C H A P T E R V

EXPERIMENTAL VALIDATION OF THE STRATEGIES

5.0 INTRODUCTION

This chapter presents the methodological details and outcomes regarding objective-4 through which the instructional strategies developed earlier as reported in the previous chapter were experimentally tried out and validated for effectiveness. The achievement scores of students learning through the strategies were compared with that of the students learning through radio alone, by applying suitable statistical techniques wherever needed. The reactions of the students towards the strategies and the reactions of the teachers towards the implementation of the strategies were analysed qualitatively. Objective-4 is stated as follows :

(A) To compare the effectiveness of the developed instructional strategies with the radio broadcast alone experimentally in terms of students' achievement on criterion tests.

(B) To study the reactions of :

(i) students towards the strategies and

(ii) teachers towards the implementation of the strategies.

The methodological details and outcomes of objective 4(A) and 4(B) are presented below under Section-I and Section-II respectively.

SECTION-I

5.1 EFFECTIVENESS OF THE STRATEGIES

5.1.1 The Hypothesis

The hypothesis concerning objective 4(A) stated in Chapter-I reads as :

Students undergoing the developed strategies will perform better than those who undergo the SBP alone, on the criterion test given.

In operational terms it can be stated in a more specific form in the following manner.

The means of the achievement scores of the students undergoing the developed strategies will be significantly greater than those of the students undergoing SBP alone.

This hypothesis has been formulated since the developed strategies were, in effect, the improvements done to the existing SBPs. Several media were selected and structured on the basis of logical considerations and they, in turn, formed components of the pre-broadcast, broadcast and post-broadcast activities

of the strategies. Therefore, to expect greater effectiveness on the part of the developed strategy in comparison to the SBP alone is justified. However, this generates a question that if the strategies were more effective than the SBPs alone, then how much more effective were they. Therefore, the procedure of the experiment would include measures to analyse the mean differences further if they were found to be significant.

5.1.2 Experimentation

Objective-4 was studied purely on the basis of the results obtained through a series of experiments. The following pages give the detailed description of the experiment with respect to the design, sample, treatments, tools, procedure and the statistical techniques employed.

5.1.2.1 Design

Before selecting the design of the experiment, the following issues were considered.

(i) There were 16 experiments to be conducted on 16 independent school broadcast programmes.

(ii) Experiments were to be conducted in the real classroom situation for a long period without disturbing the school schedule.

(iii) Two treatments i.e., SBP with strategy and SBP alone were to be compared. There were two possible ways of administering

the two treatments i.e. (1) on one group and (2) on two groups. If the treatments were administered on one group, it would not have been methodologically sound because of the carry over effects. Administering the treatment, SBP alone first and then giving the treatment of SBP with strategy is not possible because the strategy had the components of pre-broadcast and post-broadcast activities where the pre-broadcast activities were to be done earlier to the presentation of SBP. Therefore, two groups were necessary for administering the two treatments. These two groups were to be selected from the same school because of the investigator's convenience and administrative cooperation required for conducting the study. Besides, this would control so many intervening variables which would otherwise influence the two groups differently. There was a need to have both the groups equivalent by way of random allocation or matching. Random allocation was not possible because of administrative constraints. If matching was to be done, sustainence of the equivalence of the groups requires the number of students to remain constant throughout the experimentation. In the beginning, it could have been possible to have equivalent groups by matching them. But, as the experiment was to be conducted over a long period which extended to 16 experimental sessions on young children (Age group 12+), it was thought that due to various reasons all the children in those groups may not come to the school every day and attend all the experiments. It was not possible on the part

of the investigator to have control over this situation. Therefore, it was thought that the number of students in each of the group might vary in different experiments. Even then, equivalence could have been brought by eliminating some of the extreme cases from among the students who attended all the programmes. But due to irregular presence of students, this number would have been reduced to a large extent which would have stood in the way of using suitable statistical techniques while analysing the result, as well as affecting the economy of efforts. Moreover, elimination of some students was not thought proper as each member of the group has some contribution to the mean achievement of the group while interacting with each other in various situations of the experiment. So all the students present in each of the experiment were to be considered for the comparison of the achievement scores.

(iv) In the same school, giving two different treatments to two groups continuously for a long period would have brought some dis-satisfaction among the students who were selected to learn through SBP alone, because, the other group was to come across projected pictures and other interesting techniques in the process of learning through the developed strategies. So both the treatments were to be given to both the groups.

With all the above considerations, it was decided to evolve a design which would take care of the issues discussed above. To give the treatments to both the groups alternately for successive experiments was the only seemingly possible

approach. The counter balanced design was thought to be befitting in this case and hence adopted.

Counter Balanced Design

When random assignment of students is not possible and intact classes must be used, counter balanced design may be employed to overcome some of the weaknesses in non-randomised control group design. This counter balanced design which is also known as a "rotation", "crossover" or "switchover design" is most commonly used when a limited number of subjects is available, no pre test is given, and more than one variation of experimental treatment (X) is treated (Van Dalen 1962).

Under the purview of counter balanced design come all of those designs in which experimental control is achieved or precision enhanced by entering all respondents (or settings) into all treatments. Such designs have been called "Rotational Experiments" by McCall (1923), "Counter Balanced Design" by Underwood (1949), "Crossover Design" by Cochran & Cox (1957) and "Switchover Design" by Kempthorne (1952).

This design introduces a control where the groups are not equivalent in all respects. It could be suspected that variables like listening comprehension, intelligence and academic achievement may intervene in influencing the level of achievement in this experiment. This counter balanced design rotates or cancels out these initial subjects' differences and hence attains

a kind of group equation. (Van Dalen 1962).

In a counter balanced design each group of subjects is exposed to each treatment at different times during the experiment. During the first exposure if group A is exposed to treatment-1 (T_1) and group B to treatment-2 (T_2), during the second exposure group A is exposed to T_2 and group B to T_1 as illustrated below :

	Time 1	Time 2
Group A	T_1	T_2
Group B	T_2	T_1

In the current experimentation, it was proposed to study the effectiveness of the two treatments in urban as well as rural situation. As discussed earlier in Chapter -IV, students in the urban areas might be coming across different sophisticated equipment and materials, modern techniques of teaching, better physical facilities etc.; their perception as well as acceptance of SBP may differ from that of the rural children. Because of modernisation, an urban child is exposed to a variety of materials and people. His way of life is different from that of a rural child. Because of his constant exposure to mass media like newspapers, radio, television and films he gets new knowledge everyday. The knowledge that an urban child gets may become outdated by the time it reaches the rural pupils. So there may be a variation in getting benefit of

SBP among rural and urban students. Taking this into consideration it was decided to conduct the experiments both in urban and rural situations. So the final design of the experiment was as described below.

Two sets of experiments were to be conducted in urban and rural situations, one being the replication of the other. In each set, two groups of students from Grade-VII were to be selected. Two treatments, SBP integrated into strategy and SBP alone, were to be administered on both the groups alternately for each programme. Sixteen school broadcast programmes, four each from the subjects Oriya, History, Geography and General Science were to be administered to study the effectiveness of the treatments. In case of each subject, one group was to be exposed to 2 programmes through the strategies and the other 2 through SBP alone. The following table shows the design proposed for conducting the experiments in respect of each subject.

Table 5.1
Design for the Experiments

	G_1	G_2
SBP_1	T_1	T_2
SBP_2	T_2	T_1
SBP_3	T_1	T_2
SBP_4	T_2	T_1

T_1 and T_2 are the treatments,

G_1 and G_2 are the groups of subjects, and

SBP_1, SBP_2, SBP_3, SBP_4 are the school broadcast programmes in a particular subject.

The statistical technique of analysis of variance was to be used to find out the significance of difference between means of students' achievement on the criterion tests given.

The strategy which is one of the treatments is actually an improved presentation of the SBP which forms the other treatment. So whatever increase of mean the group learning through the strategy will achieve, actually represents the increase of achievement brought about by bringing in the improvements in the SBP use. Therefore, it was proposed to find the percentage increase of mean using the formula $\frac{M_1 - M_2}{M_2} \times 100$ where M_1 and M_2 are the mean achievements of the groups learning through the strategy and the group learning through SBP alone respectively. This actually answers the question generated under caption 5.1.1.

5.1.2.2 Sample

The experiment required two schools, one urban and one rural, from where the subjects were to be selected. Orissa Textile Mills High School Choudwar (urban) and Salipur High School (rural) were selected for the purpose.

Method of Selection: Before selecting the schools, the investigator paid personal visits to a number of schools belonging

to urban and rural areas of Cuttack and Bhubaneswar. As only a few schools were utilising SBP in real classroom situation in those areas, the investigator's selection was limited. Considering the listening background of students in respect of SBP, administrative cooperation required for the study and availability of sufficient number of students in Grade VII, the schools were selected for the study. The O.T.M. High School which is established by the Orissa Textile Mills is situated a few yards away from Cuttack-Sambalpur Road, and at a visible distance from Howrah-Madras railway track. It is surrounded by Orissa Textile Mills, Choudwar College, Orissa Paper Mills, Kalinga Tubes, Airforce Research Centre, Charbatia Aerodrome and many other Government and private offices, educational institutions, etc. The children enrolled in the school come from varied socio-economic backgrounds, ranging from labour class to the highly placed officers and business community. Considering all these backgrounds, O.T.M. High School was taken as the urban sample. The Salipur High School which was taken as the rural sample is situated on the Cuttack-Pattamundai Road which runs parallel to the river Chitrotpala only a quarter mile away from it. The school is surrounded by agricultural lands and a good number of villages nearby. There are a few Government Offices, a Primary Health Centre, a Degree College, near by the school and the place is well known for its agricultural products like paddy, jute, vegetables, etc. Students attending the school, come from the nearby villages where farmers live in large numbers. The urban and rural

schools were at a distance of 33 Kms from each other. Both are having public transport facilities from the city of Cuttack.

After the selection of the schools sampling of subjects and the content units was required. The selection of students are discussed under the term subjects.

Subjects

(i) Students: In both the schools, two sections each were selected out of the many sections available in each school. It was decided to include all the students of the selected sections as the subjects of the experiment. Table 5.2 below gives a description of the sample taken for the experiment.

Table 5.2
Number of Students Taken for the Experiment

	School	No.of Students in Section A	No. of Students in Section B
1	Salipur High School (Rural)	45	39
2	O.T.M. High School (Urban)	43	42

(ii) Content Units: Sixteen school broadcast programmes for Grade VII, four each in Oriya, History, Geograpy and General Science (described in Chapter-IV) broadcast during the first term of 1978-79 academic year were included in the experiment. Each programme was independent and unique in terms of its content and

way of presentation. All of them belonged to the curricular units prescribed in the syllabus. These content units were selected by the Educational Broadcasting Unit of the A.I.R, Cuttack and the programmes were prepared by commissioning expert teachers.

5.1.2.3 Treatments

The objective required comparison of the strategies developed for effective utilization of SBP with the SBP alone. So the treatments were termed as :

SBP with strategy - Treatment-1 (T_1)

SBP alone - Treatment-2 (T_2)

Treatment-1 is the combination of various instructional techniques like discussion, role playing, visuals, team teaching etc. with the SBP. These were additional activities done in the classroom along with the programme presented through the broadcast. SBP and these activities constituted the instructional strategy. Each strategy had the components of pre-broadcast, broadcast and post-broadcast activities which includes the techniques described earlier in Chapter IV (Table 4.1). Treatment-2 was the SBP alone which involved the students in only listening to the programme.

5.1.2.4 Tools

Modified form of the 16 criterion tests on the SBPs described in Chapter IV were used to measure the achievement of the students after going through the treatments.

5.1.2.5 Procedure for Experimentation

Planning: For conducting the experiment the following preparations were made in advance in both the schools taken for the experiment :

1. Orientation to teachers
2. Class arrangement
3. Instructions to students for effective listening in the new situation.

1. Orientation to Teachers: The investigator, after selecting the schools paid visits at regular intervals and met the headmasters and teachers to discuss matters like availability of listening room, necessary equipment, maps and charts etc. in connection with the experiment. Like the try-out phase, subject teachers were selected on the basis of their co-operativeness, competency in teaching, skill of interacting with students, ability in controlling the class etc., which are necessary for effective classroom teaching. They were informed about the details of the pre-broadcast, broadcast and post-broadcast activities planned for the experiment, in meetings chaired by the headmasters of the respective schools. After discussing the general nature of the experiments, the investigator met the individual subject teachers and handed over the packages of the programmes. The details of the pre-broadcast, broadcast and post-broadcast activities needed to be done for each of the programme were explained to them. They were also instructed

about the use of different techniques like question-answer, roleplaying, team teaching, field trip etc. given in different packages. For arousing interest and getting active participation from the students they were told to ask thought provoking questions and give examples relating to the students' day to day life. They were finally requested to go through the materials of the packages carefully and conduct the experiment accordingly. The investigator also met the students in their classrooms a number of times for establishing rapport with them.

2. Class Arrangements: The school authorities provided separate classrooms on request where the arrangement was made for the conduct of the experiment. In both the schools, the classrooms provided had sufficient ventilation and were free from external disturbances. As they were regular classrooms, they had blackboards and other furniture required for functioning of a normal classroom. For projection of slides the rooms were made semi-dark by putting curtains and pasting opaque papers on the window panes and skylight of the rooms respectively. Acoustics of these classrooms were also tested by providing sound at various pitches. All other materials and equipment like chalk sticks, dusters, pointer, slide projector, tape recorder with the recorded form of SBP, amplifier etc. were kept ready. These were checked thoroughly before the start of experiment. The sitting arrangements were done in a slightly different way from the normal classroom arrangement for

facilitating effective listening and discussion in the broadcast and post-broadcast sessions respectively. This was done in conformity with the observations made in respect of sitting arrangement in the tryout phase.

3. Instructions to Students: As in the tryout phase, the students were brought to the listening room and were instructed on how to listen to the programmes, take part in the discussion, take criterion test and maintain other formalities required for effective listening. The visibility of the blackboard, projected pictures and the audibility of the programmes were tested by enquiring from students sitting at different places. This was done prior to the experiment in both the schools for the four groups proposed to be taken as the subjects in the experiment.

5.1.2.6 The Experiment

For sixteen broadcast programmes, sixteen strategies described in the previous chapter were administered through sixteen experiments where each one was unique in its own way due to the variety of components involved in each of the programme. All these sixteen experiments conducted in the rural situation were replicated in the urban set-up. So altogether thirty-two experiments were conducted. All the procedures concerning the experiment viz. conduct of activities and administration of criterion tests followed in the tryout phase of the strategy

development (described in Chapter IV) were also adhered to while conducting the experiment. As the same broadcast programmes (programmes taken for the study) were not available from A.I.R, in the 1979-80, academic session, tape recorded programmes of the SBPs were administered through a tape recorder for conducting the experiments. This was the only way possible for administering the strategies in two different settings. A radio set having the built-in mechanism was used to amplify the sound of the programmes. In this process only the output jack of the tape recorder had to be joined to the input jack of the radio. By this arrangement of using recorded programmes through a radio, a psychological feeling was created among the students that they were listening to the radio. Also the use of tape recorder was convenient for adjusting time to conduct pre-broadcast, broadcast and post-broadcast activities.

The experiment started for Oriya programme No.1 (Satyara Pujari Acharya Harihara) with experimental group-1 learning through the developed strategy (T_1) and the experimental group-2 through the radio broadcast alone (T_2). Both the groups were brought to the listening room in two successive periods and were given the respective treatments. In respect of treatment-2 (SBP alone) the group was only allowed to listen to the radio in the same process, and the criterion test was administered the next day. The second programme of the Oriya series i.e. 'Paribartan', the experimental group-2 was made to learn through the strategy and the experimental group-1 to learn through the SBP alone and the

criterion test was administered. In this way, the groups were rotated for alternate experiments conducted for the subjects Oriya, History, Geography and General Science. The original sequence of the programmes followed by A.I.R. in the previous year was slightly modified so that both the groups receive equal treatments in every subject. The following was the sequence of the programmes taken for the experiment.

