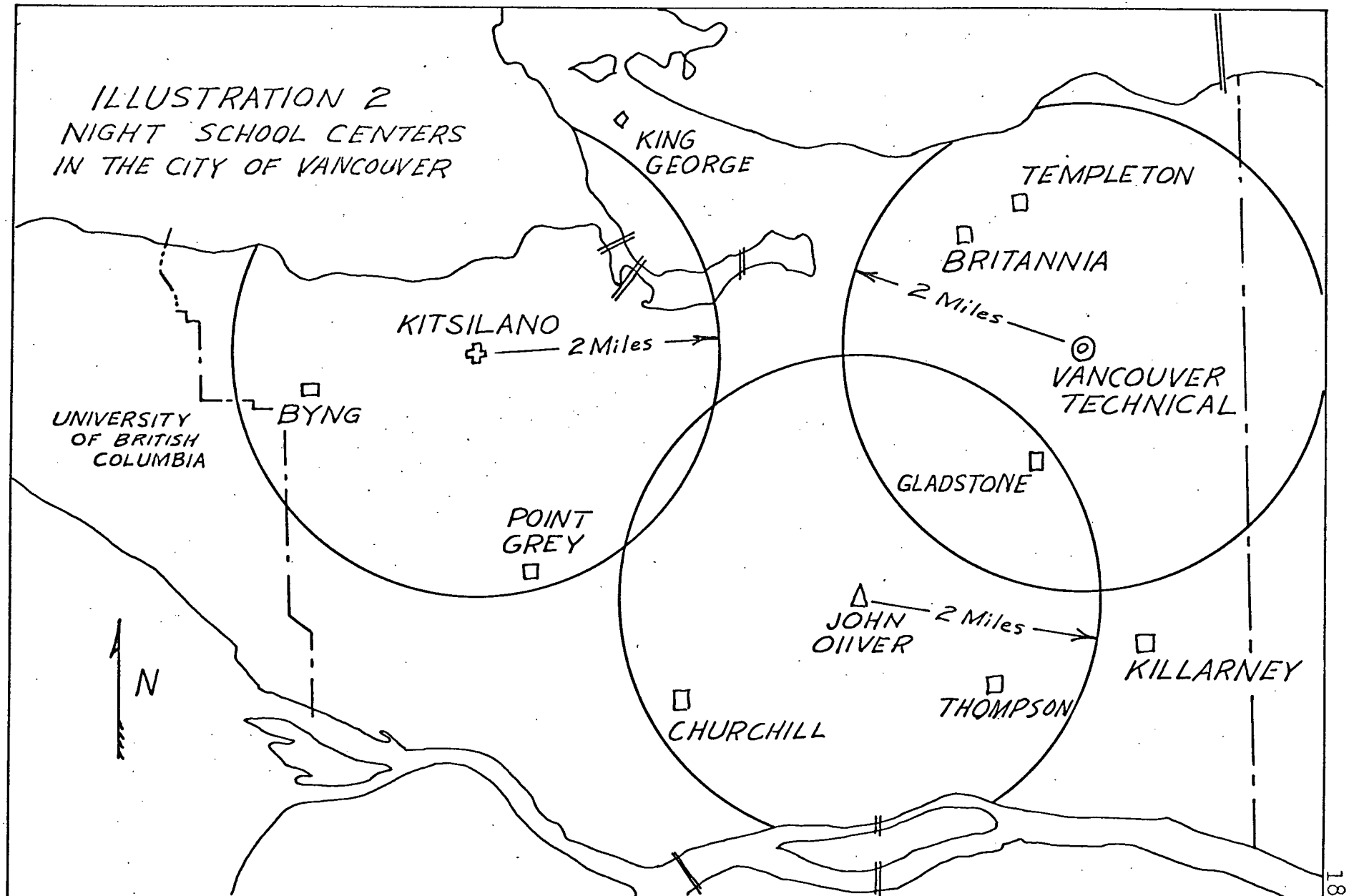


ILLUSTRATION 2
NIGHT SCHOOL CENTERS
IN THE CITY OF VANCOUVER
KING GEORGE
TEMPLETON
BRITANNIA
2 Miles
VANCOUVER TECHNICAL
KITSILANO
2 Miles
UNIVERSITY OF BRITISH COLUMBIA
BYNG
GLADSTONE
POINT GREY
JOHN OLIVER
2 Miles
KILLARNEY
THOMPSON
CHURCHILL
N

survive or whether they will share the fate of those opened in the early fifties is as yet undetermined.

Because of the variety of the program offered to adults by the Vancouver night schools, many participants are drawn from neighboring municipalities even though most of these also offer adult programs of their own although on a more limited scale.

TABLE I

ENROLLMENT BY CENTERS

Centers	School Year 59-60	60-61	61-62	62-63	63-64	64-65
Churchill*	697	604	769	538	498	523
Thompson		543	506	472	329	176
Killarney				612	586	388
Templeton						778
King George**	1081	1150	997	896	798	1518
Point Grey**	1301	1029	1165	1170	907	1791
John Oliver	2926	2513	2934	3238	3430	4020
Kitsilano	4465	4726	4475	4627	3252	4052
Technical	5345	5361	5891	6049	5868	5543
King Edward	5762	6774	7298	7093	11392	11745
V.V.I.	3712	3333	2622	2706	3405	4251

* opened in the fall of 1959.
** these centers have been open since before 1950.

POPULATION

In order to test the hypothesis, three night school centers were selected which offered a series of courses that were of general interest. The selection of the courses and the centers had to be done simultaneously in order to meet the criteria deemed essential for the study. These criteria were as follows:

1. The courses must be of general interest courses, not vocational or academic as in only the general courses would the participation be completely voluntary.
2. Each center selected must have courses of the following three types:
   (a) courses in a subject offered in that center and in no other. (i.e. Type One)
   (b) courses in a subject offered in that center and in only one other center selected. (i.e. Type Two)
   (c) courses in a subject offered in all three centers selected. (i.e. Type Three)
3. The subject matter of the courses must be of general interest with a wide appeal to potential participants and not of a specialized content that would interest only a selected group of participants.
4. The courses must be large enough to provide a dispersed population.

By applying these criteria to the selection of the

courses and centers the number of variables influencing distance travelled could be controlled. The other factors influencing participation as indicated in the review of the literature were assumed to be equal.

These criteria were applied to the course offerings at all the Vancouver School Board Night School Centers for the term 1962-1963 and those courses which did not meet the criteria were eliminated. It was evident that there would remain sufficient courses for the purposes of the study at only three centers.

At each of these three centers all the non-credit general interest courses were classified as Type One, Type Two, and Type Three. A sample of Type One courses was drawn with the use of a table of random numbers. Type Two and Type Three courses were few in number and all such courses were included in the study. The courses are listed in Tables II, III, and IV.

THE SELECTED CENTERS

The three night school centers with the largest selection of Type One, Type Two and Type Three courses that were neither academic credit, vocational, nor specialized courses were the John Oliver Night School (i.e. J.O.), Kitsilano Night School (i.e. Kits.), and the Vancouver Technical Night School (i.e. Tech.).

TABLE II

TYPE ONE COURSES

Course	Enrollment	Center
Dramatic Writing	16	J.O.
Law for Women	11	J.O.
Piloting, Junior	26	J.O.
Piloting, Advanced	12	J.O.
Cartooning, Beginners	15	Kits.
Sailing for Beginners	15	Kits.
Showcard Writing	21	Kits.
Swedish Conversation	13	Kits.
Fly Casting	20	Tech.
Fly Fishing	20	Tech.
Machine Shop Practice	28	Tech.
Norwegian Conversation	35	Tech.
Total Enrollment	232	

TABLE III

TYPE TWO COURSES

Course	Enrollment	Center
Candlemaking	21	J.O.
Candlemaking	23	Kits.
How To Invest Your Money	52	Kits.
How To Invest Your Money	42	Tech.
Total Enrollment	138	

TABLE IV

TYPE THREE COURSES

Course	Enrollment	Center
Income Tax Know How	15	J.O.
Your Christmas Camera	14	J.O.
Income Tax Know How	24	Kits.
Your Christmas Camera	24	Kits.
Income Tax Know How	23	Tech.
Your Christmas Camera	16	Tech.
Total Enrollment	116	

Of the three centers selected, J.O. had the smallest night school program. This center is located in the south central part of the city of Vancouver. The immediate neighborhood contains an old established business district and a working class residential area. Within a two to three mile range, however, there are several areas in which the housing ranges from middle to upper class. Table V shows the participation and the number of participants in courses that could be selected.

TABLE V

PARTICIPATION AT SELECTED CENTERS: 1962-1963

Center	Total Participants	Suitable* Participants	Participants in Study	Percent** Selected
J.O.	3238	2214	115	5.2%
Kits.	4628	3759	187	5.0%
Tech.	6049	4988	184	3.7%

*number of participants not enrolled in either vocational or academic credit courses.
**percentage of suitable participants.

The Kits. center is in the western section of the city in the middle of an approximately three and one-half mile radius which includes most of the upper-middle and upper class residences in the city of Vancouver. It is also

some two and one-half miles to the more exclusive residential area in the University Endowment Lands. This center had the second largest enrollment among the three selected. The enrollment data for this center is shown in Table V.

The Tech. center which was at one time the principal day school trade training center for Vancouver, is almost identical in plant and function with the other secondary schools in the city. It is located in the north-east section of the city near the Vancouver-Burnaby border. The immediate neighborhood includes an industrial area to the south and working class residences to the west and north. In general, the higher status residential areas are in the western half of the city and the working class areas are in the east. Tech. is clearly in this latter area. As is shown in Table V, Tech. has the largest enrollment of the centers selected.

These three centers are situated so as to draw from the entire city since no part of the city is more than four miles from at least one of the three and not more than one person in twenty resides more than three miles from one or other of these three centers.

PROCEDURE

When the night school centers and courses had been selected the data used for the study were collected from

the enrollment forms for each course. These forms contain the name and address of each participant. A map of the area was used for each center and twenty rings at one mile intervals were drawn in concentric circles about the center. The place of residence of each participant was then spotted on the map and the data were then computed for each center and for each course category.

MEASUREMENT OF DISTANCE

All participants within a radius of one mile of a center are estimated to travel 0.5 miles, and are said to be in ring one. Participants living outside the one mile ring but inside a circle of two miles radius from the center are estimated to travel 1.5 miles, and are said to be in ring two. This system is continued until ring nineteen. All participants travelling more than nineteen miles are considered to be in ring 20, and are estimated to travel 19.5 miles.

This system underestimates travel distances because it assumes that persons can travel to a night school center in a straight line. This underestimation is probably not great for those within Burnaby and the city of Vancouver, but it is certainly greater for the participants from the outlying municipalities, most of whom must cross one of the two bridges over either Burrard Inlet or one of three bridges

spanning the Fraser River. The computation of the mean distance travelled produces an underestimation of distance more than does the median as it is strongly influenced by long distance participants whose journey is probably considerably underestimated.

The distributions of the participants in each ring for each center and type of course were tested for statistically significant differences using the chi-square test at a 0.05 level of significance. In some cases, where the distributions were such as to produce an expected frequency of less than five, certain intervals were combined. This reduces the number of intervals measuring distance from the original twenty to seven.

COMPARISON OF COURSES IN THE SAME CATEGORY

The organization of courses into categories places courses given at the same center and at the same number of centers (i.e. of the same Type) into the same category. If this categorization is valid, one would expect the distributions of distance travelled to courses in the same category to be relatively similar. The ideal statistical solution would be to test the distributions of distance travelled to the courses in each category with the hypothesis that the distance travelled is independent of the course attended. If the hypothesis were accepted the

courses in the category could be considered homogenious with respect to distance travelled. The small number of participants in many of the courses made this procedure impossible.

It was possible, however, for Type One, to use the chi-square test with the hypothesis that if the courses in a category are homogenious, half of the participants in each course will travel less than the median distance for all the courses in the category, and half will travel further than the median. None of the categories in Type Two or Type Three contained more than two courses. For this reason it was decided to use the significance of the difference between means on the courses within these categories. It was considered that homogeneity within each category could be accepted if the hypothesis were accepted or if there was no significant difference between the mean distances travelled. It was also considered that homogeneity within the categories would indicate the validity of the center-Type categorization. Homogeneity would also indicate that the subject matter of the course attended was not a significant factor in the distance travelled.