Table 5.3
Sequence of the Programmes

	O_1	G_1	H_1	S_{c1}	G_2	H_2	S_{c2}	O_2	H_3	S_{c3}	O_3	G_3	S_{c4}	O_4	G_4	H_4
G_I	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
G_{II}	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1

T_1, T_2 are the treatments,

G_I, G_{II} are the groups of subjects,

O_1, O_2, O_3, O_4 are the programmes on Oriya,

H_1, H_2, H_3, H_4 are the programmes on History,

G_1, G_2, G_3, G_4 are the programmes on Geography,

S_{c1}, S_{c2}, S_{c3}, S_{c4} are the programmes on General Science.

In all it took twelve weeks to conduct the experiment in each school. The experiment was first conducted in the rural school and on its completion, it was carried out in the urban school. This was done only for the sake of convenience of the investigator to remain present in both the situations.

The photographs in the following pages show some of the situations where the teachers and students were involved in the various activities.

1 Students Proceeding Towards Listening Room

2 A Situation of Synchronisation of Projected Visuals with the Broadcast

3 A Situation of Role Playing in the Classroom

4 Demonstration of Skeleton Model During the Broadcast

5 Teacher Conducting a Quiz Session

7 Students Appearing at a Criterion Test

6 Students Engaged in Small Group Discussions on a Field Trip

5.1.2.7 Analysis and Interpretation

On the completion of the experiment in both the schools, the criterion tests were scored and the achievement of the students who learnt through the strategies and that of those who learnt through radio broadcast alone were recorded separately for different programmes. (Appendix-IX) They were analysed by applying the techniques of Mean, S.D., Percentiles and Analysis of Variance.

5.1.2.7.1 Means, Standard Deviations and Percentiles

The means, SDs and the percentiles were calculated in terms of percentages for both the treatments in respect of each SBP. Table 5.4 and 5.5 show the Means and SDs, and Percentiles respectively in respect of each SBP. By using the percentile scores, the graphs in the following pages were plotted to study the nature of students' achievement.

Table 5.4(A)

Mean Percentage Scores and Their Standard Deviations (Urban)

Subjects	Group Which Learnt Through the Strategy (T_1)				Group Which Learnt With Radio Alone (T_2)		
	Sr. No. of Pgm.	Group	Mean (M_1)	S.D.	Group	Mean (M_2)	S.D.
ORIYA	O_1	U_1	62.48	16.30	U_2	48.42	13.78
	O_2	U_2	61.14	9.94	U_1	49.42	10.66
	O_3	U_1	74.36	8.38	U_2	67.94	12.66
	O_4	U_2	74.06	9.68	U_1	49.82	13.52
HISTORY	H_1	U_1	67.17	11.55	U_2	57.2	8.07
	H_2	U_2	66.30	8.32	U_1	54.14	10.22
	H_3	U_1	46.4	7.63	U_2	32.95	8.5
	H_4	U_2	59.84	14.82	U_1	47.62	12.02
GEOGRAPHY	G_1	U_1	42.68	9.40	U_2	33.58	10.54
	G_2	U_2	61.52	10.44	U_1	51.42	13.40
	G_3	U_1	64.54	8.80	U_2	38.92	8.52
	G_4	U_2	63.46	10.72	U_1	47.86	11.48
GENERAL SCIENCE	Sc_1	U_1	61.04	16.00	U_2	48.36	9.66
	Sc_2	U_2	54.90	14.10	U_1	45.76	14.72
	Sc_3	U_1	72.94	6.42	U_2	51.38	11.02
	Sc_4	U_2	61.78	11.56	U_1	42.94	9.16

U_1 and U_2 are the groups experimental-1 and experimental-2 in the urban school.

Table 5.4(B)

Mean Percentage Scores and Their Standard Deviations (Rural)

Subjects		Group Which Learnt Through the Strategies (T_1)			Group Which Learnt With Radio Alone (T_2)		
	Sr. No.of Pgm.	Group	Mean (M_1)	S.D.	Group	Mean (M_2)	S.D.
ORIYA	O_1	R_1	60.34	13.56	R_2	42.00	13.26
	O_2	R_2	67.88	13.60	R_1	57.66	13.96
	O_3	R_1	65.74	12.84	R_2	57.42	9.00
	O_4	R_2	66.34	12.36	R_1	55.00	14.96
HISTORY	H_1	R_1	60.38	13.35	R_2	48.02	15.6
	H_2	R_2	67.08	12.00	R_1	57.62	9.16
	H_3	R_1	43.49	8.27	R_2	32.75	9.88
	H_4	R_2	62.16	10.28	R_1	37.40	9.20
GEOGRAPHY	G_1	R_1	51.16	8.22	R_2	33.26	8.16
	G_2	R_2	56.18	11.58	R_1	42.34	12.72
	G_3	R_1	58.56	8.86	R_2	52.06	9.82
	G_4	R_2	53.16	8.52	R_1	45.90	8.96
GENERAL SCIENCE	Sc_1	R_1	60.50	10.44	R_2	48.14	12.08
	Sc_2	R_2	57.86	8.60	R_1	40.78	11.12
	Sc_3	R_1	61.20	6.72	R_2	49.24	9.78
	Sc_4	R_2	59.06	9.08	R_1	45.20	11.48

R_1 and R_2 are the experimental group-1 and experimental group-2 in the rural school.

Table 5.5(A)

Percentiles in Percentages (Urban)

	Q_1		Q_2		Q_3		Q_4	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
P90	84.50	66.66	76.00	64.00	88.43	83.80	87.00	70.00
P80	77.00	61.00	71.00	59.18	78.74	78.80	83.00	61.50
P70	72.14	56.54	67.50	56.00	77.32	75.20	79.80	56.42
P60	68.62	52.76	64.00	52.80	75.92	71.60	77.40	55.28
P50	65.54	49.00	60.20	49.74	74.50	68.86	75.00	48.50
P40	62.44	44.74	57.76	46.82	73.08	66.28	72.60	45.66
P30	56.50	40.50	54.74	43.92	70.34	63.72	69.66	42.82
P20	53.66	35.86	51.82	41.00	67.50	61.14	65.66	38.60
P10	35.66	31.00	46.82	34.00	61.06	49.00	61.66	31.80
P0	26.00	18.00	42.00	30.00	56.00	32.00	48.00	28.00

	G_1		G_2		G_3		G_4	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
P_{90}	54.20	47.88	75.00	68.36	76.10	50.40	76.90	63.00
P_{80}	50.40	44.00	68.82	64.00	72.10	46.20	73.90	57.00
P_{70}	47.40	40.00	65.66	59.62	68.50	43.62	70.90	53.00
P_{60}	44.86	35.60	62.50	53.00	66.24	41.92	67.80	49.80
P_{50}	42.50	32.00	59.82	48.06	64.00	39.80	64.50	48.80
P_{40}	40.60	28.76	57.60	46.28	61.74	37.28	61.20	45.00
P_{30}	38.70	26.72	55.34	43.68	59.50	34.28	57.42	42.32
P_{20}	36.40	24.68	53.04	41.50	56.20	30.60	52.34	39.66
P_{10}	30.40	21.20	50.50	39.30	52.60	26.24	47.24	39.50
P_0	20.00	12.00	44.00	16.00	50.00	22.00	44.00	20.00

Table 5.5 (A) Continued.

	H_1		H_2		H_3		H_4	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
P_{90}	82.35	65.25	77.74	66.80	57.07	45.00	83.00	64.40
P_{80}	79.35	62.00	74.00	63.80	51.43	41.54	76.00	59.08
P_{70}	75.50	59.87	70.72	61.04	49.58	38.46	68.00	55.12
P_{60}	70.75	57.95	68.8	58.04	47.74	33.69	63.50	50.20
P_{50}	66.25	57.25	66.90	54.20	46.15	30.46	59.60	47.12
P_{40}	61.75	54.55	65.00	51.10	44.77	28.69	51.80	44.64
P_{30}	57.75	51.50	61.50	48.36	43.38	27.49	47.30	41.34
P_{20}	55.45	47.25	58.00	43.80	41.08	26.15	44.52	36.20
P_{10}	52.75	43.00	54.50	38.84	35.54	23.08	41.76	29.94
P_0	50.00	40.00	48.00	36.00	29.23	16.92	40.00	26.00

	Sc_1		Sc_2		Sc_3		Sc_4	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
P_{90}	90.50	61.04	72.56	67.66	81.94	67.20	77.80	55.44
P_{80}	71.20	56.48	70.20	58.14	79.40	62.20	70.60	52.20
P_{70}	67.28	53.64	62.80	52.42	76.86	56.40	67.00	48.60
P_{60}	62.42	50.82	58.46	48.00	74.60	53.20	64.42	44.88
P_{50}	57.88	48.00	55.10	42.00	72.32	50.00	61.84	42.80
P_{40}	54.10	46.60	51.72	39.88	70.30	46.80	59.28	40.74
P_{30}	50.32	42.66	45.20	35.44	68.60	43.80	56.08	38.28
P_{20}	46.24	40.20	39.22	31.00	66.90	41.04	52.80	33.72
P_{10}	42.00	35.60	35.10	26.00	65.02	37.80	49.54	29.80
P_0	36.00	28.00	32.00	22.00	60.00	34.00	38.00	26.00

T_1 - Percentiles for the group which learnt with strategy.

T_2 - Percentiles for the group which learnt with SBP alone.