COMPARISON OF CENTERS

All Participants

The three distributions each containing all the

participants from one center were tested with the chi-square test of independence on the hypothesis that the distances travelled by participants were independent of the center they attended. The distributions were also tested two at a time to determine which, if any, pairs of distributions were similar. If the hypothesis of independence were accepted the distributions were considered similar.

The significance of the difference between means and medians for the centers were tested both as a check of the chi-square tests and because of their value as added comparisons between the centers. These latter tests, however, are probably not as valid as the non-parametric chi-square tests because the data are very positively skewed.

Type One Participants

Three distributions of distance, one for each center, were prepared for participants attending courses in subject matter offered at one center only. In the terms used in this study these are the Type One distributions for each of the three schools.

These distributions were compared using a chi-square test on the hypothesis that the distributions of distances travelled were independent of the center attended. These tests were superior to the tests on the distributions in the previous section because they control for Type and because they are not affected by unequal numbers of participants in the categories.

In order to substantiate the chi-square tests, the significance of the difference between the mean distances travelled to the centers by participants of Type One courses were also calculated.

Type Two Participants

The three distributions for the categories in Type Two (J.O.-2, Kits.-2 and Tech.-2) were tested in the same way as the distributions in Type One. However, there are only four courses in Type Two and one of these contains women only. The results of these Type Two tests must thus remain somewhat tentative.

Type Three Participants

The three distributions of distance travelled, one for each center, of courses given in the same subject matter at all three schools was also tested in the same way as the distributions in Type One. These distributions are of particular interest because the distribution for each center contains one course in 'Income Tax' and another in 'Christmas Camera'. For this reason additional distributions were prepared which included only participants from Burnaby and the city of Vancouver. The significance of the differences between the means of these distributions of distance travelled was also tested.

In order to discover how many participants did not attend the center closest to their residence even though the closest center offered a course in the same subject matter

as the one they attended, three maps were prepared. Lines were drawn joining the three centers. These lines formed a triangle. The perpendicular bisector of each side was drawn and extended to the point where the bisectors intersected. These bisectors divided Vancouver and Burnaby into three zones with a night school center in the middle of each zone. Any participant who did not attend the closest school had to cross one of these bisectors. (Illustration 3) The residence of each Type Three participant was placed on one of the three maps - one map for each center. It was then a simple matter to count the participants who did not reside in the same zone as the school they attended. Only participants residing in Burnaby or the city of Vancouver were included in this zone analysis as participants residing in the surrounding areas often had to detour considerable distances to cross bridges and thus the zone they lived in was often rather irrelevant.

ATTENDANCE

To determine if a relationship exists between distance travelled by the participant and the percentage of sessions he attended, a product moment correlation was run between these two variables. The correlation was checked to see if it was significantly different from zero. One class, Drama at J.O. was not included in the correlation because of doubt about the validity of attendance recording.[24]

---

24. A population of 697 participants was used for analysing attendance only. This population contained courses categorized as Type Two and Type Three even though the courses were in different terms.

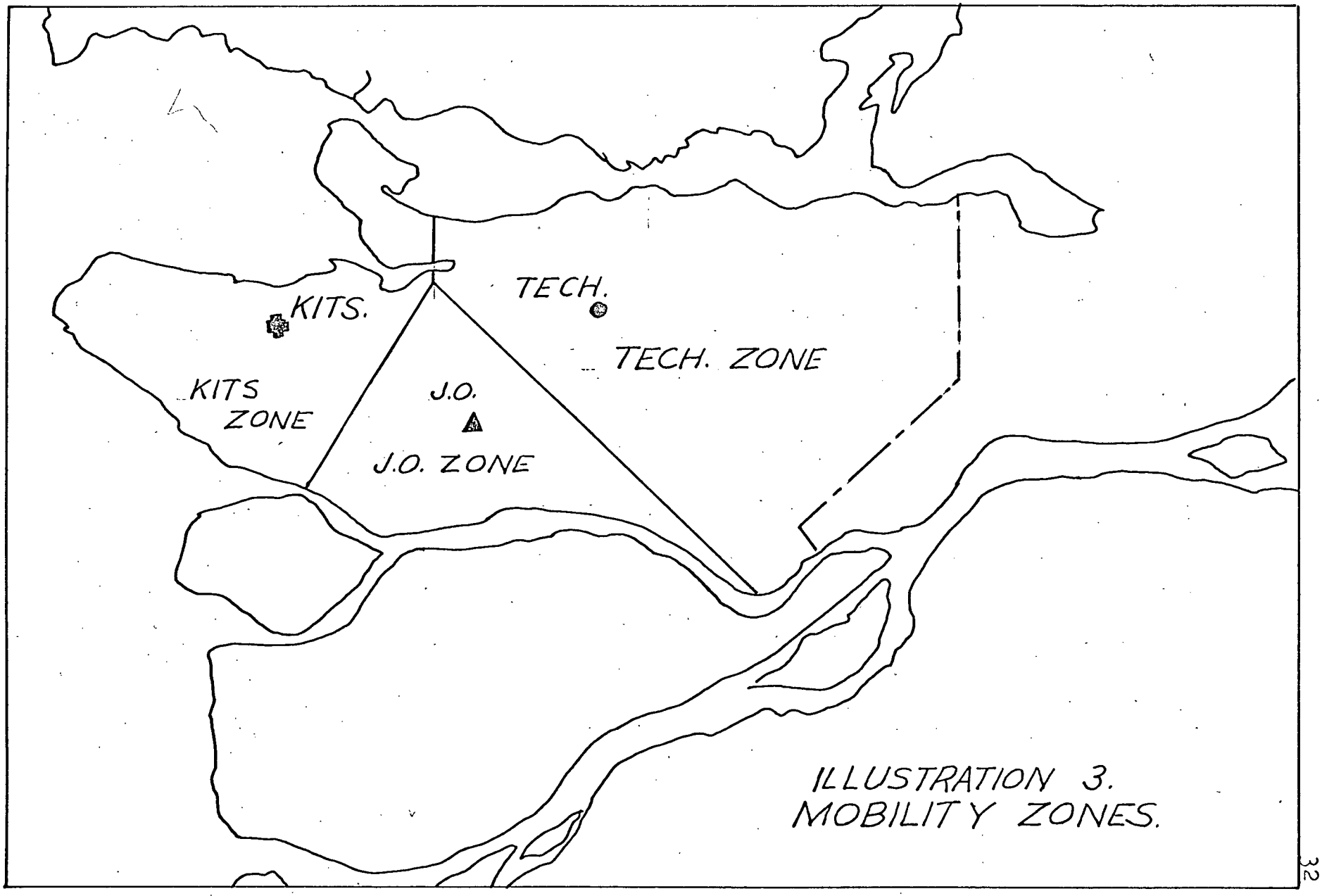


ILLUSTRATION 3.
MOBILITY ZONES.

CHAPTER III

RESULTS

The sample population in this study consisted of 486 participants attending adult night classes in three Vancouver School Board centers. When the sample is analyzed as a whole, the mean distance travelled is 3.53 miles, while the median distance travelled is 2.78 miles. This difference between the mean and the median results from the distributions of distances travelled being positively skewed so that the relatively few participants who travel longer distances increase the mean. Since the mean indicates the arithmetic average of the distances travelled it is not a particularly useful descriptive statistic, however, it is very necessary for the statistical analysis. The median is a more useful descriptive statistic since it shows that half the population travels more than 2.78 miles and half live within that distance of the center which they attend. This is further illustrated by the finding that 15.7% of the participants travel less than one mile to their center while 104, or 21.4%, travel between one and two miles. A radius at three miles from the center includes 53% (Table VI) of the participants with more than three-quarters of them living within five miles and over 83% living within six miles of the center they attend. Only 3.6% travel more than ten miles and

less than one percent travel more than fifteen miles. The percentage of participants in each ring can be seen in Illustration 4.

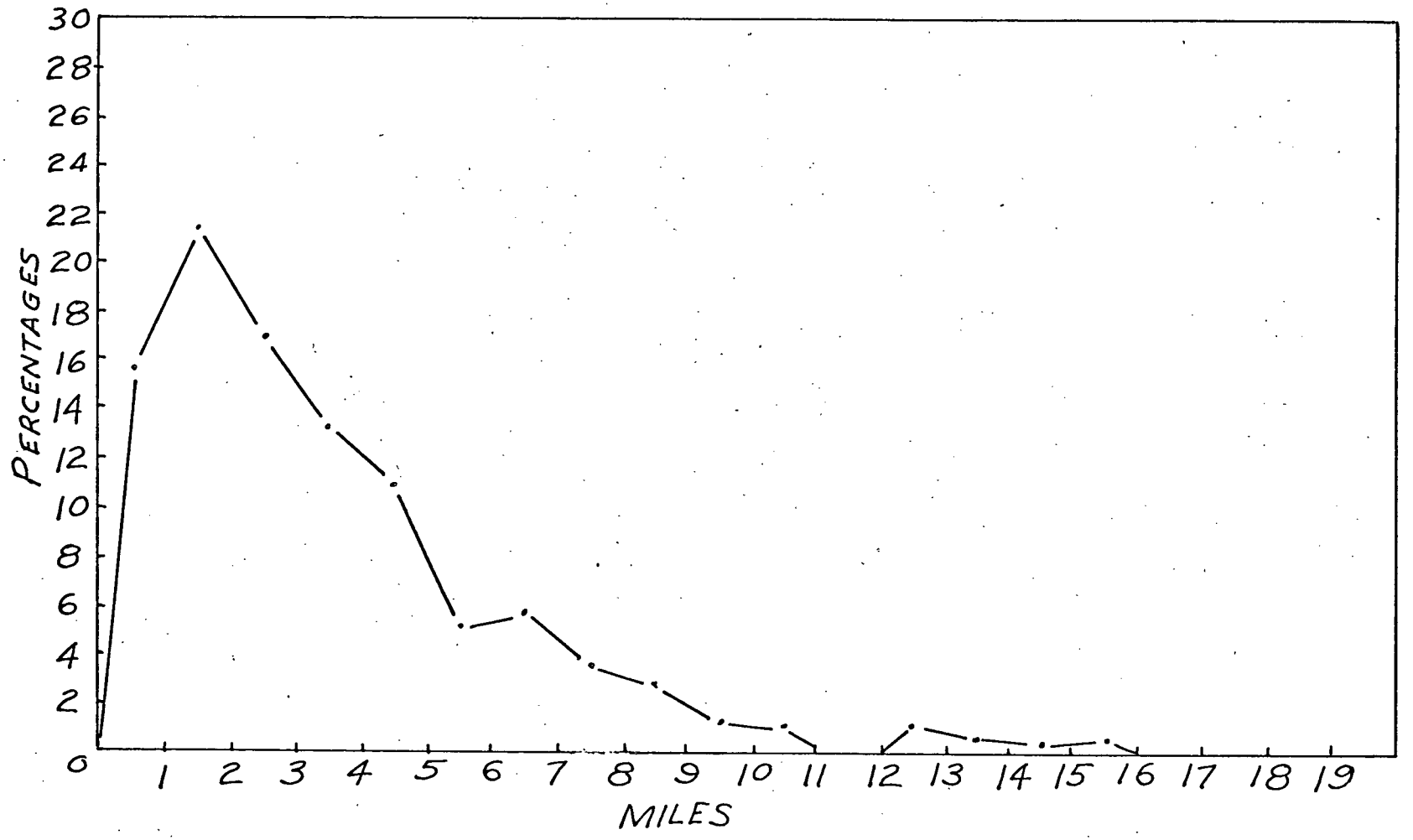
TABLE VI

DISTRIBUTIONS OF THE POPULATION BY DISTANCE MEASURED IN MILE INTERVALS

Mile Interval	N	%	Cumulative %
1	76	15.7	15.7
2	104	21.4	37.1
3	82	16.8	53.9
4	64	13.2	67.1
5	53	10.9	78.0
6	25	5.2	83.2
7	28	5.8	89.0
8	17	3.5	92.5
9	13	2.7	95.2
10	6	1.2	96.4
11	5	1.0	97.4
12			
13	5	1.0	98.4
14	3	0.6	99.0
15	1	0.2	99.2
16	2	0.4	99.6
19+	2	0.4	100.0
Total	486	100.0	100.0

ILLUSTRATION 4

PERCENTAGE FREQUENCY DISTRIBUTIONS-ALL PARTICIPANTS



As distance from the night school center increases beyond the two mile radius the participation tends to decrease in spite of the fact that each additional mile in radius from the center increases the area and the potential population. Beyond a nine mile radius from the center the participation is virtually insignificant with only twenty-four participants recorded at distances greater than nine miles. This is a smaller number than was recorded in any radii up to and including seven miles. Thus the cumulative percentage curve rises steeply for the first seven miles after which the increase tends to slow down and eventually flatten out. (Illustration 5)

COMPARISON OF DISTANCES TRAVELLED TO THE CENTERS

The distances travelled to the three centers are not the same. Participants tend to travel further to J.O. and Tech. than to Kits. The median distance travelled to J.O. is 3.07 miles (Table VII) which is not significantly different from the median of 3.44 miles travelled by participants to Tech. Table VIII, however, shows that the median distance of 2.09 miles travelled to Kits. is significantly different from the median distances travelled to the other two centers.