Figure: 8 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2): Urban O1

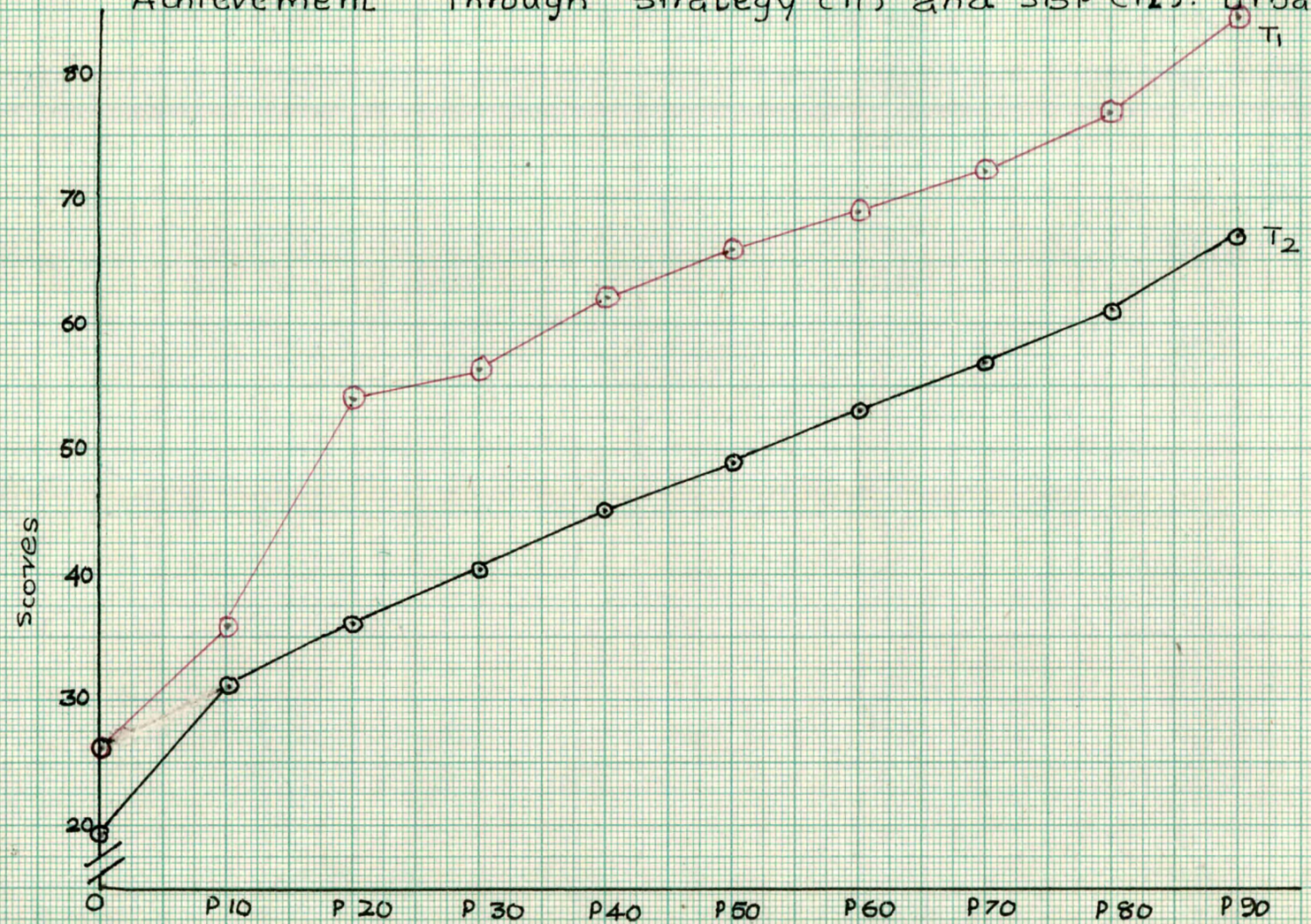


Figure: 9 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2) : Urban O_2

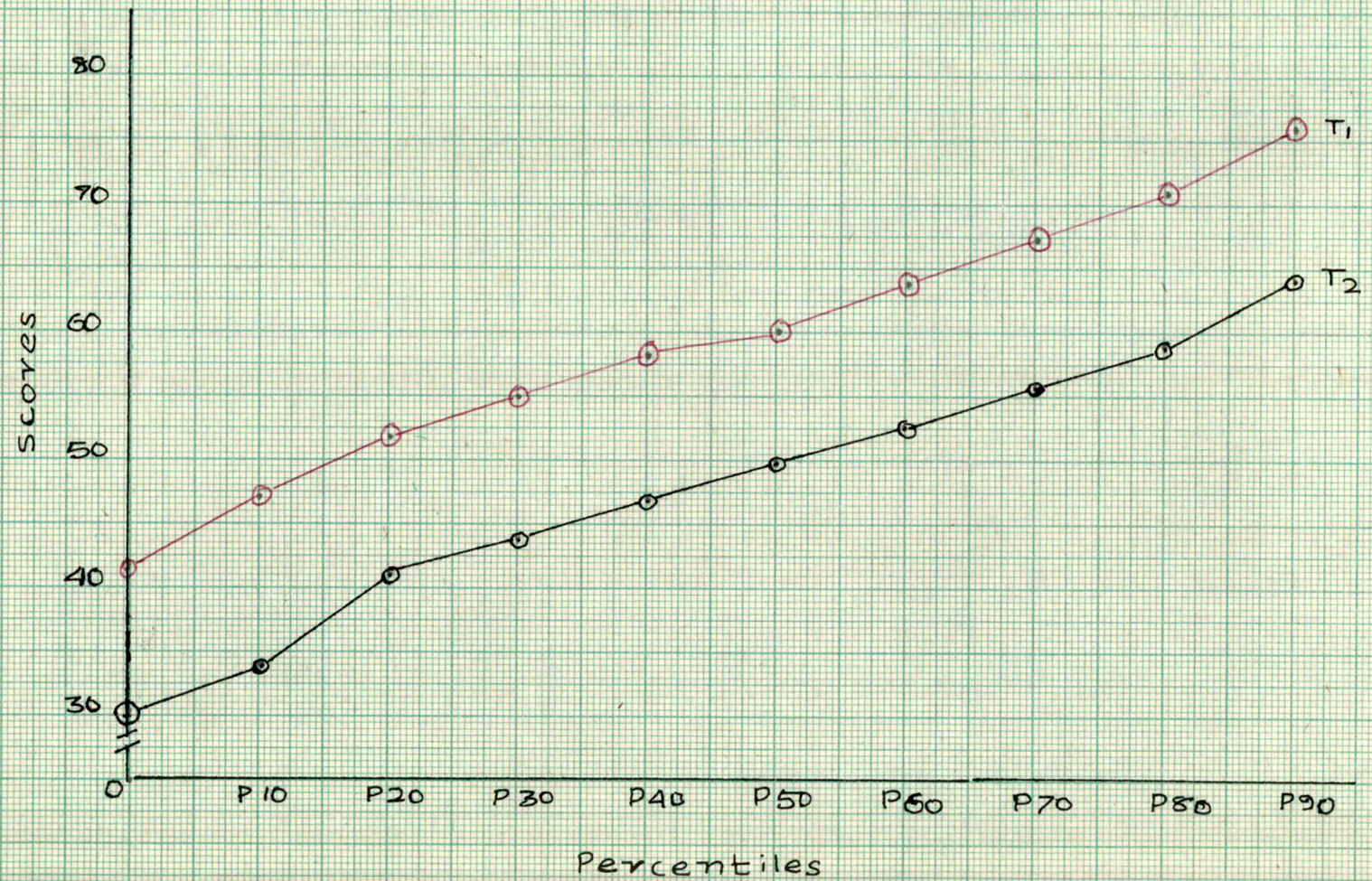


Figure 10 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2) : Urban 03

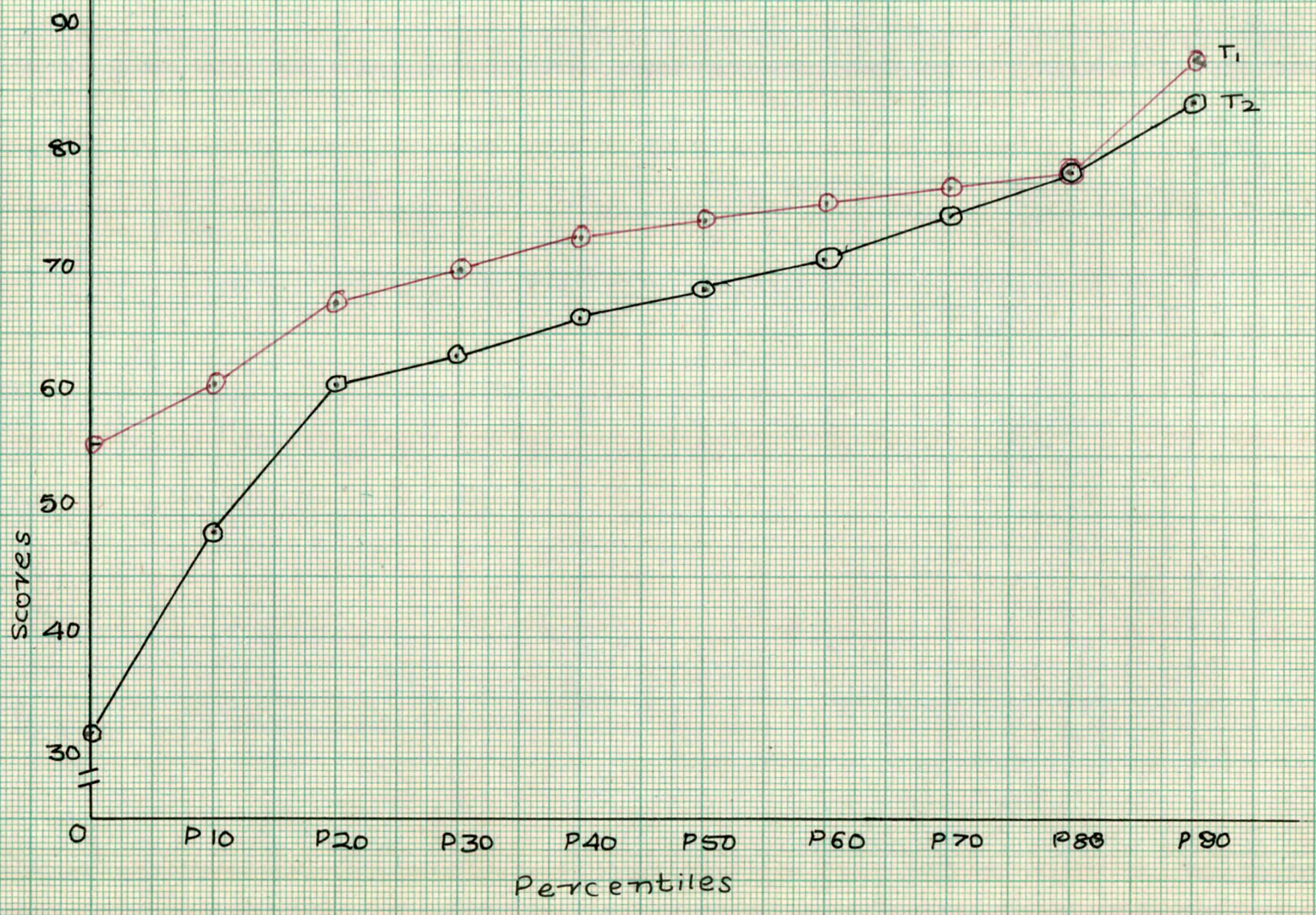


Figure: 11 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2) : Urban 04

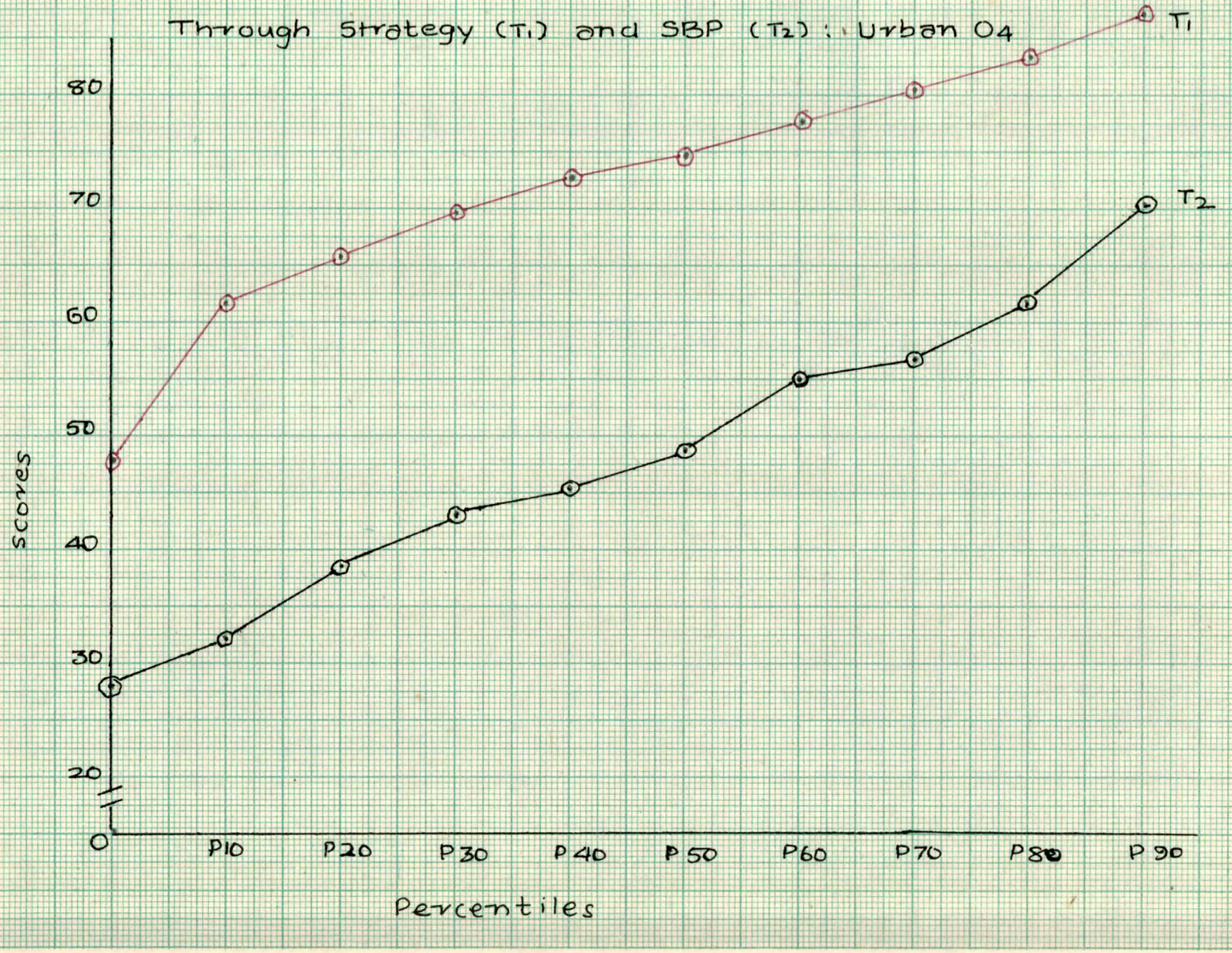


Figure 12 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2): Urban H1

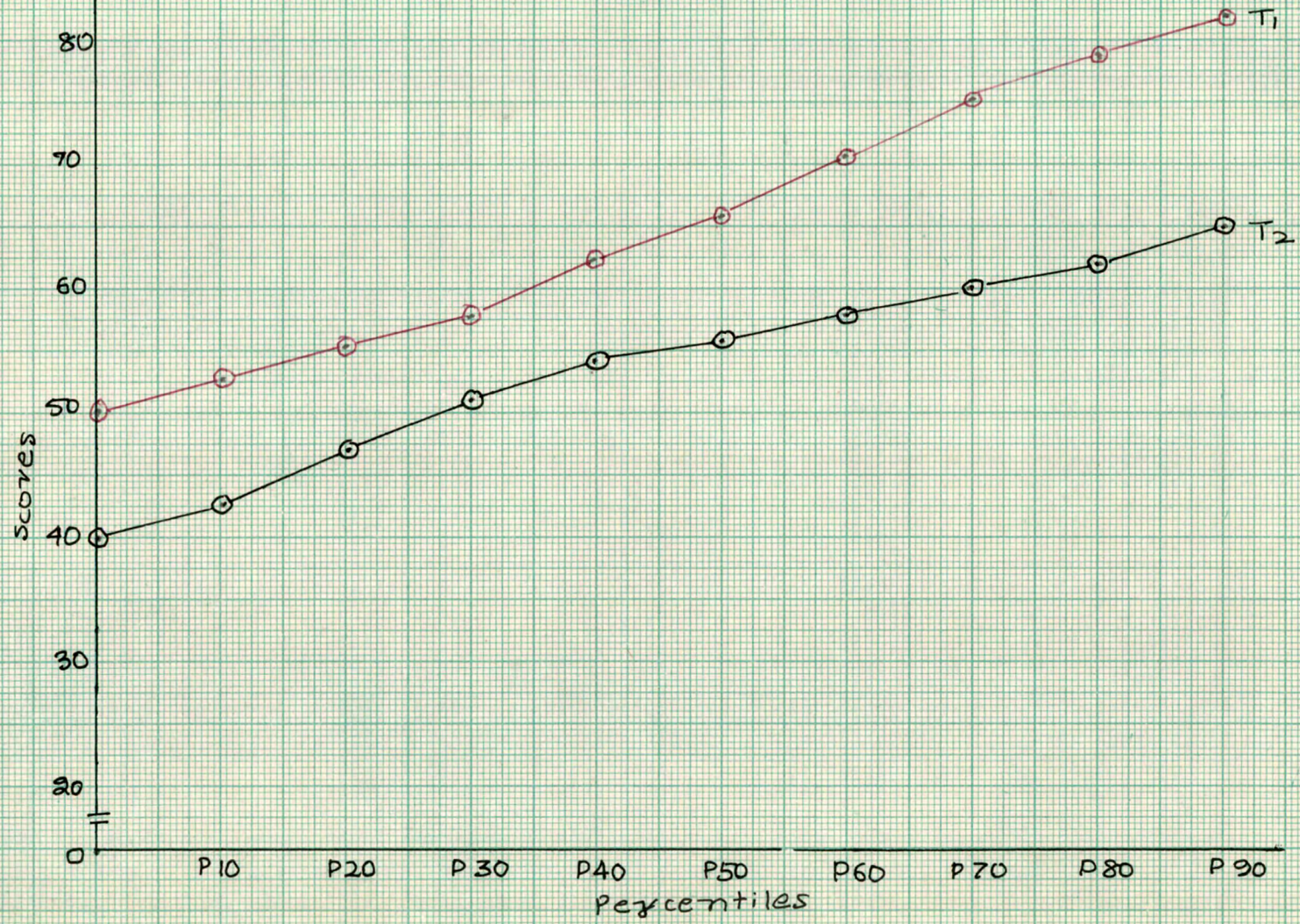


Figure 13 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2) : Urban, H2

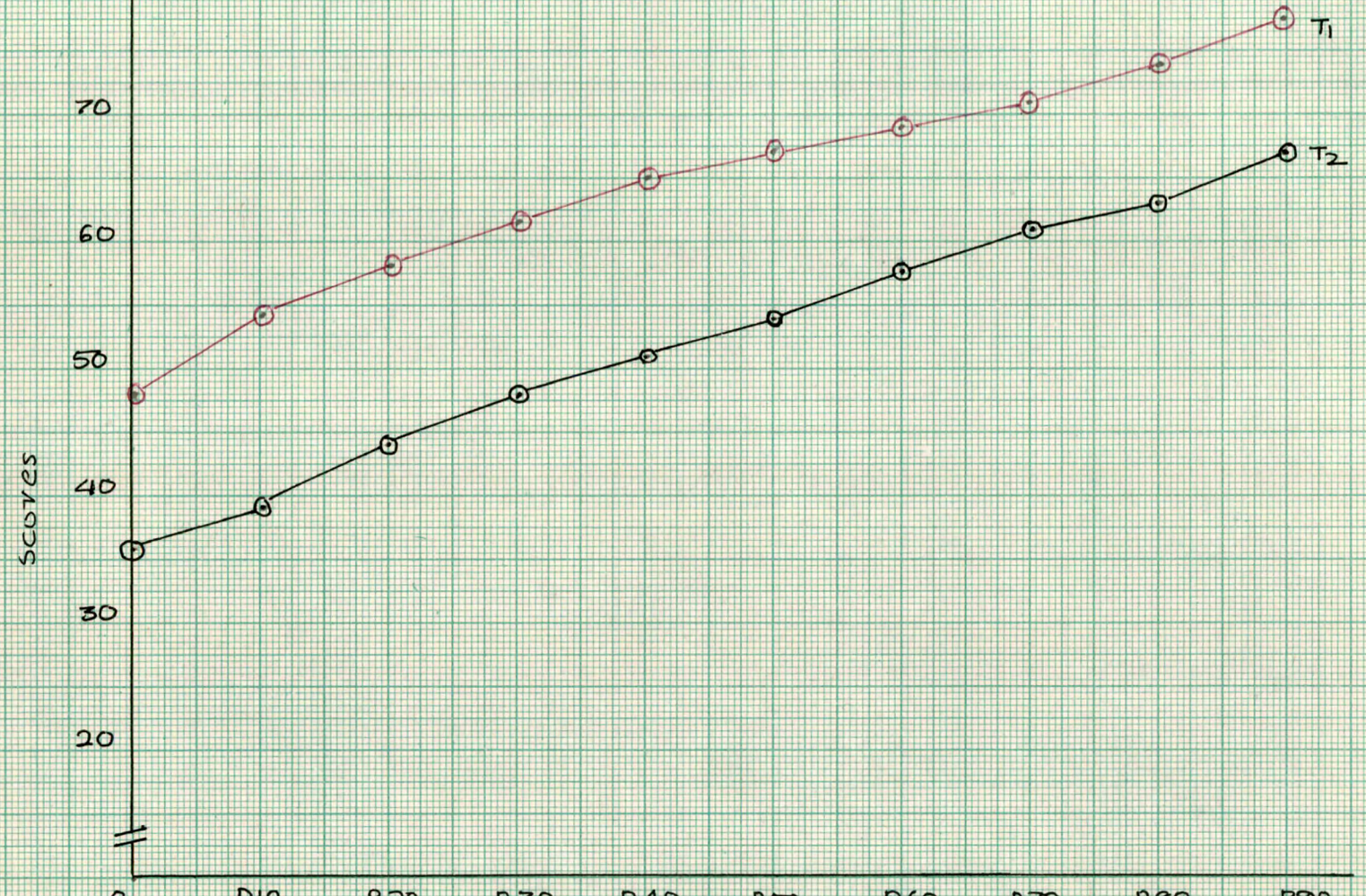


Figure 14 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2): Urban H3

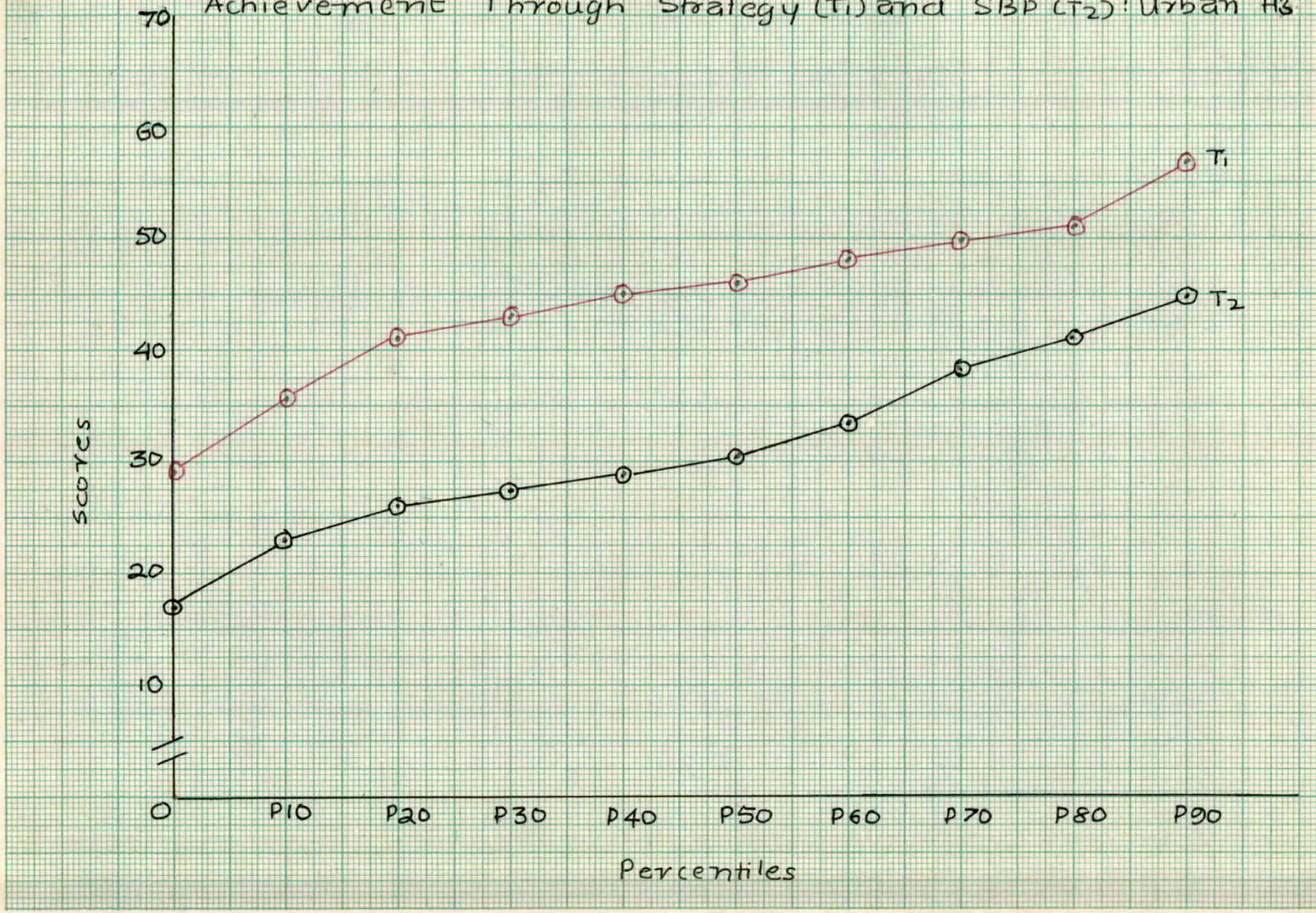


Figure 15, Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2) Urban 174

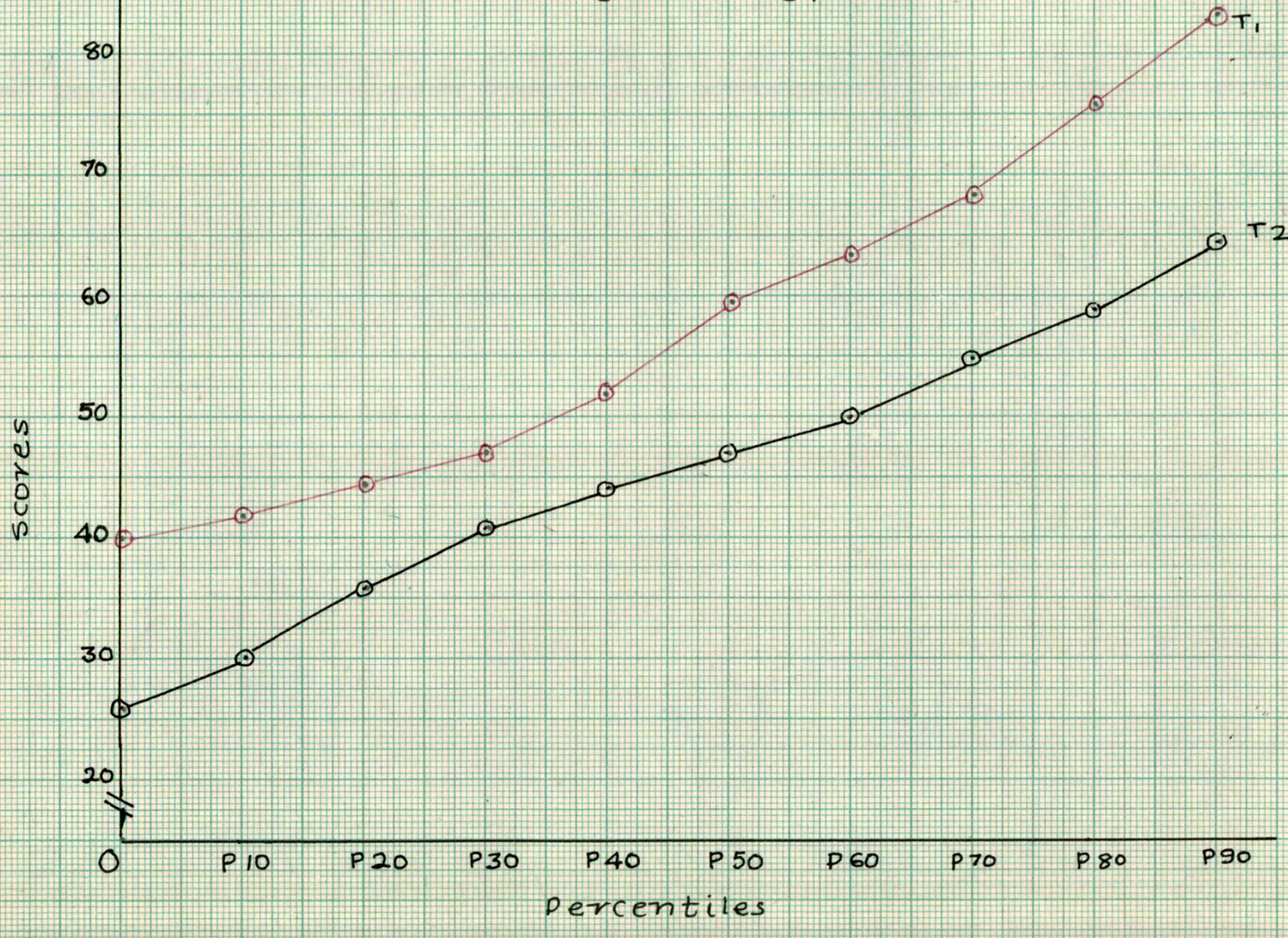


Figure: 16 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and T_2 SBP (T_2) Urban G1

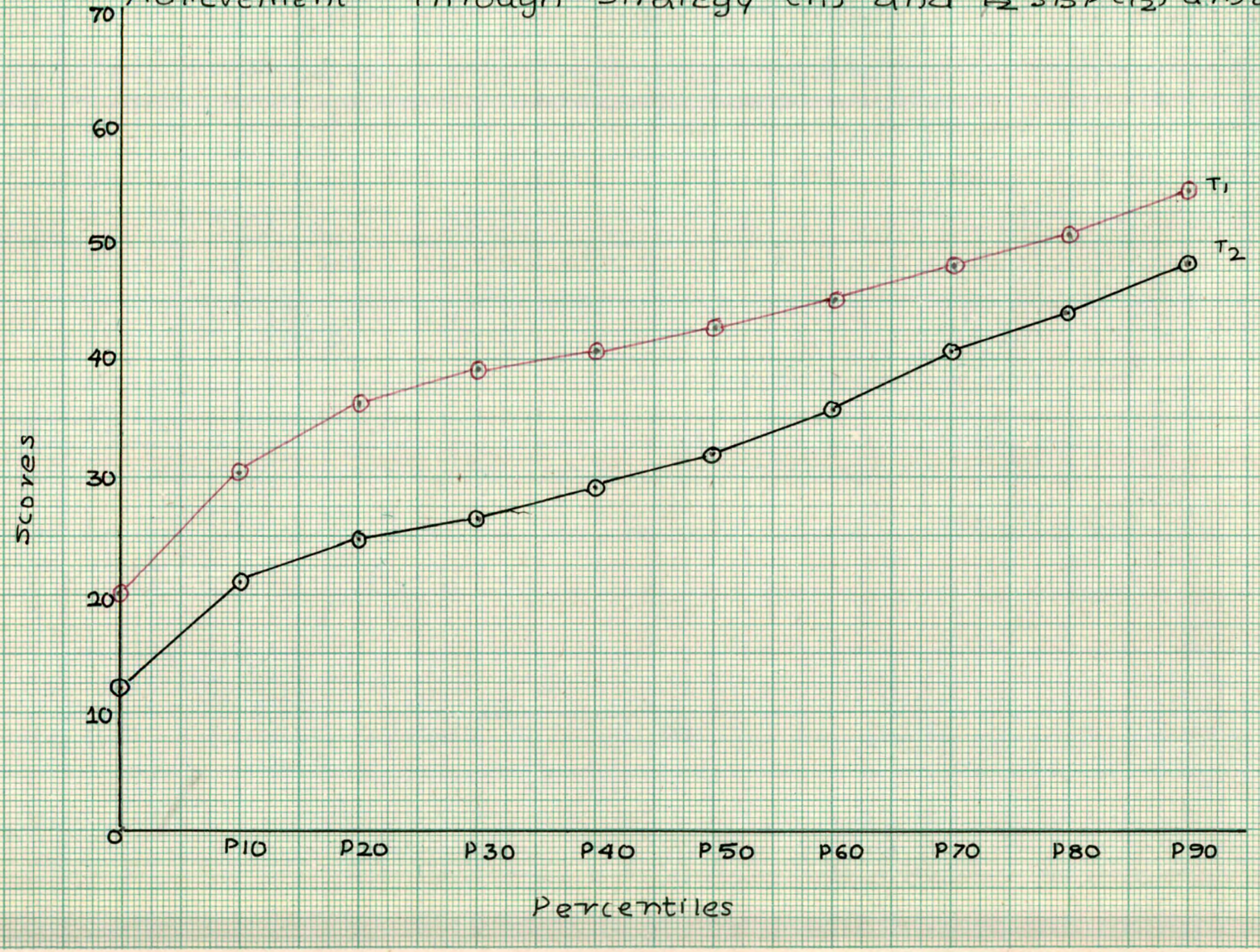


Figure 17, Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SIBP (T_2) Urban G 8