When the mean distances travelled to the three centers are tested for significant differences, the results

ILLUSTRATION 5
CUMULATIVE FREQUENCY GRAPH - ALL PARTICIPANTS

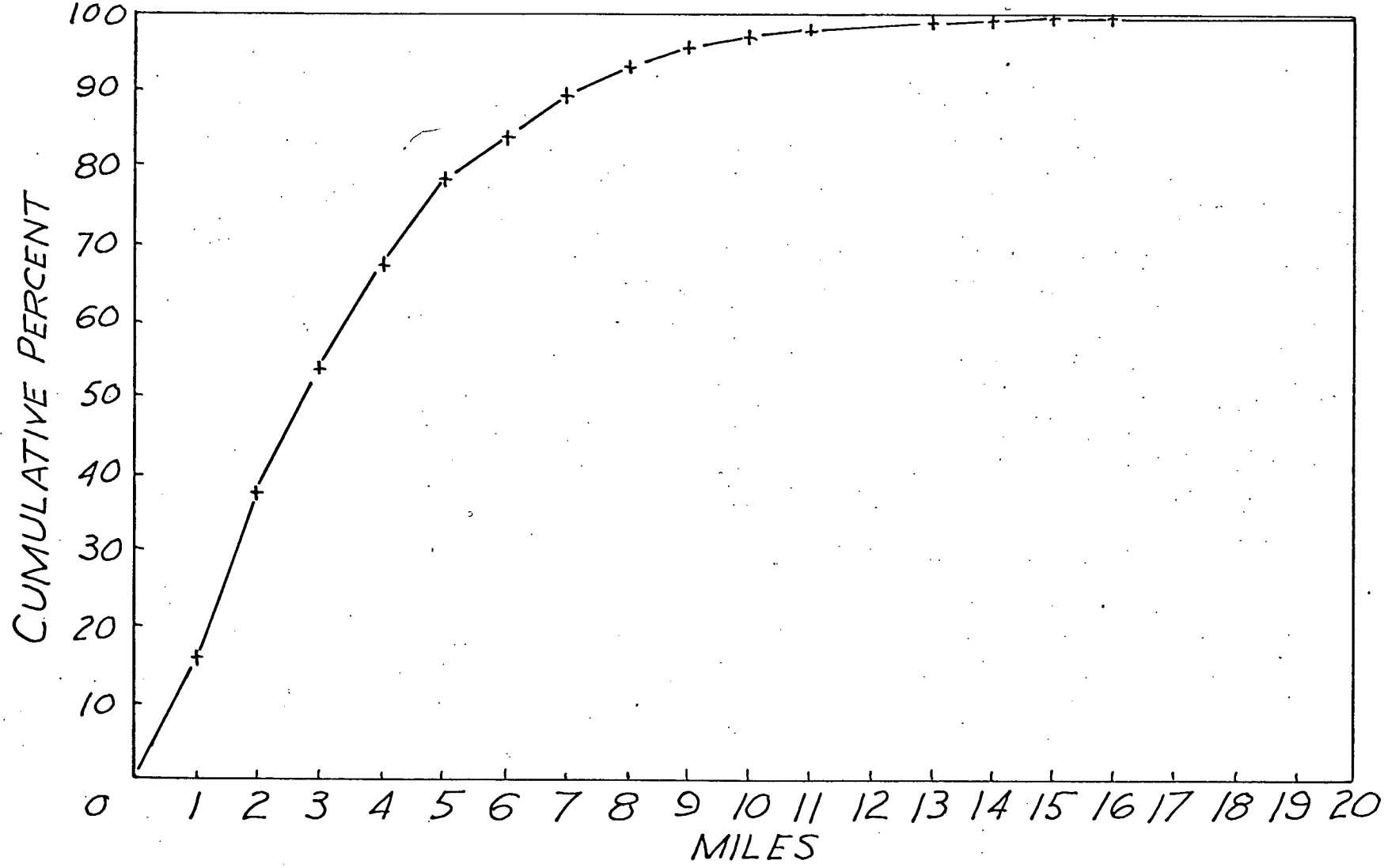


TABLE VII

AVERAGE DISTANCES TRAVELLED TO THE CENTERS BY CATEGORY

Means:	J.O.	Kits.	Tech.
Type 1	3.78	3.80	4.34
Type 2	3.83	2.94	3.55
Type 3	2.64	2.15	3.86
Total	3.50	3.03	4.06
Medians:	**J.O.**	**Kits.**	**Tech.**
Type 1	3.54	2.80	3.62
Type 2	1.83	1.98	3.17
Type 3	2.15	1.60	3.08
Total	3.07	2.09	3.44

TABLE VIII

SIGNIFICANCE OF THE DIFFERENCE BETWEEN MEANS AND MEDIANS FOR THE CENTERS

	J.O. & Kits.	J.O. & Tech.	Kits. & Tech.
Between Means	1.40	1.60	<u>3.35</u>
Between Medians	2.34*	.84	<u>3.30</u>

Underlined values significant at the .01 level of confidence.
* Significant at the .05 level of confidence.

are not consistent with those tests on the medians which have just been discussed. Table VIII shows that there is no significant difference between the mean distances travelled to J.O. and Kits. even though the medians for the same two centers were significantly different. These tests on the means are the only statistics which do not confirm the similarity of the distances travelled to J.O. and Tech.

When the distributions of distance to the three centers are tested with the chi-square method on the hypothesis that the distances travelled are independent of the center attended, the hypothesis is rejected at the .01 level of confidence.

TABLE IX

CHI-SQUARE VALUES FOR TESTS OF INDEPENDENCE FOR THE CENTERS

Centers Tested	$\Sigma\chi^2$	d.f.
All Three	<u>39.2</u>	12
J.O. & Kits.	<u>23.2</u>	6
Kits. & Tech.	<u>38.5</u>	6
J.O. & Tech.	3.8	6

Underlined values significant at the .01 level of confidence.

This test would seem to substantiate the contention that participants travel further to some centers than to others. When the centers are tested for independence two at a time, the results coincide with the results of the tests on the medians: the distances that participants travel to J.O. and Tech. are similar and the distances participants travel to Kits. are different.

The tendency for participants to reside close to the center they attend is more evident at Kits. than at the other two centers. Each of the three mile intervals closest to Kits. contains more than twenty percent of the participants at Kits. and thus 68% of the Kits. participants reside within three miles of that center while, on the other hand, less than half of the participants at the other two centers reside within three miles of the center. (Table X) The graph of the distributions, (Illustration 6), also shows the higher participation in the mile intervals closest to Kits. The cumulative frequency graph, (Illustration 7), has the greatest slope for the mile intervals closest to Kits., but, after about six miles from the center, the curves for all three centers are similar with a gentle slope.

When the results of this analysis of the centers are considered in total, the most striking differences between the centers are in the participation patterns closest to the centers. A circle of two miles radius drawn around each

TABLE X

DISTRIBUTIONS FOR THE CENTERS

	Numbers			Percent			Cumulative Percent		
Rings	J.O.	Kits.	Tech.	J.O.	Kits.	Tech.	J.O.	Kits.	Tech.
1	16	42	18	13.9	22.4	9.8	13.9	22.4	9.8
2	25	48	31	21.7	25.7	16.9	35.6	48.1	26.7
3	15	38	29	13.0	20.3	15.8	48.6	68.4	42.5
4	21	11	32	18.3	5.9	17.4	66.9	74.3	59.9
5	17	10	26	14.8	5.4	14.1	81.7	79.7	74.0
6	7	9	9	6.1	4.8	4.9	87.8	84.5	78.9
7	5	11	12	4.4	5.9	6.5	92.2	90.4	85.4
8	2	5	10	1.7	2.7	5.4	93.9	93.1	90.8
9	1	5	7	.9	2.7	3.8	94.8	95.7	94.6
10	2	3	1	1.7	1.6	.5	96.5	97.4	95.1
11			5			2.7			97.8
13	2	3		1.7	1.6		98.2	99.0	
14		1	2		.5	1.1		99.5	98.9
15		1			.5			100.0	
16	2			1.7			100.0		
19+			2			1.1			100.0
Total	115	187	184	100.0	100.0	100.0	100.0	100.0	100.0

ILLUSTRATION 6

PERCENTAGE FREQUENCY DISTRIBUTIONS FOR EACH CENTER

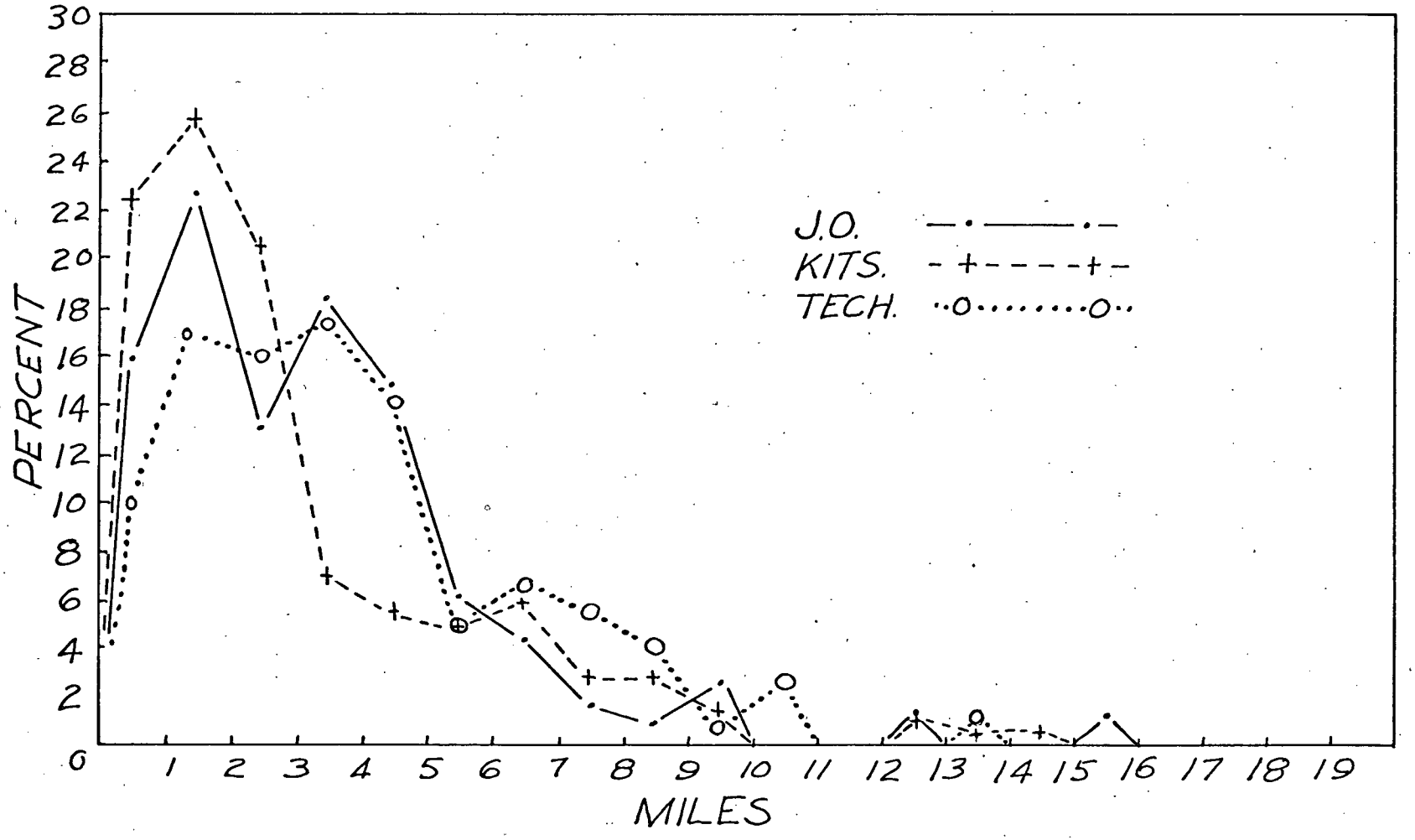
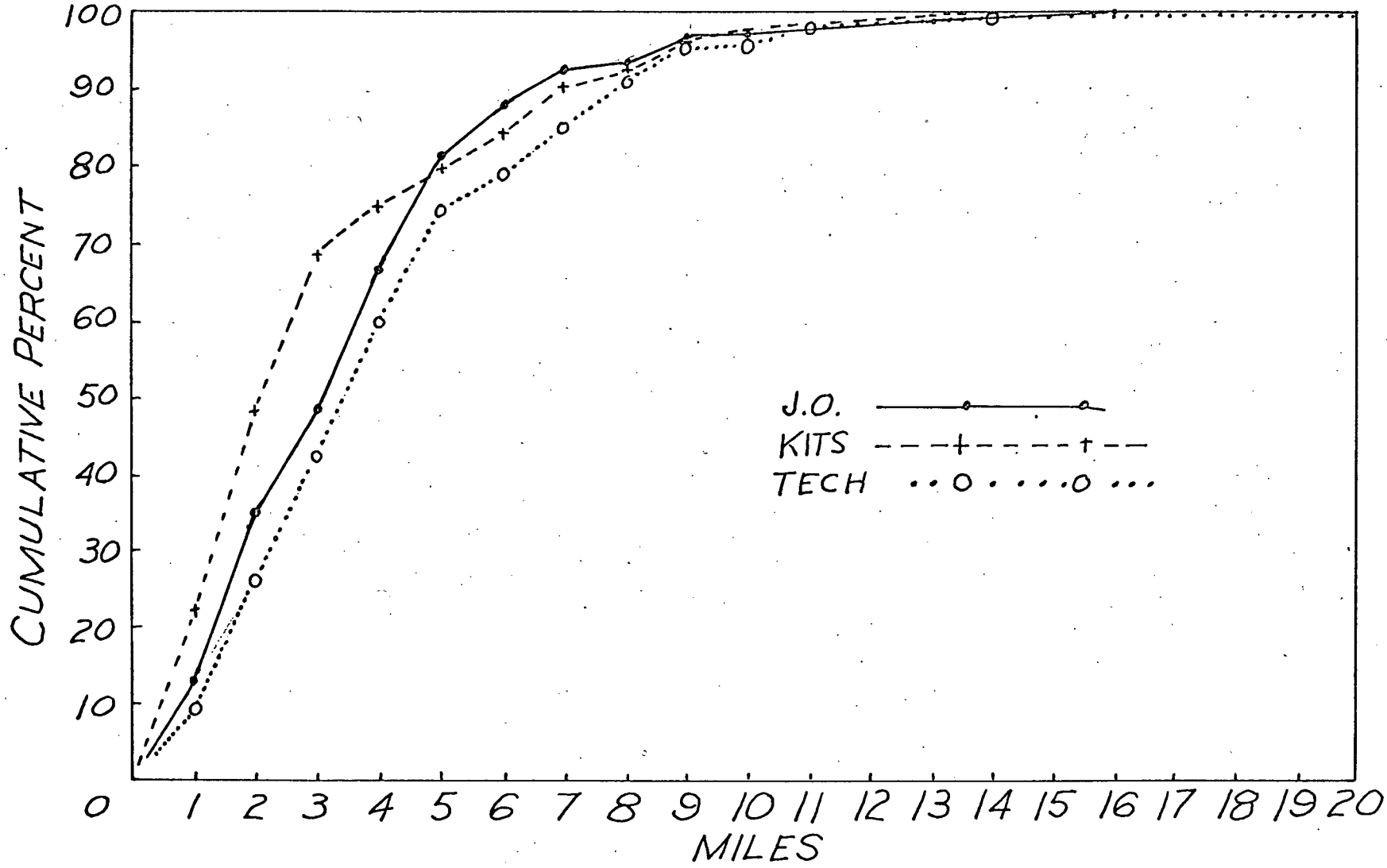


ILLUSTRATION 7
CUMULATIVE FREQUENCY GRAPH FOR EACH CENTER



center contains about half the participants at Kits., one-third at J.O., and only slightly more than one-quarter of the participants at Tech.

TYPE ONE COURSES

When courses in a subject are offered at one location only, they are categorized as Type One. If a participant wishes to attend a Type One course he has no choice of center, however, an analysis of the travel patterns shows that under such a circumstance there are no statistically significant differences between the three centers.

The chi-square test on the three distributions of the distance travelled by Type One participants indicates that the hypothesis of independence must be accepted. Thus when participants have no choice of center in which to obtain the subject matter they desire, there is no difference between the travel patterns at the three centers. The chi-square is shown on Table XI.

When the means of the Type One distributions are compared, there is no significant difference at the .05 level of confidence between the means of the three centers. (Table XII) This supports the chi-square test noted above. Both tests indicate that participants of Type One courses follow similar travel patterns to each of the centers.

TABLE XI

CHI-SQUARE TESTS OF INDEPENDENCE ON THE FIVE STEP DISTRIBUTIONS FOR THE CATEGORIES

Distributions	N	d.f.	$\Sigma\chi^2$
J.O.-1, Kits.-1, Tech.-1	232	8	9.78
J.O.-2, Kits.-2, Tech.-2	138	8	10.9
J.O.-3, Kits.-3, Tech.-3	116	8	<u>28.2</u>
Kits.-3, Tech.-3	87	4	<u>15.51</u>
Kits.-3, J.O.-3	77	4	<u>14.92</u>
J.O.-3, Tech.-3	68	4	5.52

Underlined values significant at the .01 level of confidence.

TABLE XII

SIGNIFICANCE OF THE DIFFERENCE BETWEEN MEAN DISTANCES TRAVELLED FOR THE CATEGORIES

	Schools Tested		
Type	J.O.-Kits.	J.O.-Tech.	Kits.-Tech.
1	.041	1.25	1.07
2	1.08	.316	1.22
3	1.15	2.18*	<u>3.1</u>

Underlined value significant at the .01 level of confidence.
*Significantly different at the .05 level of confidence.

Participants appear to attend Type One courses from throughout the city of Vancouver, the municipality of Burnaby, and the areas north of Burrard Inlet as indicated on the map (Illustration 8) which shows them to be widely scattered throughout the area but with slightly more attending from the western sections of the city. The map for the Kits. participants (Illustration 9) shows some clustering of the participants about that center but this was not statistically significant, as shown earlier. Even though the participants at both J.O. and Kits. are widely spread, the residences of the Tech. participants are even more widely scattered with the notable exception that none attend Tech. from the immediate vicinity of Kits. as shown on Illustration 10.

These data consistently indicate that the participants attending courses in subject matter offered at one center only tend to travel relatively long distances to attend regardless of where the course is located.

TYPE TWO COURSES

When a course is offered at any two of the three centers the travel patterns appear to be the same at each center. The chi-square test of independence indicates that there is no association between the distances travelled and the center attended. This is the same result obtained for

ILLUSTRATION 8

MAP OF TYPE ONE PARTICIPANTS AT J.O.

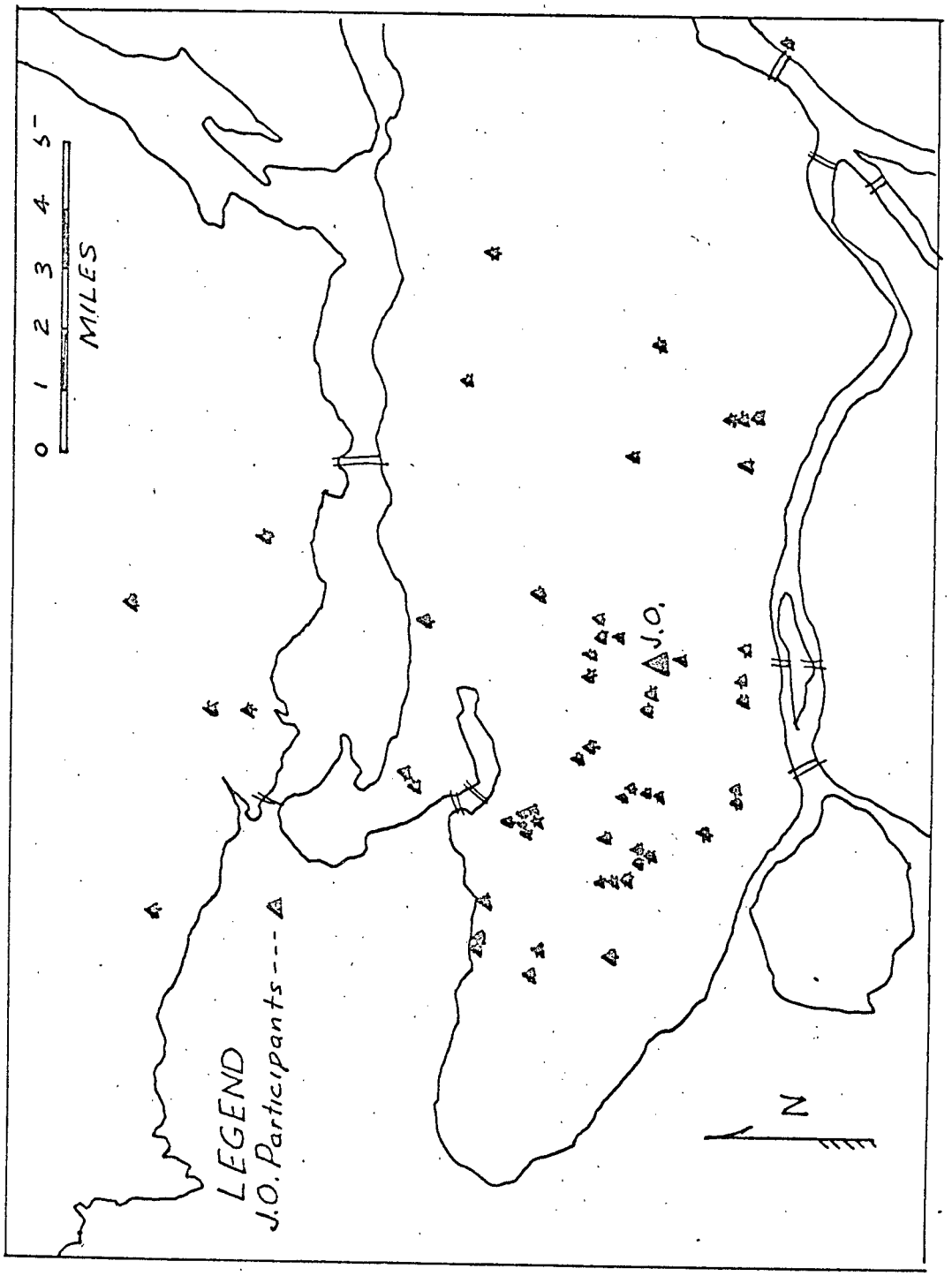


ILLUSTRATION 9
MAP OF TYPE ONE PARTICIPANTS AT KITS.