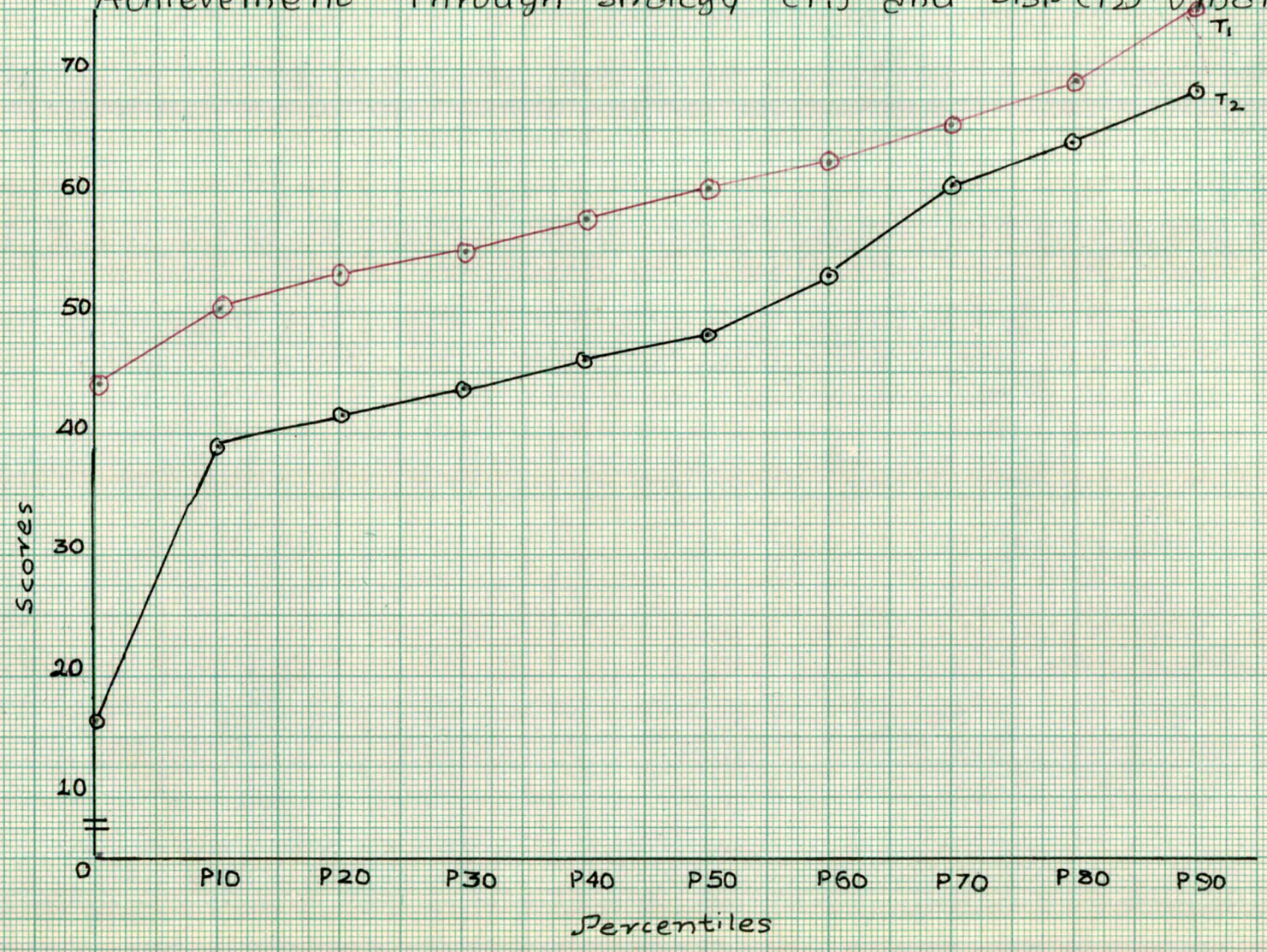


Figure 18, Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2) Urban: G3

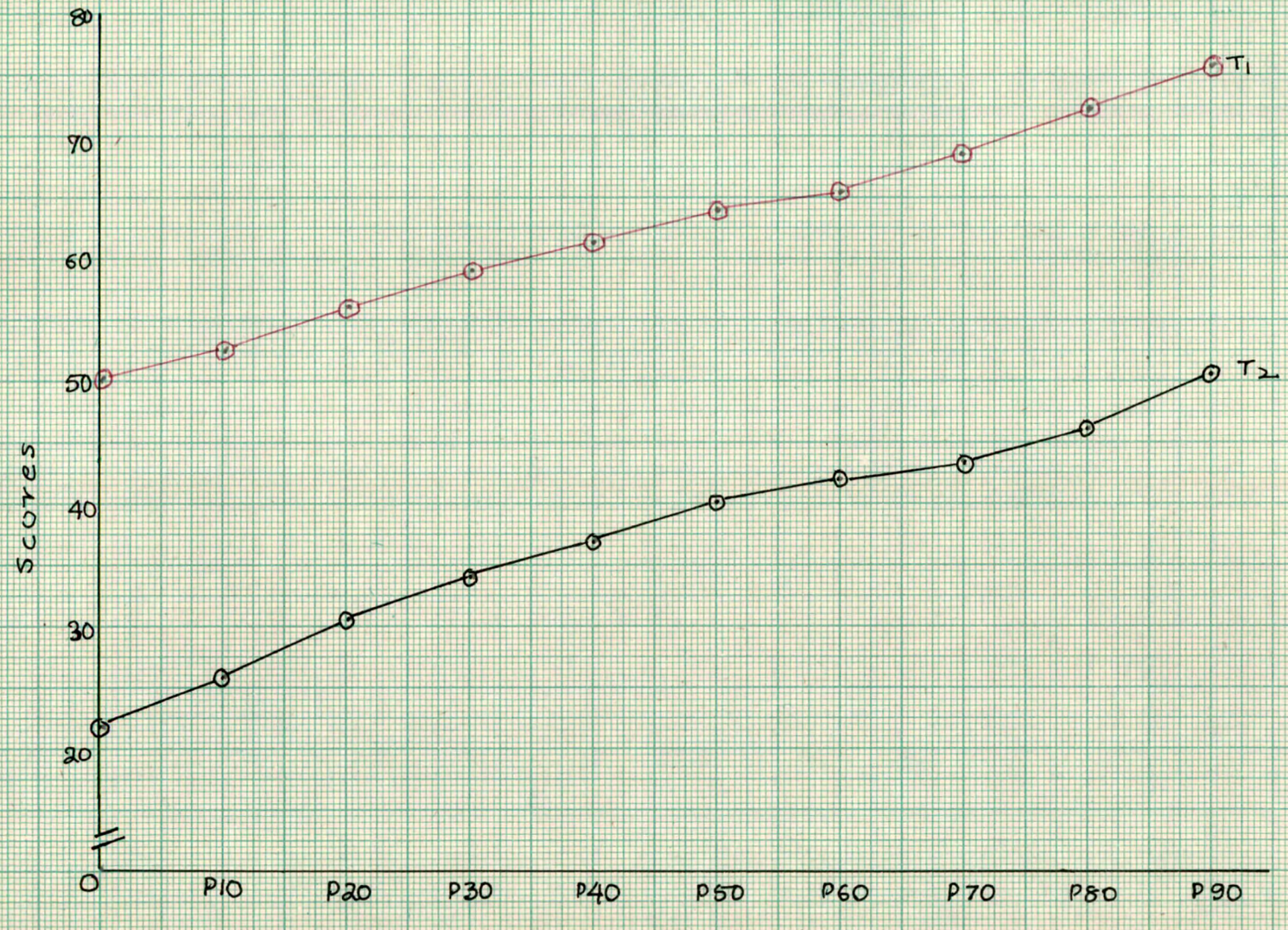


Figure 19. Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2): Urban. G4.

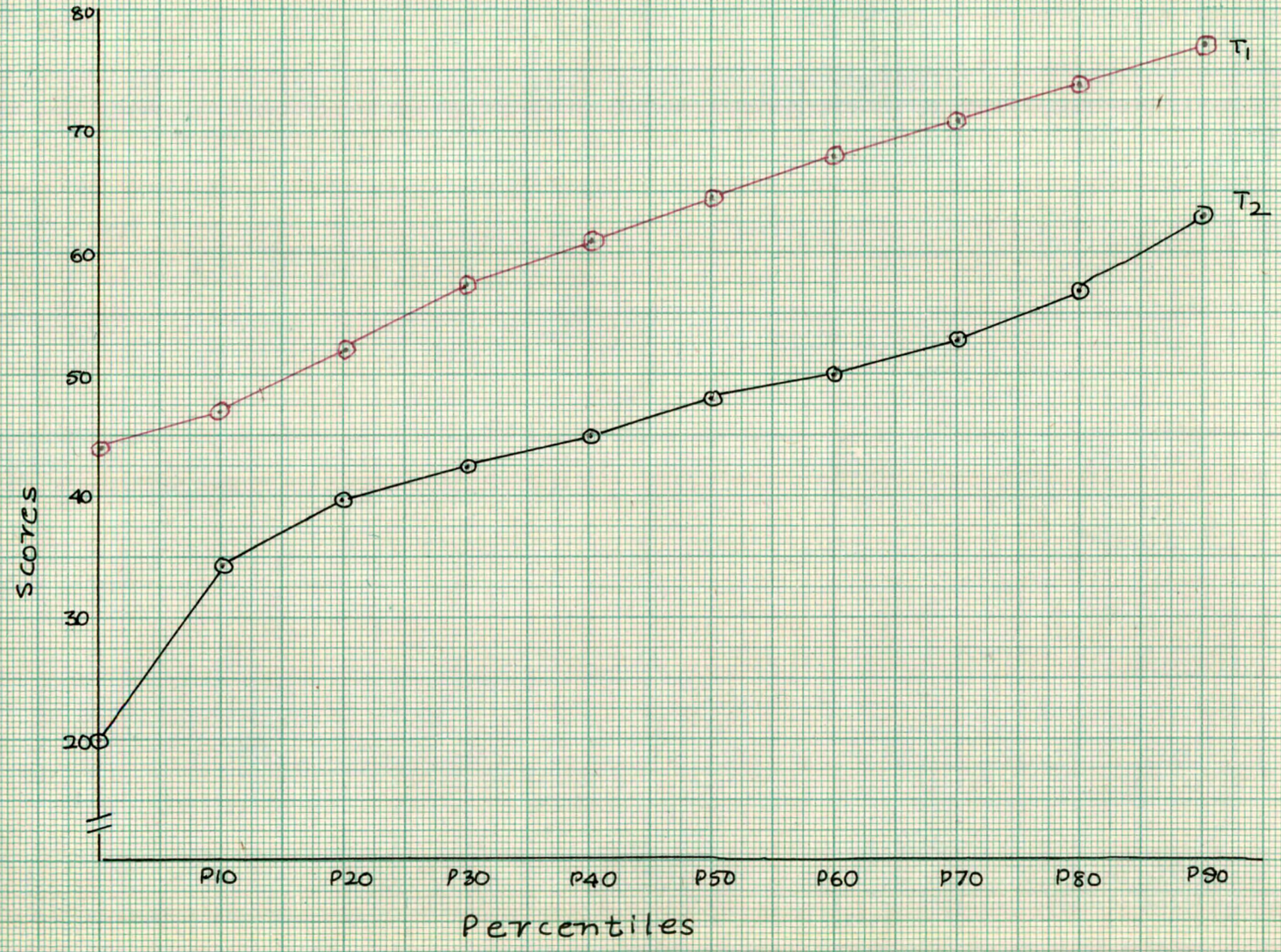


Figure 20. Graphical Representation of the Percentile Points on T_1 Achievement Through Strategy (T_1) and SBP (T_2): Urban Sc1

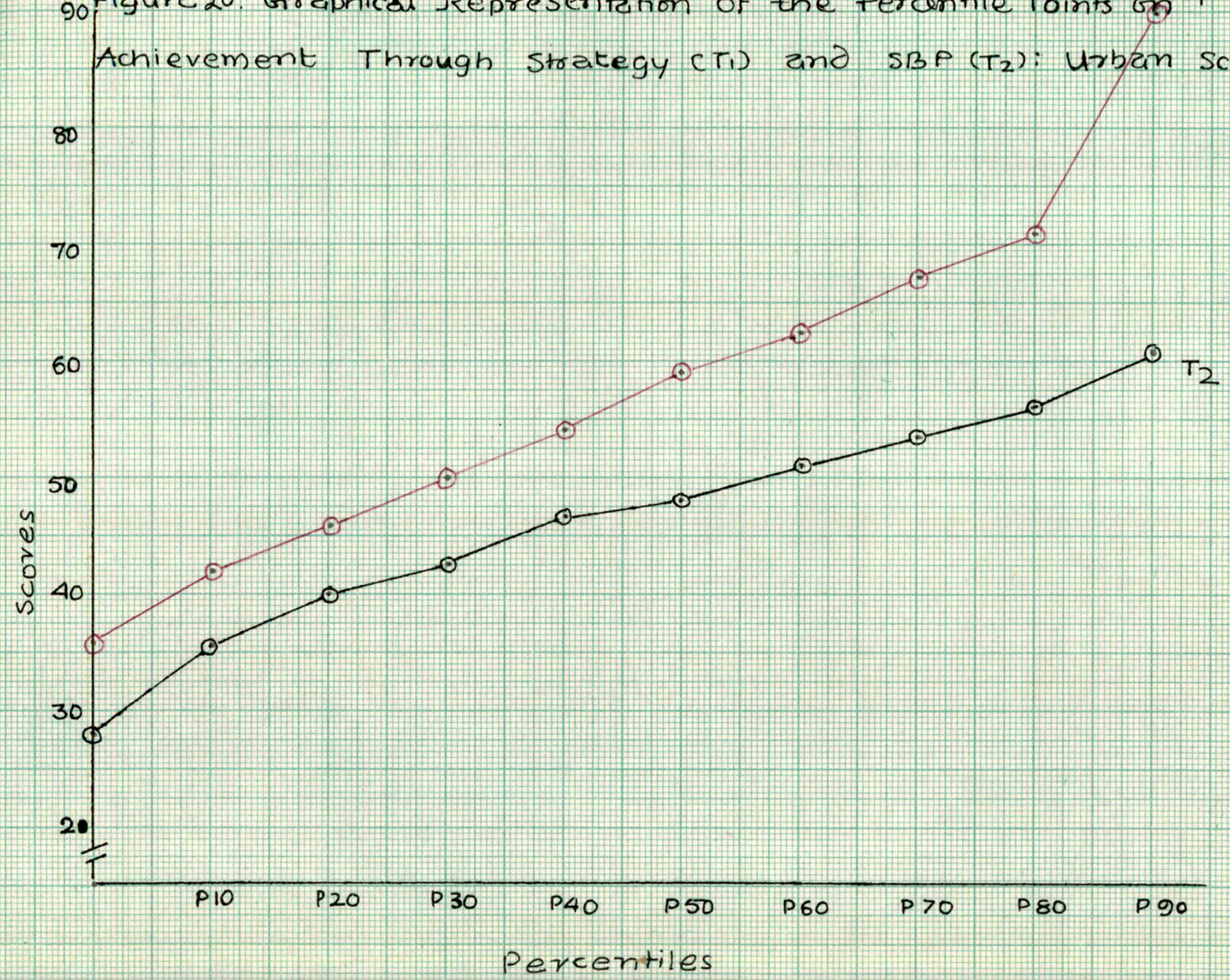


Figure 81. Graphical Representation of the Percentile Points on Achievement Through strategy (T_1) and SBP (T_2): Urban, Sc2

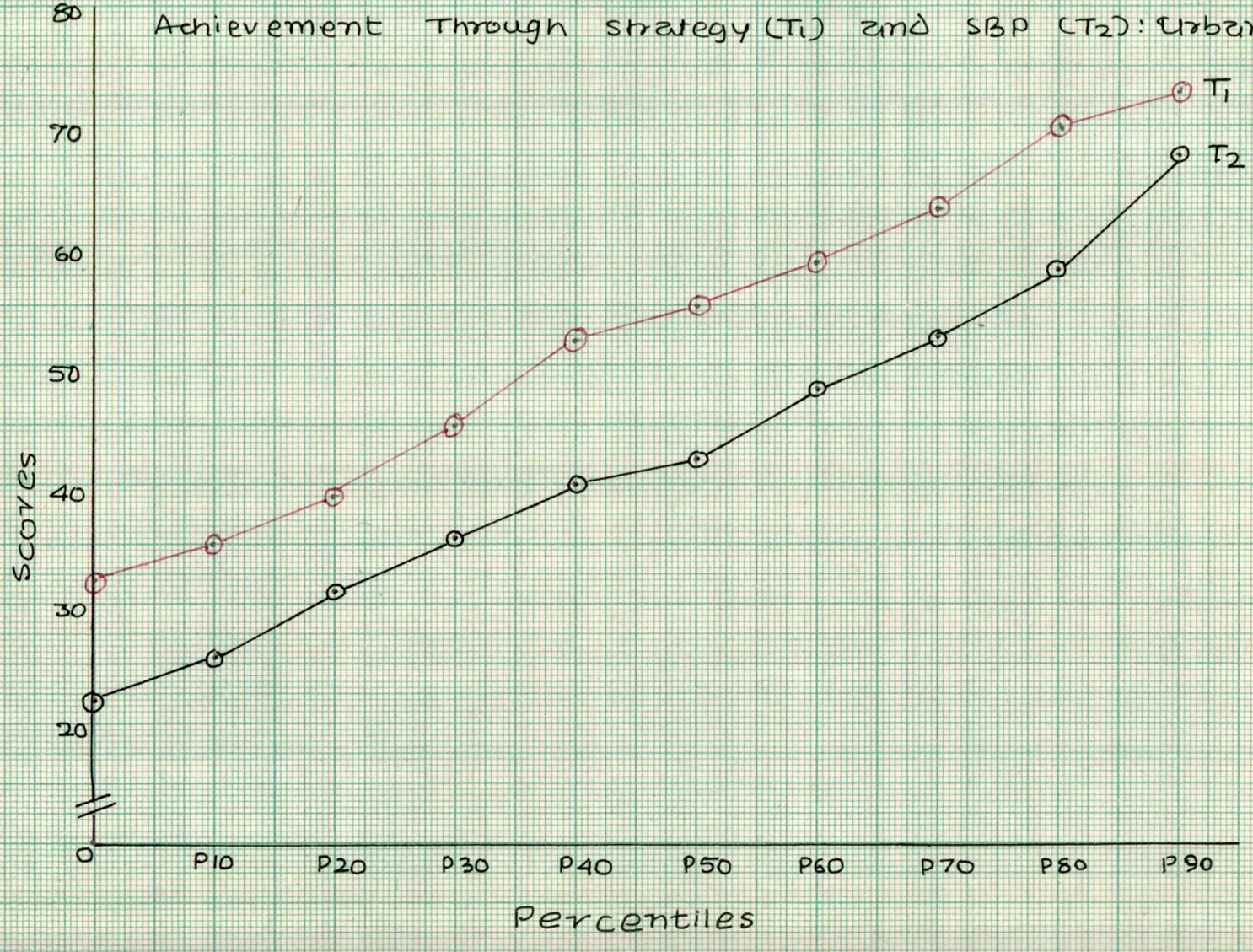


Figure 22. Graphical Representation of the Percentile Points on Achievement Through strategy (T_1) and SBP (T_2) : Urban: Sc3

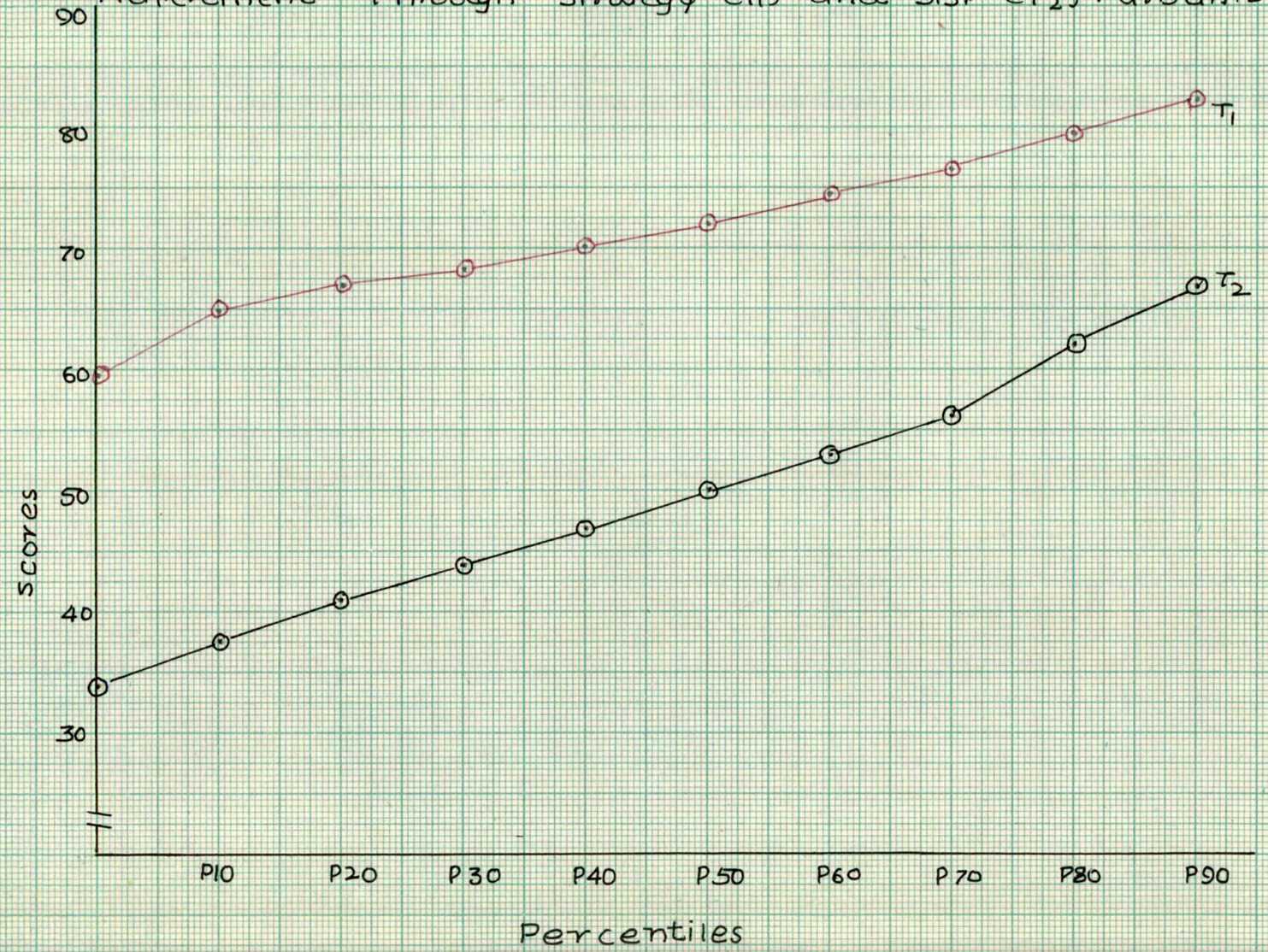


Figure 23. Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2): Urban Sc 4

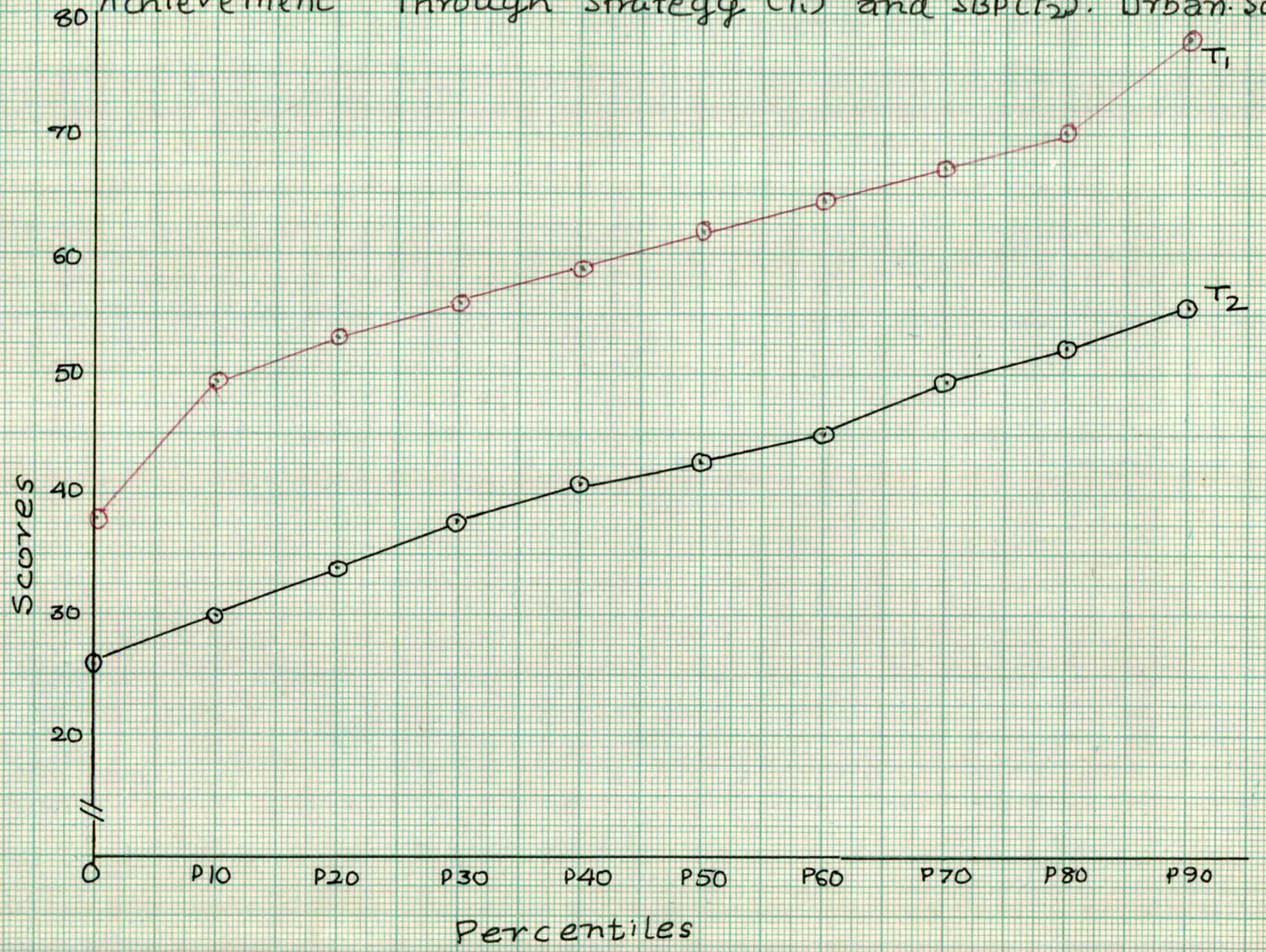


Table 5.5(B)

Percentiles in Percentages
(Rural)

	O_1		O_2		O_3		O_4	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
P_{90}	79.00	63.50	85.66	75.00	79.60	68.30	82.32	77.66
P_{80}	73.40	51.50	80.54	68.16	76.68	65.66	74.60	67.00
P_{70}	65.70	46.90	77.00	64.66	73.76	62.92	69.50	58.28
P_{60}	60.52	44.00	73.44	61.16	70.84	60.40	66.50	57.42
P_{50}	57.52	41.08	69.56	58.14	68.14	58.34	62.50	54.56
P_{40}	54.54	37.88	65.00	55.15	65.44	56.28	60.40	51.70
P_{30}	51.04	34.00	60.32	52.14	62.70	54.22	56.80	47.24
P_{20}	48.08	30.10	55.00	46.66	56.32	52.16	53.20	42.24
P_{10}	44.54	24.82	50.32	37.66	43.66	46.00	48.20	35.00
P_0	42.00	20.00	36.00	22.00	40.00	28.00	48.00	28.00

	G_1		G_2		G_3		G_4	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
P_{90}	62.04	43.08	75.40	61.20	69.90	67.00	64.00	59.80
P_{80}	61.80	41.18	67.62	54.36	64.92	57.00	61.20	53.70
P_{70}	54.72	39.26	64.36	48.60	62.16	55.00	58.80	49.64
P_{60}	52.20	37.20	60.80	43.40	60.68	53.00	57.00	46.94
P_{50}	49.90	35.10	57.00	41.00	59.20	51.00	52.80	44.40
P_{40}	47.82	33.00	53.20	38.28	57.72	48.60	49.50	42.24
P_{30}	45.76	28.80	49.62	33.96	54.72	46.20	46.86	40.08
P_{20}	43.56	24.60	46.36	30.20	50.28	43.80	44.24	37.64
P_{10}	41.28	20.24	42.80	26.40	45.84	41.40	41.62	34.94
P_0	40.00	16.00	40.00	22.00	40.00	40.00	40.00	28.00

Table 5.5.(B) Continued

	H_1		H_2		H_3		H_4	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
P_{90}	78.42	70.00	81.74	70.44	55.63	44.15	78.00	48.82
P_{80}	72.50	61.25	77.90	66.10	52.03	38.92	69.60	45.82
P_{70}	68.12	56.87	74.54	62.00	48.80	36.97	66.60	42.82
P_{60}	63.75	52.50	71.18	59.34	45.85	35.02	63.60	39.92
P_{50}	59.37	48.17	68.08	57.16	43.08	33.08	60.68	37.14
P_{40}	55.52	44.12	65.00	55.00	40.31	30.92	58.24	34.38
P_{30}	51.77	40.22	61.90	52.82	37.54	28.00	55.08	31.60
P_{20}	47.50	36.25	56.66	50.14	34.78	25.08	53.36	28.20
P_{10}	42.77	28.95	50.00	44.84	32.00	19.62	50.74	24.60
P_0	37.50	22.5	36.00	32.00	24.62	12.31	44.00	22.00

	Sc_1		Sc_2		Sc_3		Sc_4	
	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
P_{90}	80.74	59.80	65.60	56.80	69.72	60.78	71.00	62.50
P_{80}	69.66	56.80	62.92	51.88	66.94	57.70	67.00	50.74
P_{70}	66.22	53.80	60.80	47.60	64.60	55.80	64.60	48.42
P_{60}	62.76	50.28	58.70	43.80	63.30	51.56	62.20	46.12
P_{50}	59.62	47.50	56.74	39.40	61.94	48.94	59.00	43.80
P_{40}	56.80	44.20	54.80	35.92	60.68	46.40	55.00	41.50
P_{30}	54.00	40.88	52.82	33.64	59.38	43.88	52.60	38.58
P_{20}	51.18	37.22	50.70	31.36	53.80	41.34	50.20	35.50
P_{10}	46.02	33.54	48.48	26.20	50.16	35.70	47.00	32.40
P_0	46.00	28.00	46.00	20.00	48.00	26.00	44.00	22.00

T_1 = Percentiles of the group which learnt with strategy.

T_2 = Percentiles of the group which learnt with Radio alone..

Figure 24. Graphical Representation of the Percentile Points on Achievement Through strategy (T_1) and SBP (T_2) Rural 01

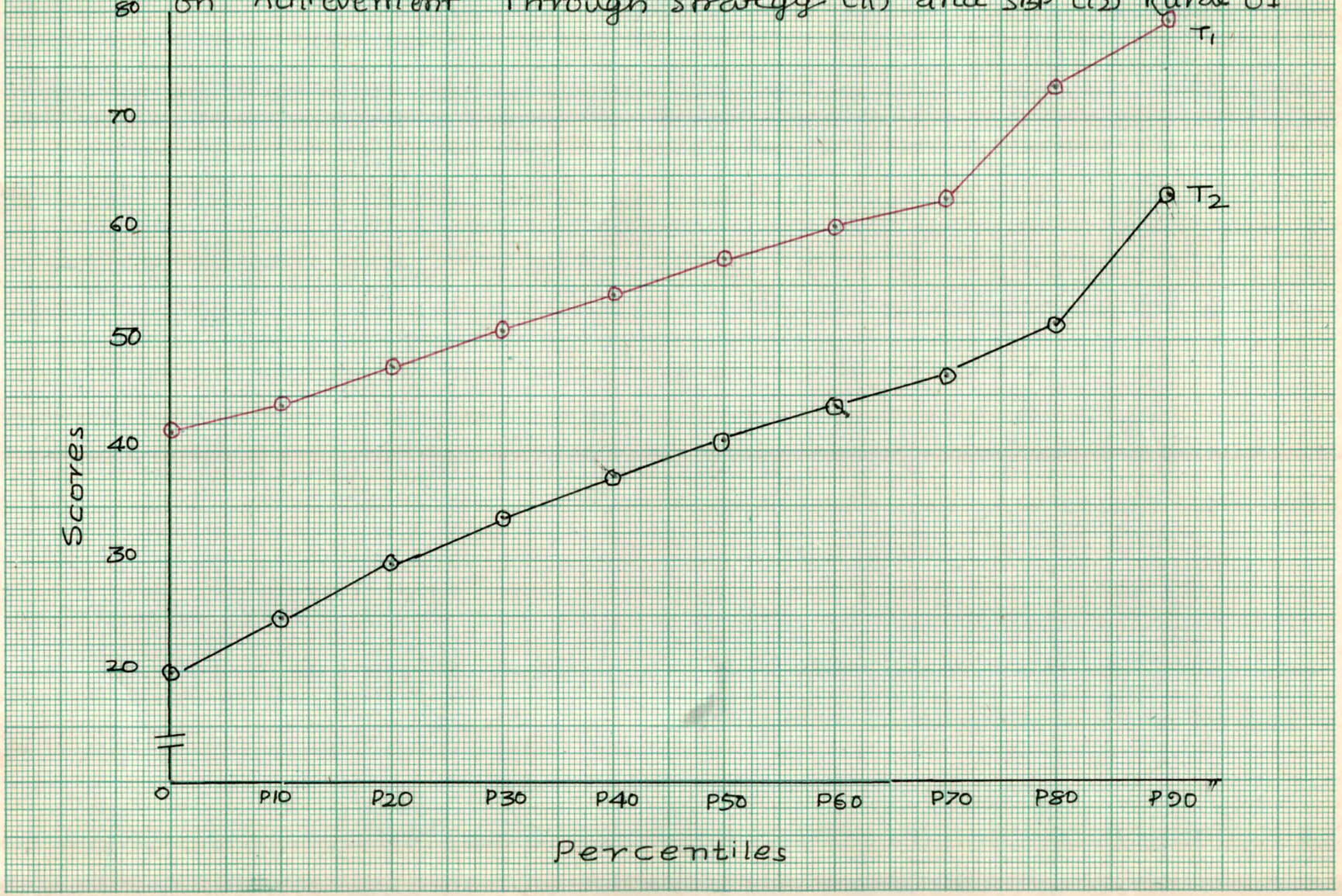


Figure: 25 Graphical Representation of the Percentile Points on Achievement Through Strategy (CT_1) and SBP(CT_2) Rural 02