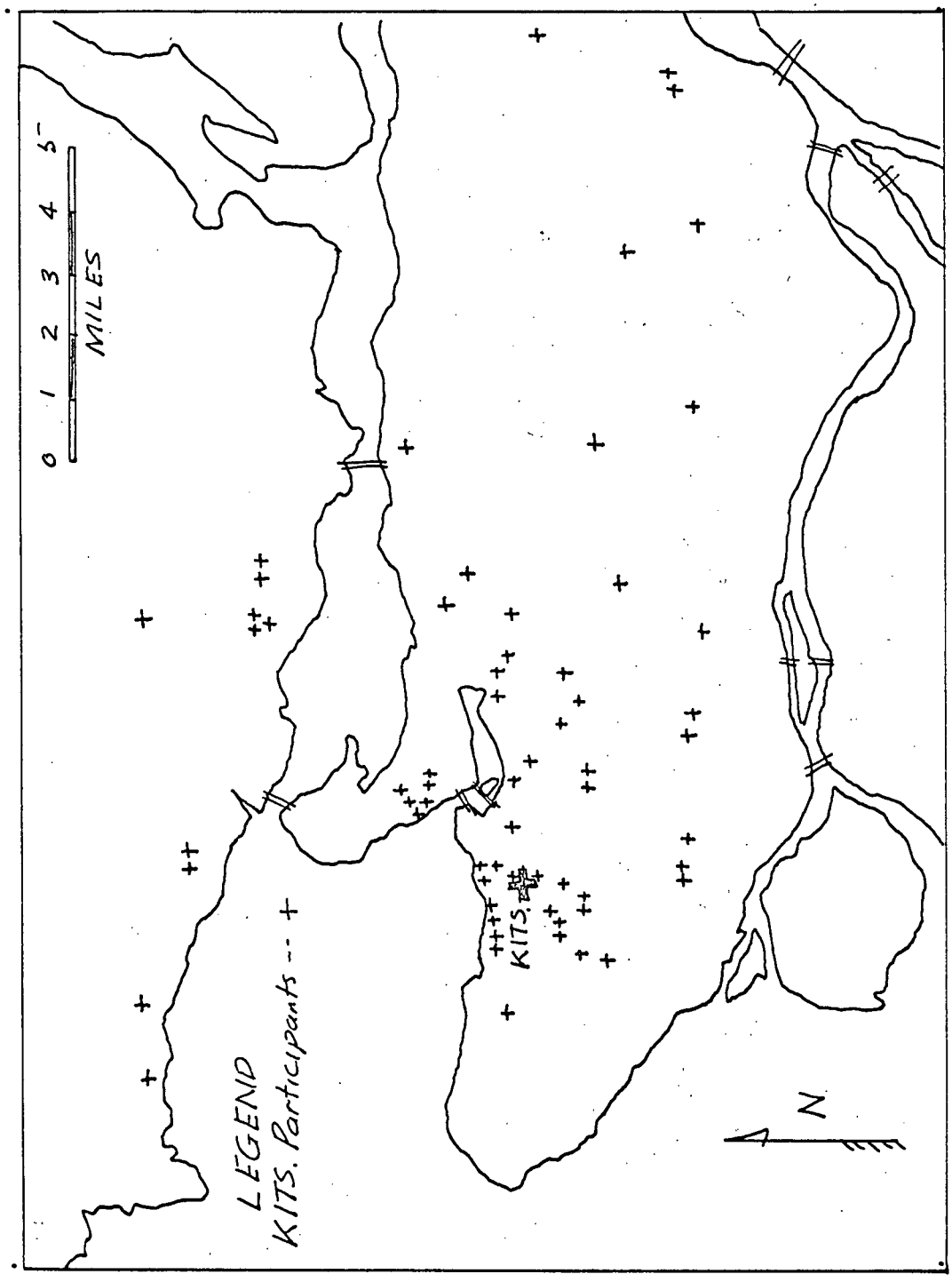


ILLUSTRATION 10

MAP OF TYPE ONE PARTICIPANTS AT TECH.

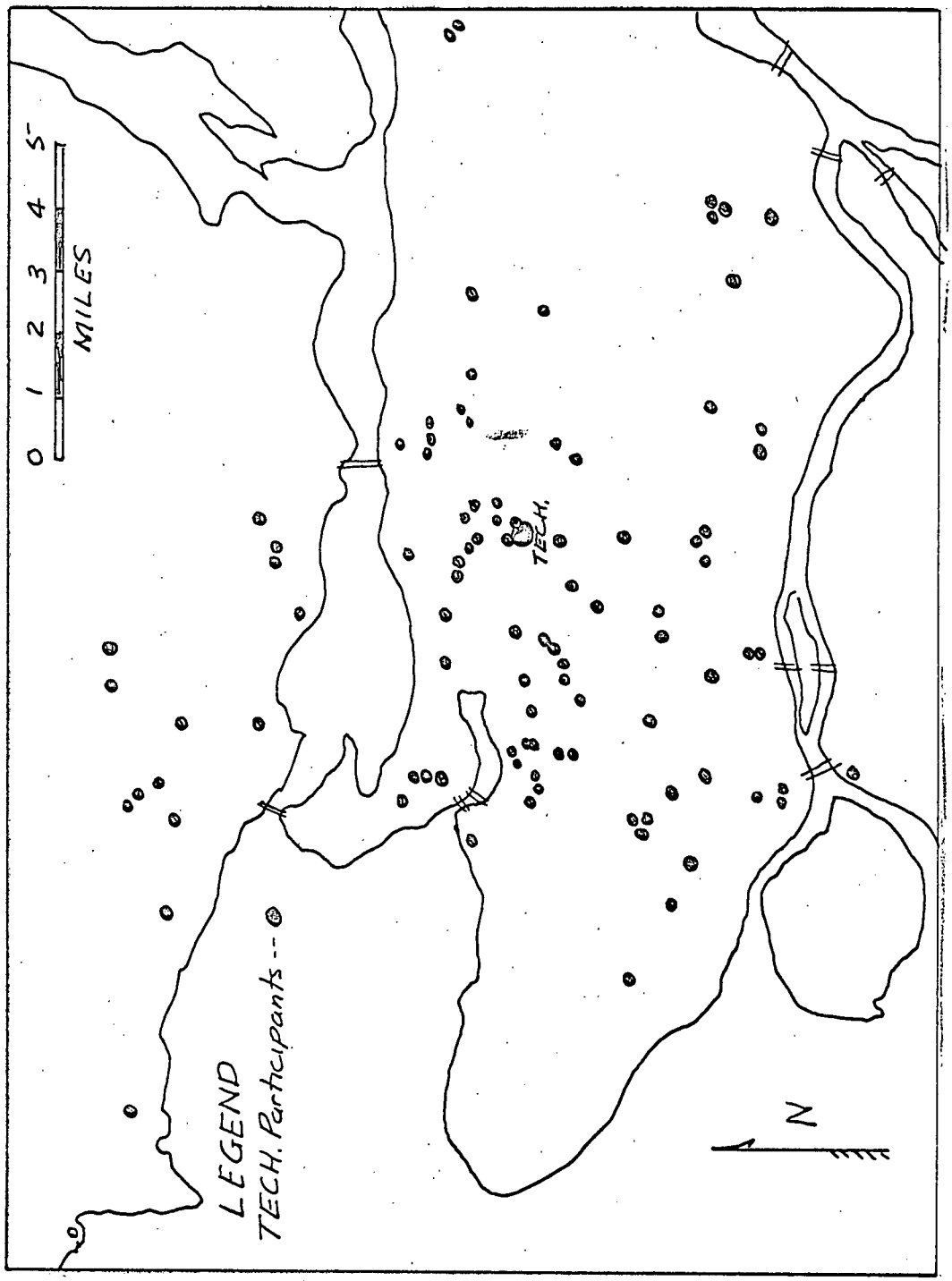
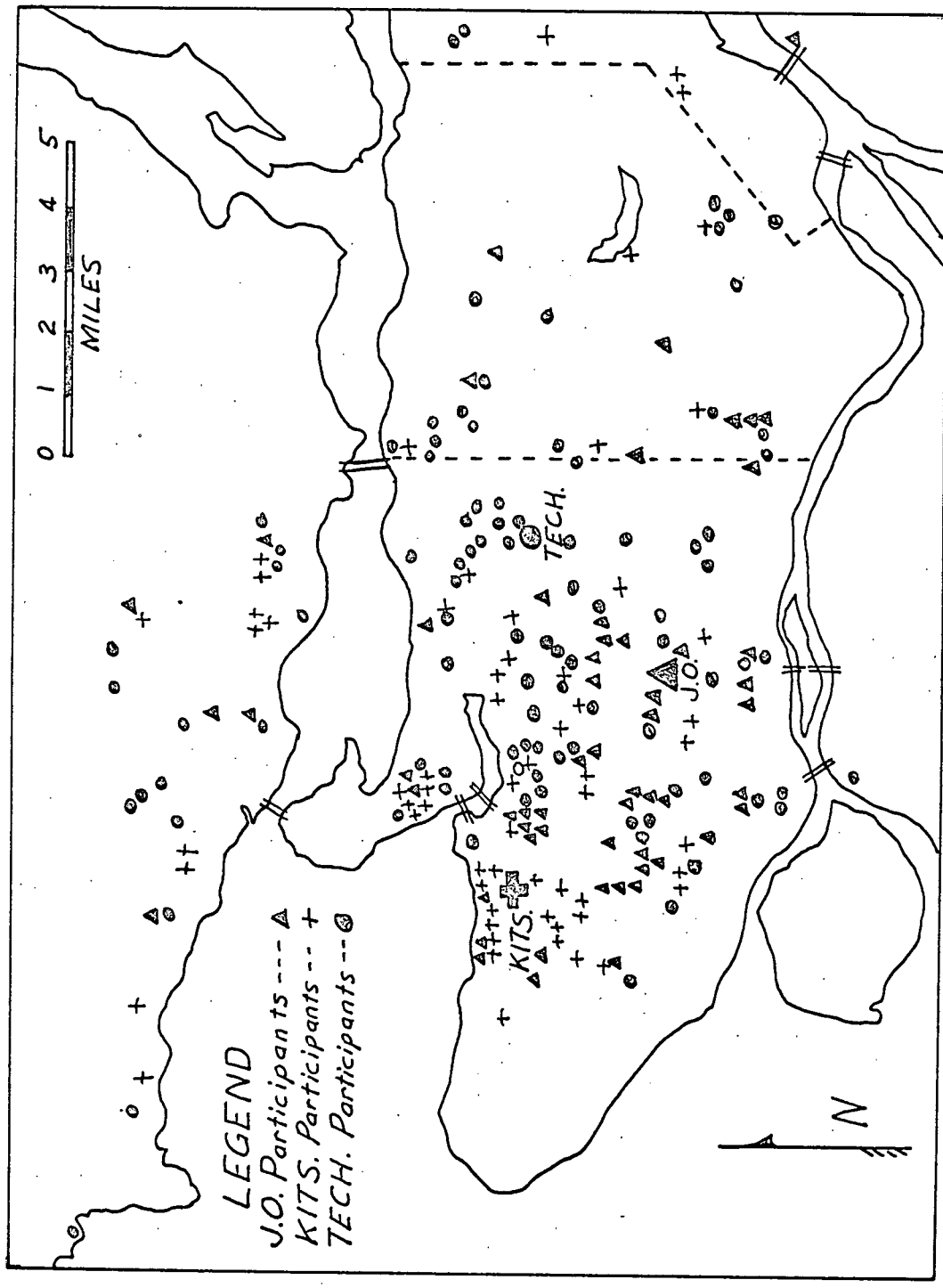


ILLUSTRATION 11

MAP OF ALL TYPE ONE PARTICIPANTS



Type One courses as shown on Table XI. The tests of the significance of the difference between the mean distances travelled also indicate that the travel patterns for the three centers are similar. The results of these three tests parallel the results for Type One courses. (Table XII)

Thus, the statistical analysis indicates that there is no difference between the travel patterns to the three centers for either Type One or Type Two participants. This result may be biased by the fact that one of the Type Two courses offered at Kits. was made up almost wholly of women. The possible influence of sex on the distance travelled to evening classes is discussed later.

TYPE THREE COURSES

Type Three courses were offered in all of the centers studied. Participants who chose Kits. travelled shorter distances than did those choosing J.O. or Tech. When the chi-square test of independence is made on the three distributions of distances travelled, an association is indicated between the distance travelled and the center attended. In order to determine if the travel patterns to any two centers were similar, the distributions for the centers were tested for independence two at a time. (Table XI) The results indicate that the patterns of distance travelled to Kits. again deviates from those of J.O. and Tech. as was found in

the test of the distributions made for the total sample of the three centers.

When the mean distances travelled to courses offered at all three centers are tested for significant differences, the results, (Table XII), do not coincide with the chi-square tests of independence. Although the chi-square test indicated that the J.O. pattern of distances travelled was similar to the Tech. pattern, the tests on the means indicated that the J.O. pattern is like the Kits. pattern. This anomaly may be caused by the small number of J.O. participants travelling more than five miles since a higher proportion of Kits. and Tech. participants travel longer distances than those attending J.O. as indicated on Table XIII.

The participants who choose Kits. when the same course is offered at the other two centers, tend to travel short distances. More than half of them live within two miles and 85% live within three miles of the center. This clustering of the participants is clearly evident when the residences are plotted on a map as shown in Illustration 12. Participants from the immediate neighborhood of the center predominate.

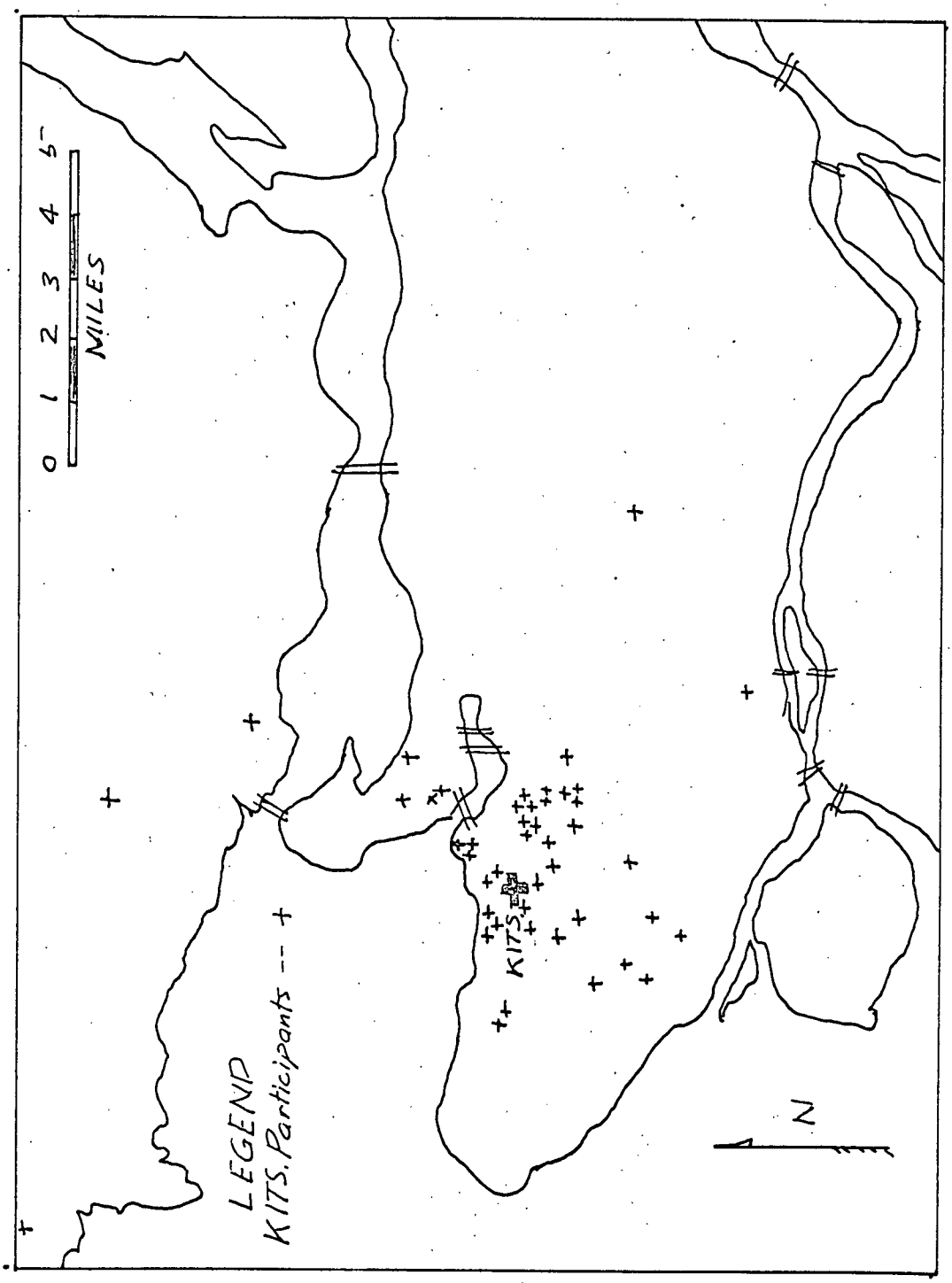
The participants at J.O. also tend to reside close to the center. Half of the Type Three participants live within 2.15 miles of this center, while half of the participants in Type One courses at the same center who had no alternate center in which their course was offered, lived within 3.54

TABLE XIII

DISTRIBUTIONS OF TYPE THREE PARTICIPANTS

	J.O.			Kits.			Tech.		
Ring	N	%	Cumul. %	N	%	Cumul. %	N	%	Cumul. %
1	6	21	21	15	31	31	4	10	10
2	7	24	45	15	31	62	9	23	33
3	3	10	55	11	23	85	6	15	48
4	6	21	76				6	15	63
5	5	17	93	2	4	89	4	10	73
6	1	3	96				2	5	78
7	1	3	99	3	6	95	2	5	83
8							2	5	88
9				2	4	99			
10									
11							4	10	98
Totals	29	100	100	48	100	100	39	100	100

ILLUSTRATION 12
MAP OF TYPE THREE PARTICIPANTS AT KITS.



miles of the center. Thus, if there is no alternative, the participants will travel a greater distance. The map showing the residences of the J.O. participants in Type Three courses is in Illustration 13. Illustration 14 shows the map of Type Three participation at Tech.

By comparing the distributions of the residences of Type One participants, shown in Illustration 11 with those of Type Three participants as shown on the map in Illustration 15, the tendency of Type Three participants at Kits. to cluster around that center is evident since the Type Three participants at the other two centers are more widely scattered; however, the Type One participants for all centers are even more widely and evenly spread throughout the city and adjoining areas than the Type Three participants of all centers.

Since the city of Vancouver and the municipality of Burnaby form the geographic core of the metropolitan area, and since the J.O. distribution of distances travelled produced statistical inconsistancies because of the lack of long distance travellers, the patterns of distributions for Type Three courses containing only participants who live in Vancouver and Burnaby were tested. (Table XIV) When the significance of the difference between the means were tested, the results show that the distances travelled to J.O. and Tech. are similar and the distances travelled to Kits. are deviant from the other two centers. (Table XV) This tends

ILLUSTRATION 13

MAP OF TYPE THREE PARTICIPANTS AT J.O.

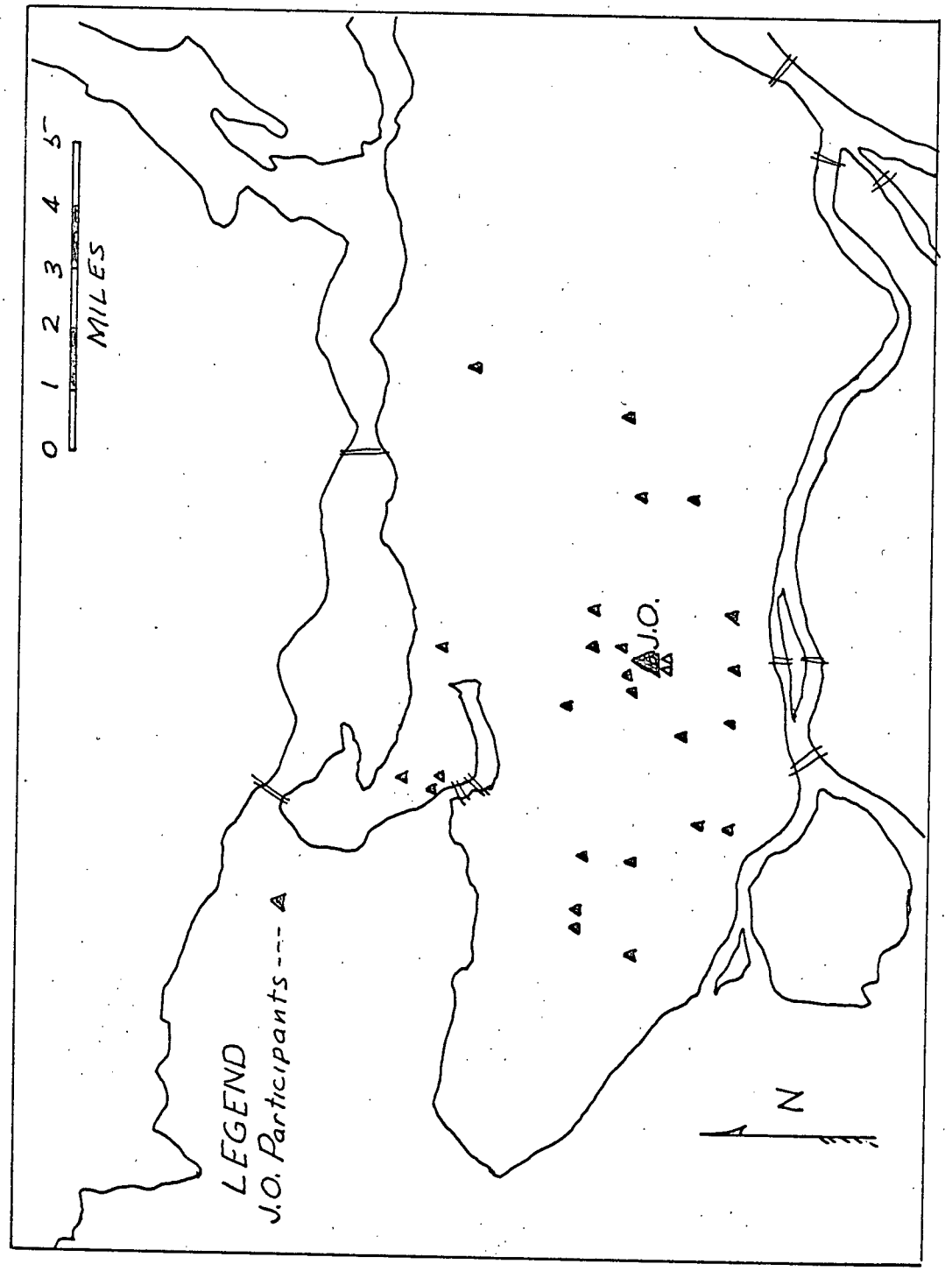


ILLUSTRATION 14
MAP OF TYPE THREE PARTICIPANTS AT TECH.