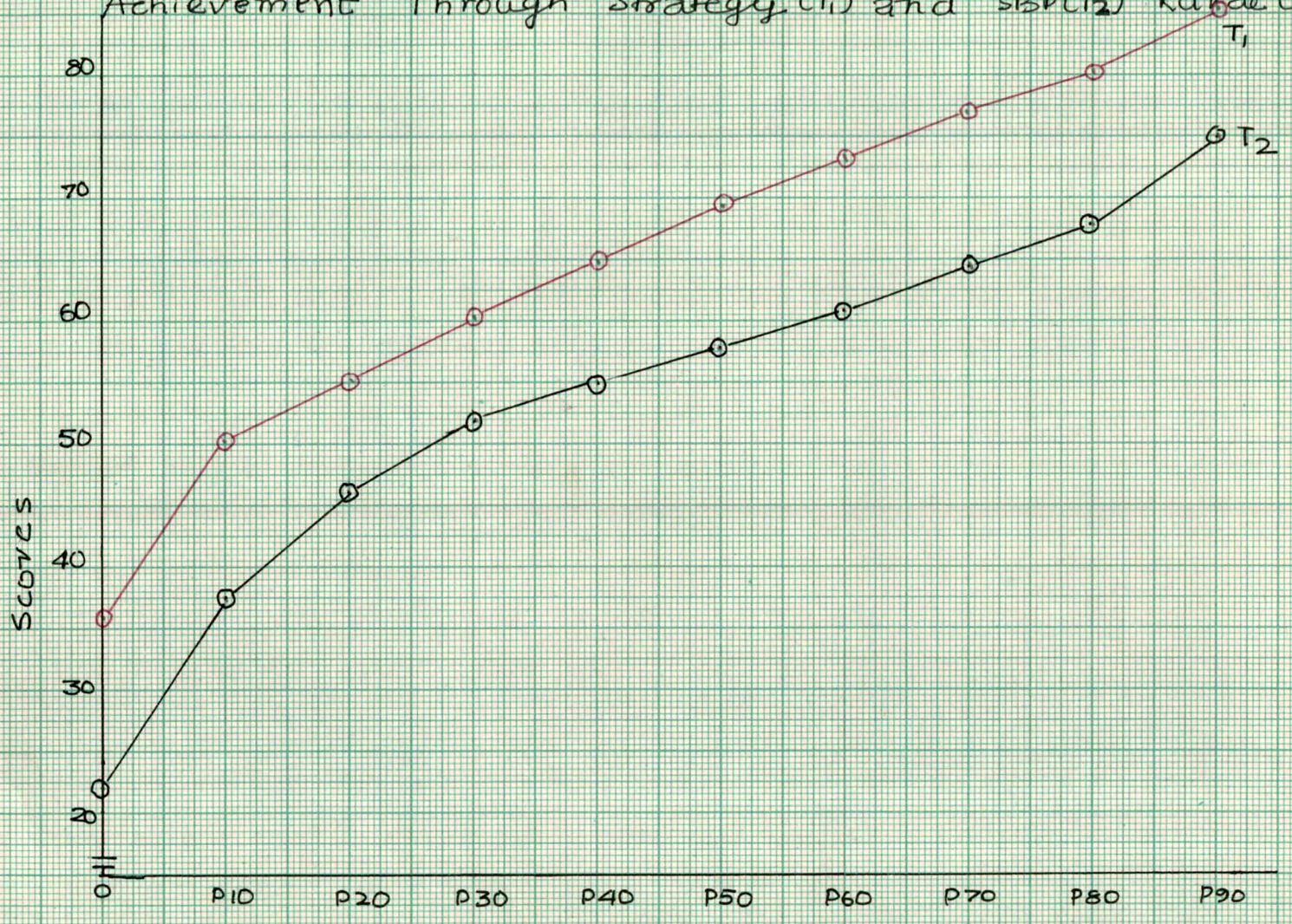
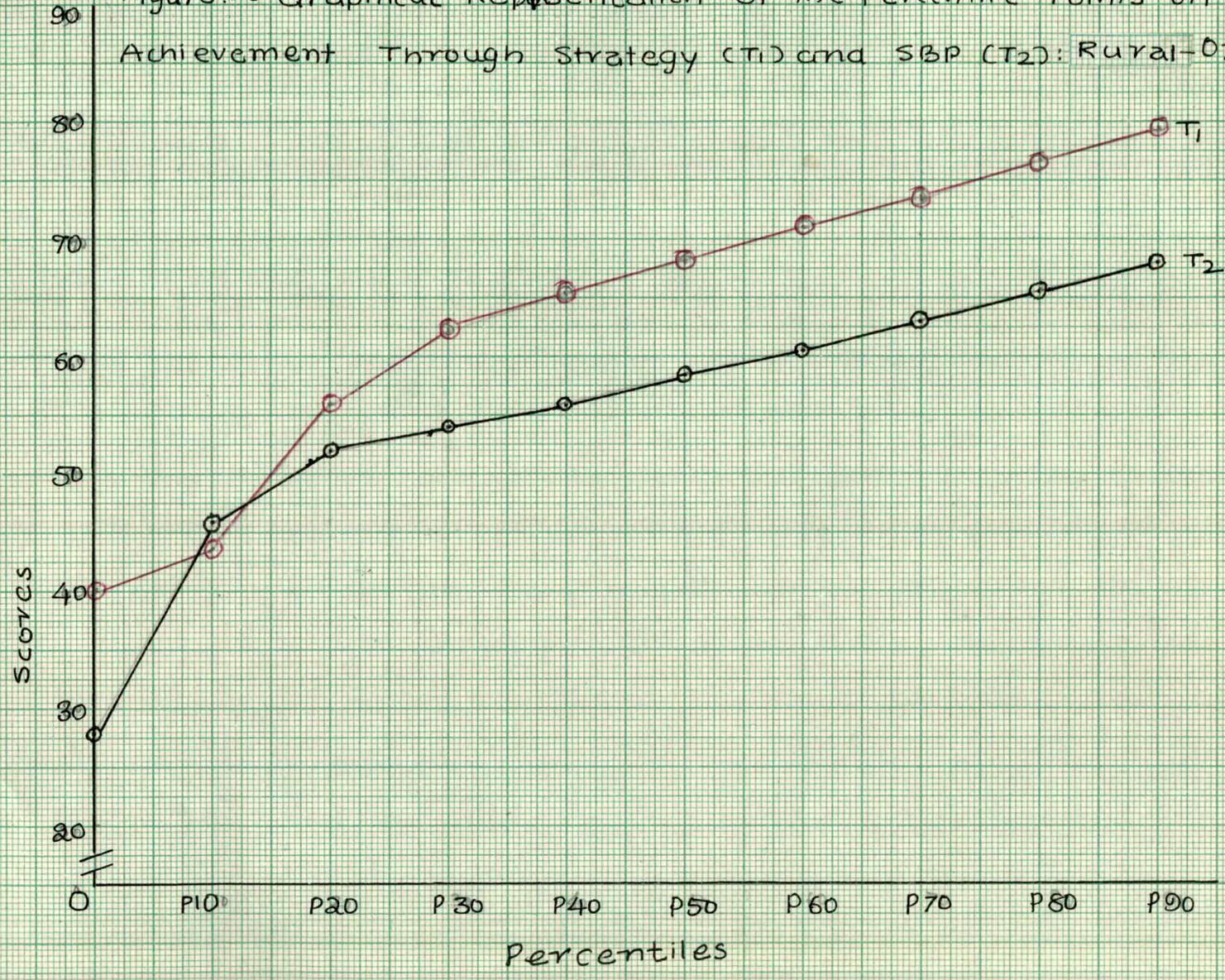


Figure:26 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2): Rural-03



RD3

Figure 27. Graphical Representation of the Percentile Points on Achievement Through strategy (T_1) and SBP (T_2): Rural 04