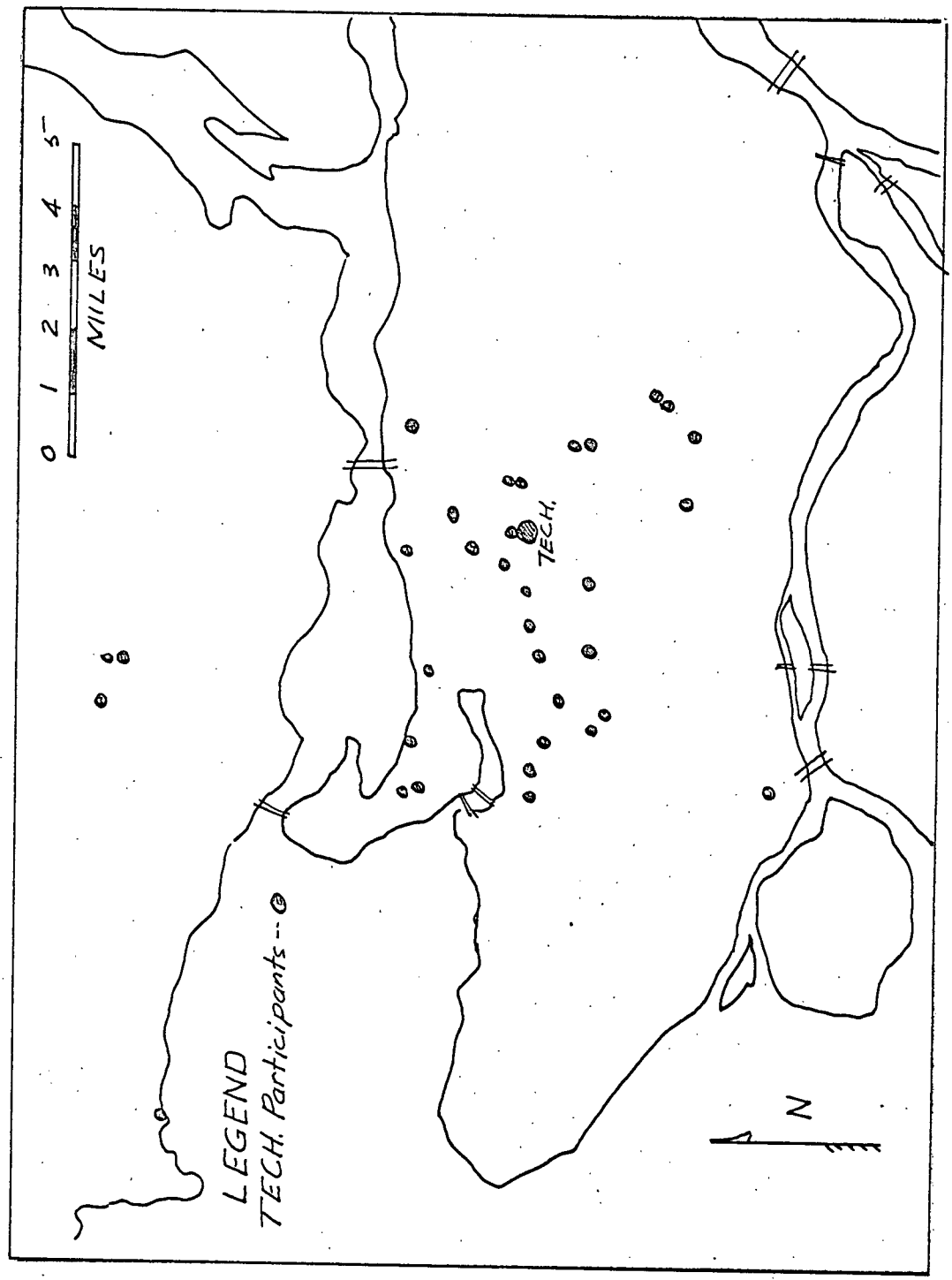
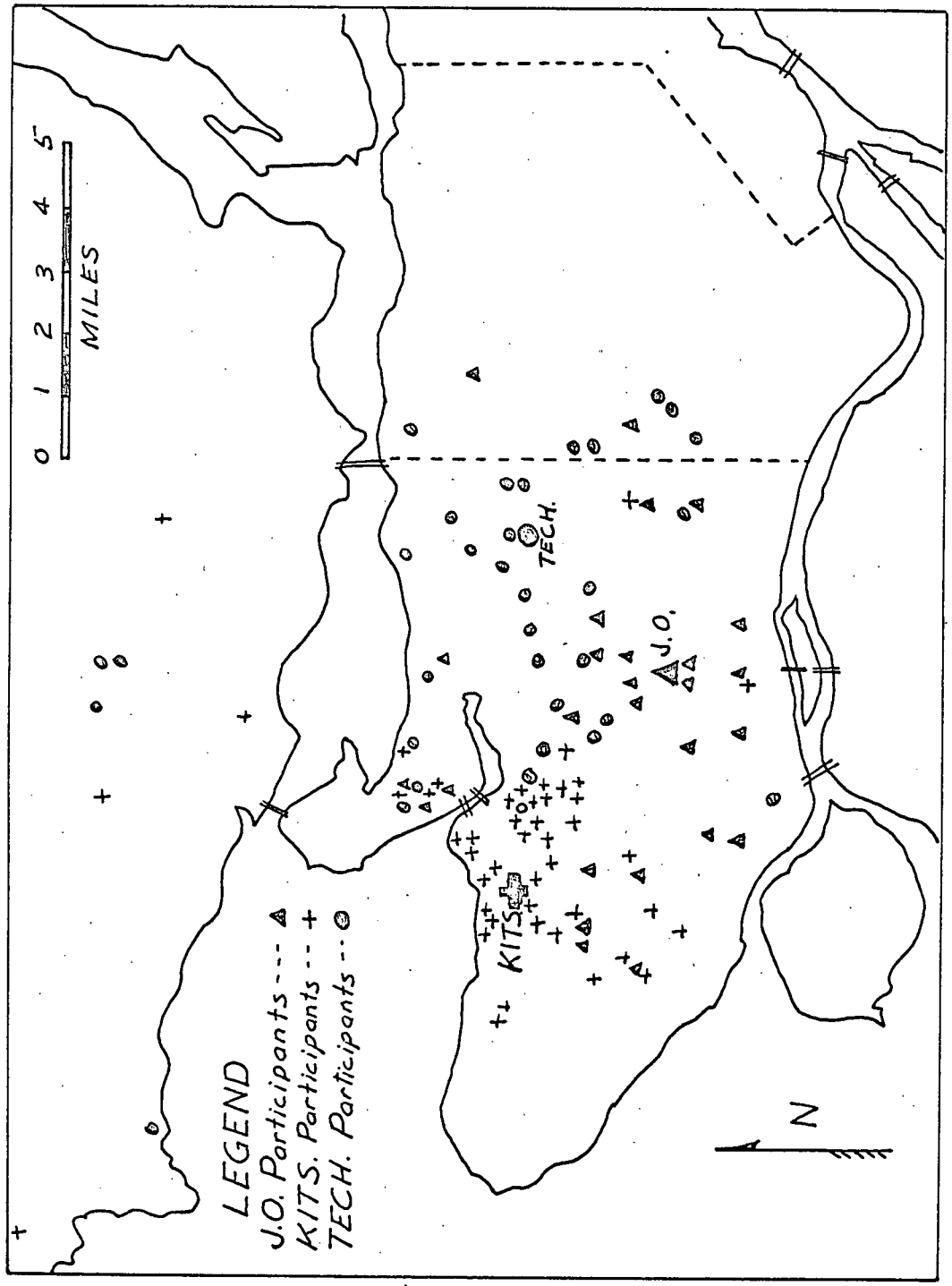


ILLUSTRATION 15

MAP OF ALL TYPE 3 PARTICIPANTS



to confirm the earlier contention that the J.O. pattern is like the Tech. pattern except for participants travelling longer distances.

TABLE XIV

PARTICIPANTS FROM 'CAMERA' AND 'TAX' COURSES WHO RESIDE IN THE CITY OF VANCOUVER OR IN BURNABY

Ring	J.O.	Kits.	Tech.
1	6	15	4
2	7	16	10
3	4	10	6
4	6	0	7
5	4	1	2
6	1	1	1
Total: N	28	43	30
Mean	2.43	1.55	2.37
Median	2.25	1.41	2.17
S.D.	1.49	1.08	1.33

TABLE XV

SIGNIFICANCE OF THE DIFFERENCE BETWEEN MEANS FOR TYPE THREE COURSES VANCOUVER AND BURNABY ONLY

Centers Tested	C.R.
J.O. and Tech.	0.16
Kits. and J.O.	2.68
Kits. and Tech.	2.79

Underlined values are significant at the .01 level of confidence.

MOBILITY

In an attempt to see whether participants attend the night school center which is closest to their residence, the city of Vancouver and the municipality of Burnaby were divided into three geographic zones with a night school center centrally located in each zone. (Illustration 3) These zones were constructed in such a way that any participant who resided in the same zone as the center he attended would be attending the closest center. Participants who attended the closest center were termed non-mobile and those who lived in one zone and attended a center in another zone were termed mobile; thus, mobile participants did not attend the closest center.

Of the total number of Type Three participants attending courses offered at the three centers, slightly more than one-fourth did not attend the closest center and were thus mobile. The percentage of mobile participants varies from center to center. At J.O. 43% of the total sample of Type Three participants in that center were mobile, with 37% at Tech., and only 9% at Kits.

TABLE XVI

MOBILITY OF TYPE THREE PARTICIPANTS RESIDING IN VANCOUVER AND BURNABY ONLY

	J.O.	Kits.	Tech.	Total
Mobile	12	4	11	27
Non-Mobile	16	39	19	74
Total:	28	43	30	101
Percent Mobile:	43%	9%	37%	27%

When the number of mobile participants were tested against the non-mobile in the three centers, the chi-square test showed a difference that was statistically significant at the .01 level of confidence. (Table XVII)

The low percentage of mobile participants at Kits. further substantiates the evidence that Type Three participants at Kits. are closely bunched around the center they attend. The much higher mobility percentages for the

participants at the other two centers indicate that at J.O. and Tech. the participants are scattered more widely throughout the city.

TABLE XVII

CHI-SQUARE TEST ON THE HYPOTHESIS THAT MOBILITY IS INDEPENDENT OF THE CENTER ATTENDED

	Type 1	Type 3
$\Sigma\chi^2$	3.45	<u>11.9</u>

Underlined value significant at the .01 level of confidence.

Although Type One courses were offered at only one center, the geographic dispersal of these participants was tested by using the same procedure. Since 52% of the Type

TABLE XVIII

MOBILITY OF TYPE ONE PARTICIPANTS RESIDING IN VANCOUVER AND BURNABY ONLY

	J.O.	Kits.	Tech.	Total
Mobile	32	19	38	89
Non-Mobile	20	25	37	82
Total:	52	44	75	171
% Mobile	62%	42%	51%	52%

One participants did not travel to the nearest center and since mobility was not associated with the center attended, it was clear that for at least half of the participants distance was not the most important factor in determining their selection of course and center.

SUBJECT MATTER

The subject matter of the course does not seem to be a factor which influences distance except in the case where courses were attended primarily by women. When the influence of subject matter was explored by controlling for the Type of course and the center attended, only the means of two courses, 'Candlemaking' and 'How to Invest Your Money' showed a significant difference.

There were four Type One courses at each center. If center and Type determine the distances travelled to evening classes one would expect the distances travelled to each of the four courses located in the same center to be similar. Four Type One courses at each center were tested using the hypothesis that half the participants in each course would travel a shorter distance than the median for the four courses combined, and half would travel further. The chi-square tests produced no significant difference indicating that this hypothesis should be accepted at all three centers. (Table XIX)

TABLE XIX

CHI-SQUARE TEST ON THE MEDIANS OF THE COURSES IN TYPE ONE

Center	ΣX^2	d.f.
J.O.	6.10	3
Kits.	1.98	3
Tech.	1.48	3

Type Two and Type Three courses, of which there were two at each center, were tested for the significance of the difference between the means. The mean distances travelled to the Type Three courses at each center were not significantly different; however, the Type Two courses offered at Kits. had a significant difference between the means. Thus

TABLE XX

SIGNIFICANCE OF THE DIFFERENCE BETWEEN THE TWO COURSES IN EACH CATEGORY

Center	CR	d.f.
Kits. - 2	2.23*	73
J.O. - 3	.12	27
Kits. - 3	.35	46
Tech. - 3	.80	37

* Significantly different at the .05 level of confidence.

the distances travelled to these two courses were not predetermined by the center attended and by the number of centers offering the same course. It was subsequently noted that one of these Kits. courses, 'Candlemaking', was attended primarily by women.

In order to determine whether the sex of the participants influenced the distances travelled, four distributions were prepared, (Table XXI), one contained participants from courses attended primarily by women; another for participants in courses attended primarily by men; a third for men attending courses containing a mixture of men and women; and a fourth for women in courses containing both men and women. The mean distances travelled were calculated and tested for the significance of the difference between the means. The mean distance travelled by men to courses for men is significantly different from the mean distance travelled by women to courses offered for women. None of the other comparisons are significant.

Apparently, under certain circumstances the sex of the participant is related to the distance travelled. In general, it would appear that women attending class in subject matter oriented to women travel shorter distances than do the participants at other courses. This relationship is not clear cut and more research is needed to clarify the relationships between rate of participation, distance travelled and the sex of the participant.

TABLE XXI

SEX AND DISTANCE TRAVELLED

Courses	Participants	Mean Distance	Standard Deviations
Men only	80	4.32	3.78
Women only	55	2.7	3.16
Men in mixed	255	3.8	3.06
Women in mixed	302	3.5	2.96

SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS

Courses	CR
Men only - Women only	<u>2.70</u>
Men mixed - Women mixed	.86
Men only - Men mixed	1.90
Women only - Women mixed	1.10

Underlined value significant at the .01 level of confidence.

ATTENDANCE AND DISTANCE

Although attendance is not directly related to enrollment, it seems that once an adult enrolls in a course the distance he must then travel does not influence his subsequent attendance. The percentage of sessions attended and the distance travelled was correlated for all participants residing within ten miles of the center they attended. The resultant correlation of -.075 was not significant. Although no statistical tests were made, it would seem that the percentage of participants with perfect attendance does not decrease as distance from the center increases. (Table XXII) Thus there appears to be no relationship between the distance a participant travels and how many sessions he attends.

LOCATION OF CENTERS

The decision to open new night school centers that have a reasonable chance of survival is one of the responsibilities of the night school administrator. The analysis of J.O., Kits. and Tech. indicates that participants tend to travel relatively long distances to attend night school. On this basis it would seem that a relatively small number of centers can adequately serve the central city. Lee concluded that the rate of participation at English University

TABLE XXII

PERFECT ATTENDANCE AND DISTANCE TRAVELLED

Ring	Total Students	Students with Perfect Attendance	Percent with Perfect Attendance
1	99	47	47
2	152	56	37
3	106	39	37
4	88	24	27
5	80	20	25
6	46	13	28
7	46	7	15
8	24	8	33
9	18	9	50
10	10	2	20
Total	669	225	34%

Extension courses did not decline appreciably within two and one-half miles of the center where the courses were located. Since more participants tend to travel between one and two miles to attend Vancouver night school than from any other interval, it seems likely that participation within two miles of the three centers studied is close to the optimum level.

This suggests the hypothesis that new centers opened within two miles of an established center will be less likely to survive. To examine this hypothesis, the three centers studied were plotted on a map of the city and a circle with a radius of two miles was drawn to scale around each center as shown on Illustration 3. King George night school is located outside the three circles and in the six years previous it has had at least 800 participants. Point Grey night school, like King George, has been in operation since before 1950. During the past six years enrollment in that center has reached a high of 1800 and has not dropped below 900. Although the Point Grey center is slightly less than two miles from Kits. it is adjacent to the south-west corner of the city which is not within any of the circles. Churchill night school seems to have been sharing this south-west corner of the city with Point Grey for the past six years and has been averaging 500 participants per year. Churchill lies just within the J.O. circle. A night school was opened in the south-east corner of the city at Killarney

in 1962 but participation has subsequently dwindled from an original 600 to a present 300 participants. Although Killarney is not within any of the two mile circles, the area remaining outside the circles but inside the city may not be sufficient to enable it to survive.

The centers mentioned thus far are either well established or seem at least to have some chance of surviving; however, the other centers which have been opened since the early fifties have either ceased or their closure seems imminent. Byng, Brittania and Gladstone centers were opened and subsequently closed in the early fifties and all three lie within one of the two mile circles. Thompson, within one and one-half miles of both J.O. and Killarney, was opened in 1962 and, not surprisingly, seems to be in the process of closing for lack of participants. Templeton, opened in 1964, has had very light enrollment in general courses but the courses in learning to speak English have had considerable enrollment from the Italian ethnic group in the immediate vicinity of the center. Thus, Templeton may indicate that there are other factors to be considered which are not predictable from considering only its proximity to the well established centers.

The record of the opening of new centers in Vancouver during the fifteen year period subsequent to 1950 seems to indicate that a new center opened within two miles of a large well established center has little chance of establishing a large enough clientele to contribute appreciably to the total night school enrollment in the city.

CHAPTER IV

SUMMARY AND CONCLUSIONS

SUMMARY

The problem of voluntary participation by adults at evening classes has been widely studied. Distance is one factor influencing enrollment which is often mentioned, however, the distance travelled to Public School Adult Centers has not previously been studied specifically. This study compared the distances travelled to three large urban night school centers. A sample consisting of twenty-two courses was selected from the 1962-1963 evening class program of the Vancouver night school system.

The straight line distances between the residence of each participant and the center attended was computed and arranged in distributions for comparison.

The results showed that when all 486 participants were considered, 50% travelled less than 2.8 miles, 95% travelled less than 9 miles, and under 1% travelled more than 14 miles. More participants travelled from between one and two miles than from any other interval.

The chi-square test indicated that when courses were offered at one center only there was no association between the center attended and the distance travelled. When courses

were offered at two of the three centers the chi-square test again indicated there was no relationship between the night school center attended and the distances travelled. For these courses, however, some doubt exists about the validity of this conclusion because two of the courses involved were attended predominantly by women.

When courses in the same subject matter were offered in all three centers there were significant differences between the distances travelled to the various centers. At the Kitsilano Night School the participants were closely bunched around the center. At this center 50% of the participants travelled less than 1.6 miles and 85% travelled less than three miles. On the other hand, the distances travelled to the same courses at John Oliver Night School and Technical Night School were not significantly different from each other. Of the participants who could get the same course at these two centers 50% travelled less than 2.5 miles at J.O. and half travelled less than 3.1 miles at Tech.

Participants would seem to travel from throughout the city of Vancouver to attend J.O. and Tech. The participants at Kits., however, travel from throughout the city to attend courses available only at Kits., but when the course is available at all three centers, the Kits. participants come mainly from the immediate neighborhood of the center.

CONCLUSIONS

DIFFERENCES BETWEEN CENTERS

The patterns of distances travelled to a night school course would seem to depend upon where courses are located. As the number of centers offering the same subject matter increase, the travel patterns tend to vary more from center to center. The distances travelled to courses offered in one center only tend to be the same at all centers. However, when courses are offered in three centers, travel patterns differ from center to center. These generalizations are based upon the analysis of three large successful centers. The travel patterns to small and newly opened centers may well differ from those considered in this study. Although course locations seem to determine travel patterns, courses attended predominantly by women seem to be an exception. Women travel shorter distances to courses offered for women. This might be expected since the commuting studies of Adams, MacKesey and of Taaffe, Garner and Yeates indicate that women travel shorter distances to work than do men.

AREA SERVED

The area served by a night school center is delineated by the residences of its participants. Since these participants tend to reside in widely scattered areas of the

municipal complex the area served by night school centers cannot be marked by finite boundaries shown on a map, however, well established centers tend to have the highest participation rates from within a two mile radius. New centers opened within two miles of existing well established centers have trouble attracting and maintaining clientele.

The area served by a given center is not the same for all courses given at that center. This tendency is very strong at some centers and not statistically significant at others. The size of the area served is probably increased by scheduling courses in a subject on different nights of the week in different centers. Many participants did not attend the closest center offering a course and for many participants this undoubtedly occurred so that they could attend on a convenient night of the week. There is every reason to suppose that the procedure of locating courses in the same subject in different centers and on different nights of the week helps to increase participation. This question, however, should be studied so as to control the influence of the night of the week on distance and participation.

The areas served by night school centers overlap and are in turn overlapped by the area served by University Extension courses. Melton found that the area served by extension courses which were also offered by the public school centers was the same as the area served by courses

offered only by the Extension Department. Thus, participants are attracted to classes conducted by both the Extension Department and the public school from throughout the central urban area. Since Brunner indicates that Extension participants generally have a higher socio-economic status than public school participants, the extent to which the two institutions compete for the same clientele is difficult to assess.

DISTANCE AND ENROLLMENT

The distance participants must travel to obtain courses is a variable within the control of the night school administrator who can reduce the necessary travel distances or hold the courses in few centers and force participants to travel further. The tendency for participants to be widely spread would seem to indicate that a small number of centers could serve urban areas adequately. Although not indicated here, different centers may attract different kinds of participants which would introduce different factors influencing participation than distance alone.

BOUNDARIES AND PARTICIPATION

Dent concluded that rural municipal boundaries were barriers to participation in rural farming communities, but the large number of suburban participants who travel to

night schools in the central city indicate that municipal boundaries do not act as a barrier to participation in the urban setting. It may be that the suburban participant loses his reluctance to travel to the central city since he commutes to work there.

One might expect participants of higher socio-economic status to attend centers in high socio-economic areas and participants of lower socio-economic status to feel more welcome at centers in those areas but these tendencies are not evident here.

DISTANCE AS A BARRIER TO PARTICIPATION

Since the number of participants per mile interval decreases as distance from each center increases one might conclude that decreasing participation is caused by increasing distance; however, there are good reasons for not accepting this conclusion. Melton found that at some centers there was no significant difference between the distances travelled to courses offered at that center only and courses also offered at alternate centers. If participants considered distance to be the prime factor they should have chosen the closest center. If distance were a barrier to participation Lee would not have found uniform participation rates within two and one-half miles of the center he studied. The maps in this study tend to show scattered participation rather than gradually decreasing participation. It would

seem that within the central city distance is a barrier to only a few participants.

The fact that number of sessions attended by participants who travel as far as ten miles is not less than the number of sessions attended by participants residing in the immediate vicinity of their center indicates that for those who enroll, distance is not subsequently a barrier.

BIBLIOGRAPHY

Adams, Leonard P., and Thomas W. MacKesey. Commuting Patterns of Industrial Workers. Ithica: Cornell University Press, 1955.

Booth, Alan. "A Demographic Consideration of the Non-Participant," Adult Education, XI (Summer, 1961), 223-229.

Brunner, Edmund deS., et al. An Overview of Adult Education Research. Chicago: Adult Education Association of the U.S.A., 1955.

Cartier, A.L. "Public School Adult Education," Journal of Education of the Faculty of Education of the University of British Columbia: Vancouver, X (April, 1964), 29-35.

Dent, William J. "An Exploratory Study of the Distances Which Farmers Travel To Attend Various Types of Educational Activities Dealing With Agricultural Production." Two Hills: Agricultural Extension Service, 1965. (Unpublished)

Dominion Bureau of Statistics. 1961 Census of Canada, Population and Housing Characteristics by Census Tracts: Vancouver, Bulletin CT-22. Ottawa: Queen's Printer, 1963.

Garrett, Henry E. Statistics in Psychology and Education. Fifth edition. New York: Longmans, Green and Co., 1958.

Kaplan, Abraham Abbott. Socio-Economic Circumstances and Adult Participation. Teachers College Contributions to Education, No. 889. New York: Teachers College, Columbia University, 1943.

Lee, Terence. "A Null Relationship Between Ecology and Adult Education," The British Journal of Educational Psychology, XXXVI (February, 1966), 100-102.

Lindenberger, Alice, and Coolie Verner. "A Technique for Analysing Extension Course Participants," Adult Education, XI (Autumn, 1960), 29-34.

Marble, Duane. Predicting Evening Class Registration Potential In Small Areas of the Seattle Metropolitan Area. Seattle: University of Washington Bulletin, 1959.

Melton, James. "The Influence of Alternate Course Locations On Distances Travelled By Participants In Urban Adult Evening Classes." Unpublished Master's thesis, The University of British Columbia, Vancouver, 1966.

Selman, Gordon R. "University Extension 1915-1963," Journal of Education of the Faculty of Education of the University of British Columbia: Vancouver, X (April, 1964), 17-25.

Smith, G. Milton. A Simplified Guide To Statistics. Third edition. New York: Holt, Rinehart and Winston, Inc., 1962.

Taaffe, Edward J., Barry J. Garner, and Maurice H. Yeates. The Peripheral Journey To Work. Evanston: Northwestern University Press, 1963.

Van Dalen, Deobold B. Understanding Educational Research. New York: McGraw-Hill Book Company, Inc., 1962.

Verner, Coolie, and George S. Davis, Jr. "Completions and Drop Outs: A Review of Research," Adult Education, XIV (Spring, 1964), 157-175.

Wales, Bertram Edwards. "The Development of Adult Education In British Columbia." Unpublished Ed.D. thesis, Oregon State College, Corvallis, 1958.

Wingo, Lowdon Jr. Transportation and Urban Land. Washington: Resources For the Future Inc., 1961.