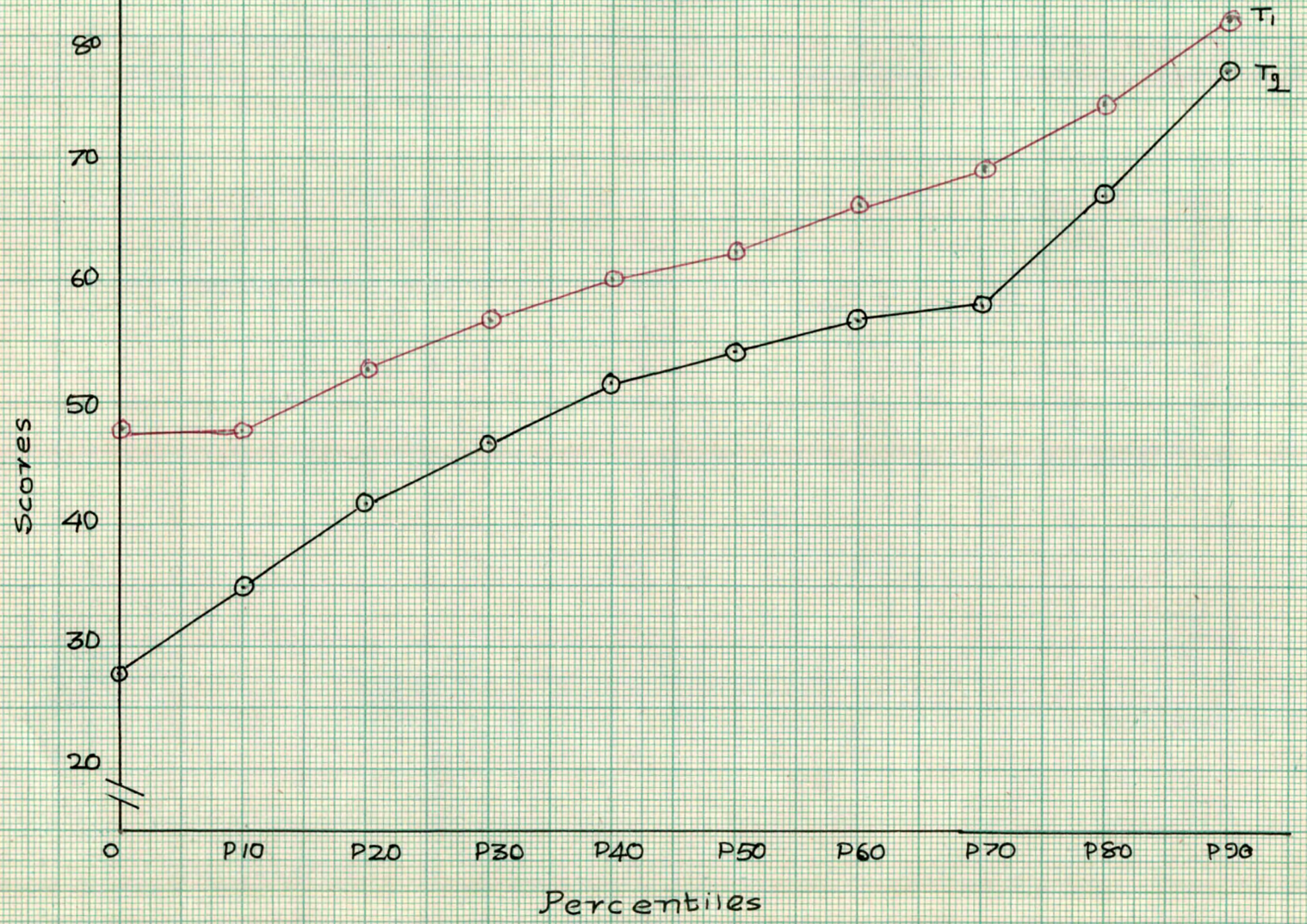


Figure 28 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2) Rural H1

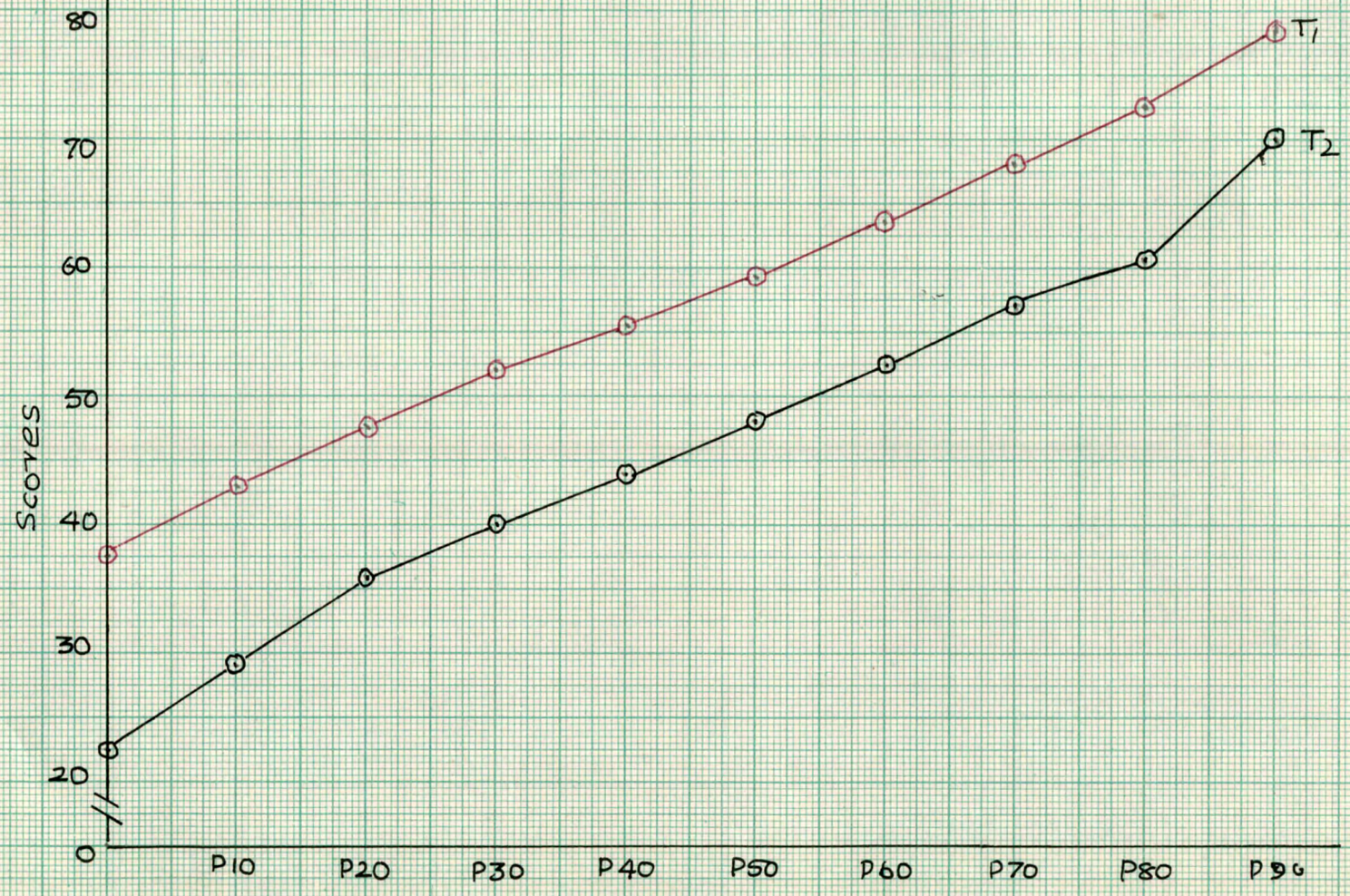


Figure 29 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2) Rural H2

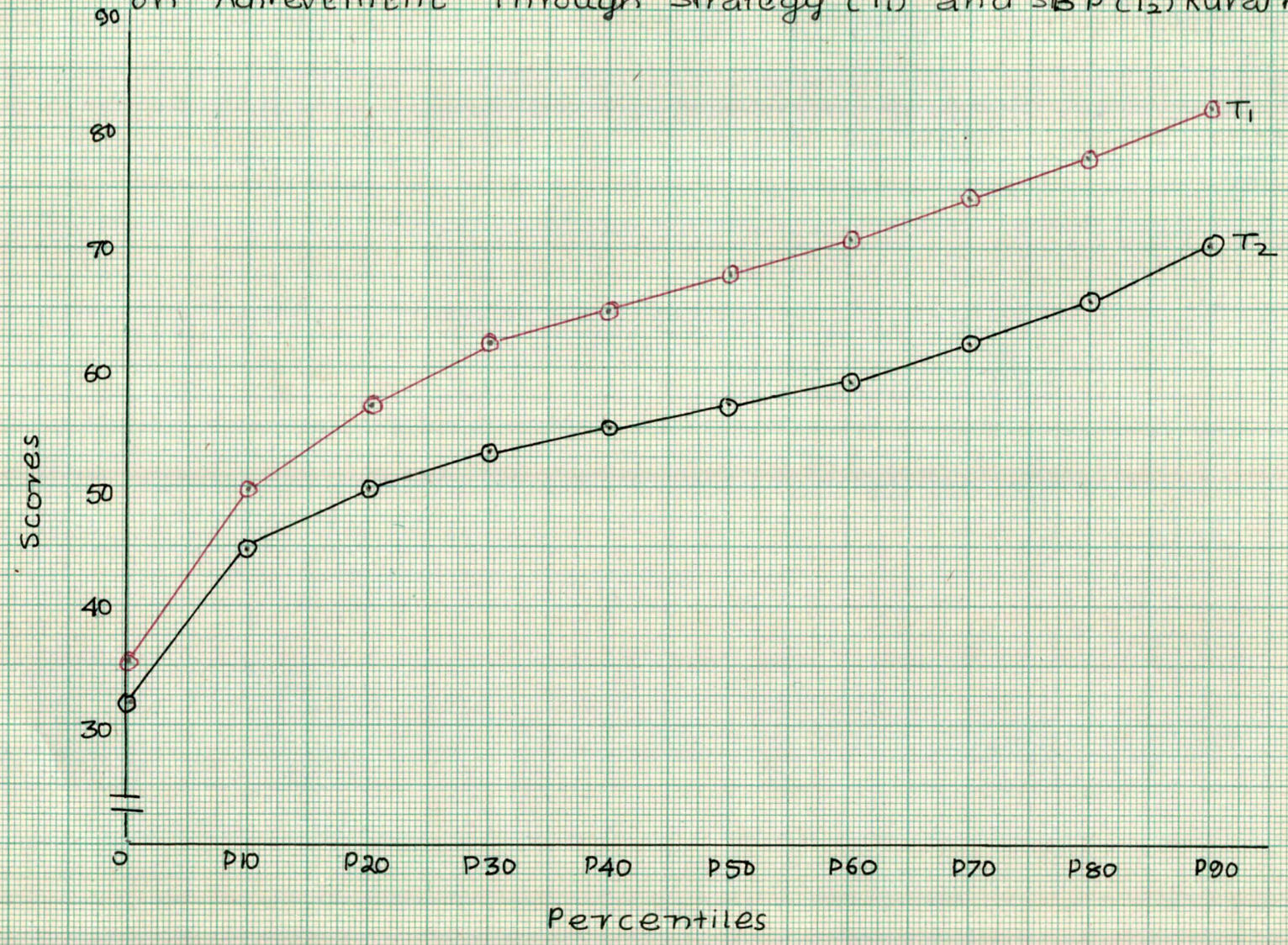


Figure 30 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP(T_2): Rural H3

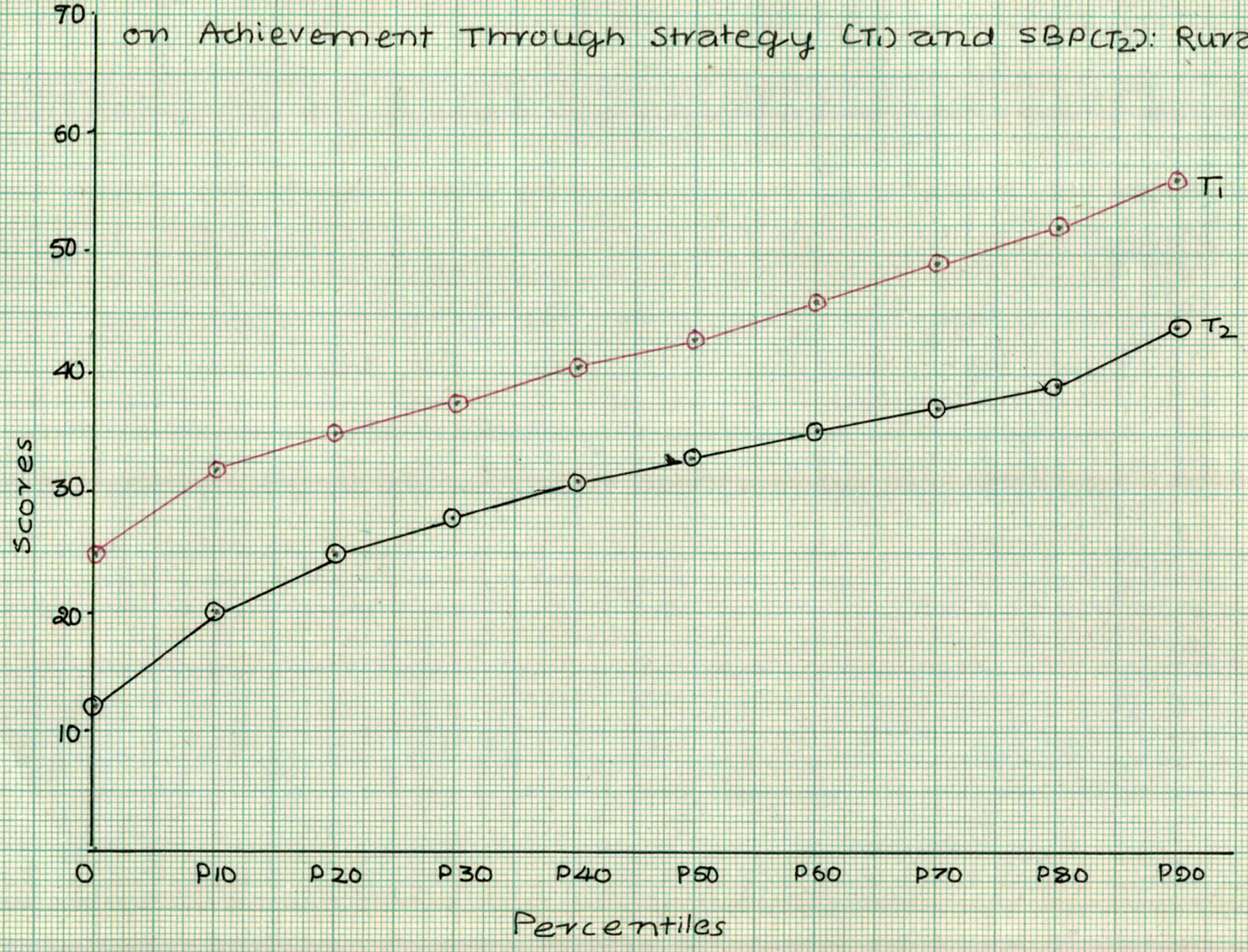


Figure 31. Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2): Rural H4

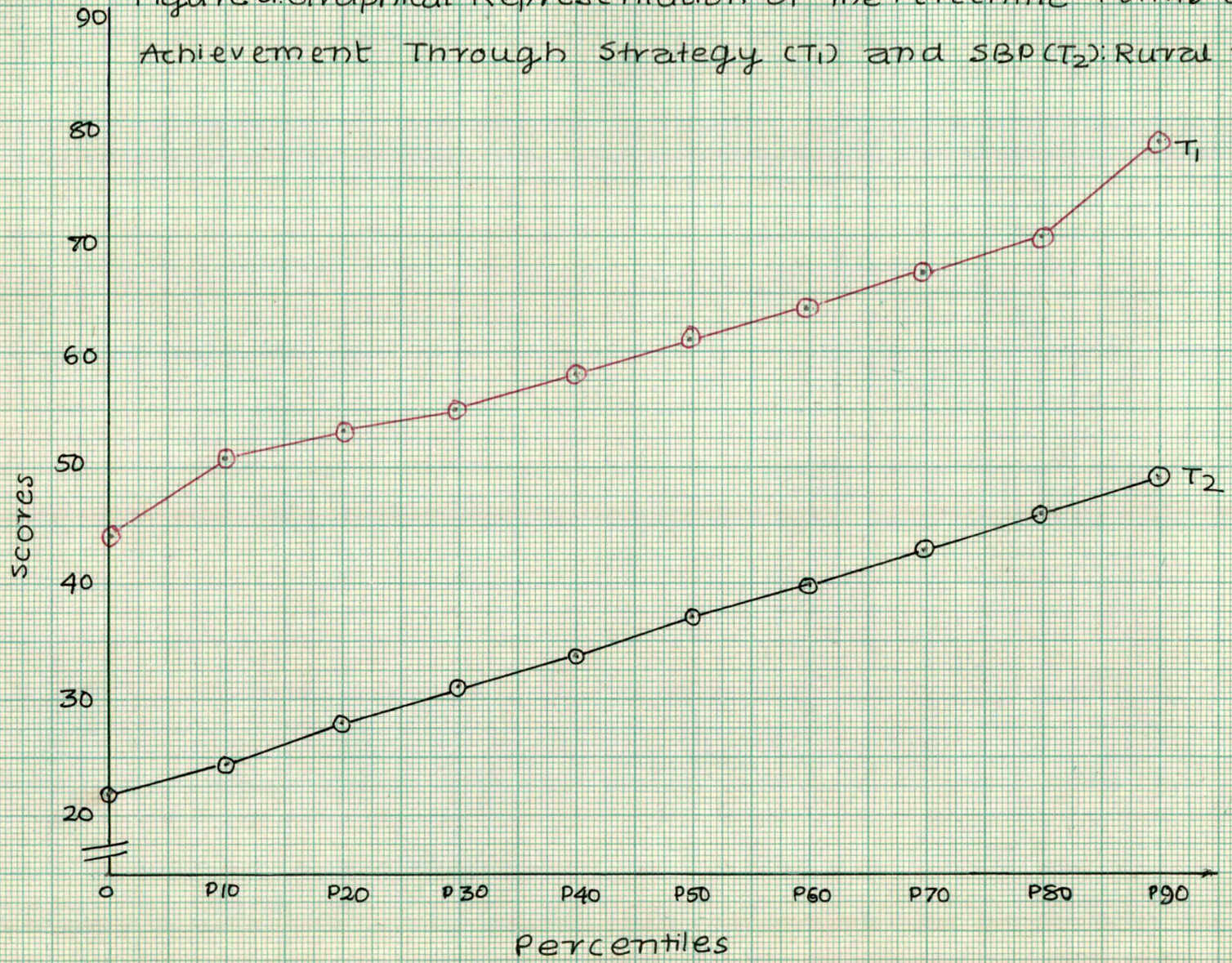


Figure 32 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2): Rural G1

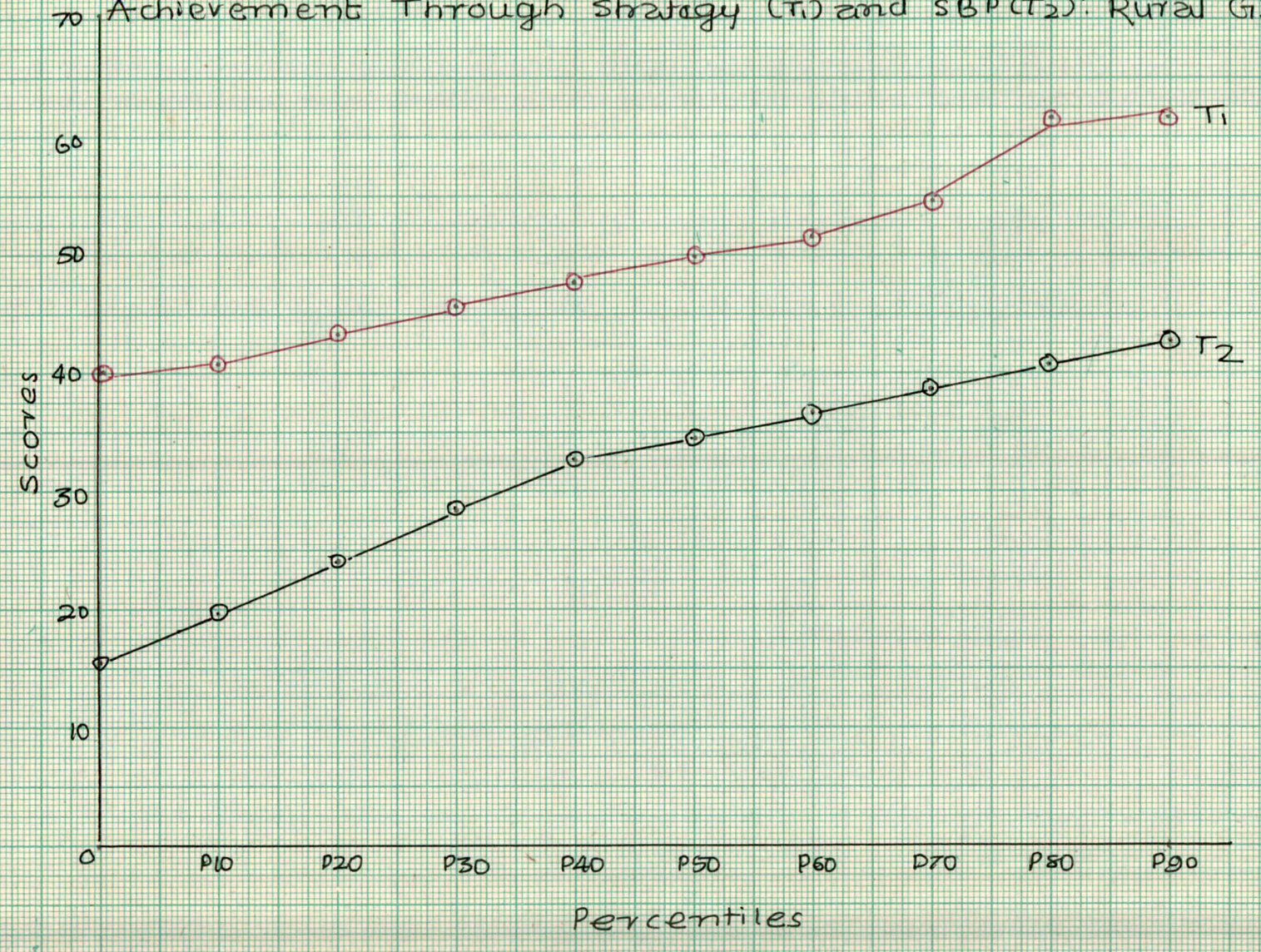


Figure 33 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2) Rural G2

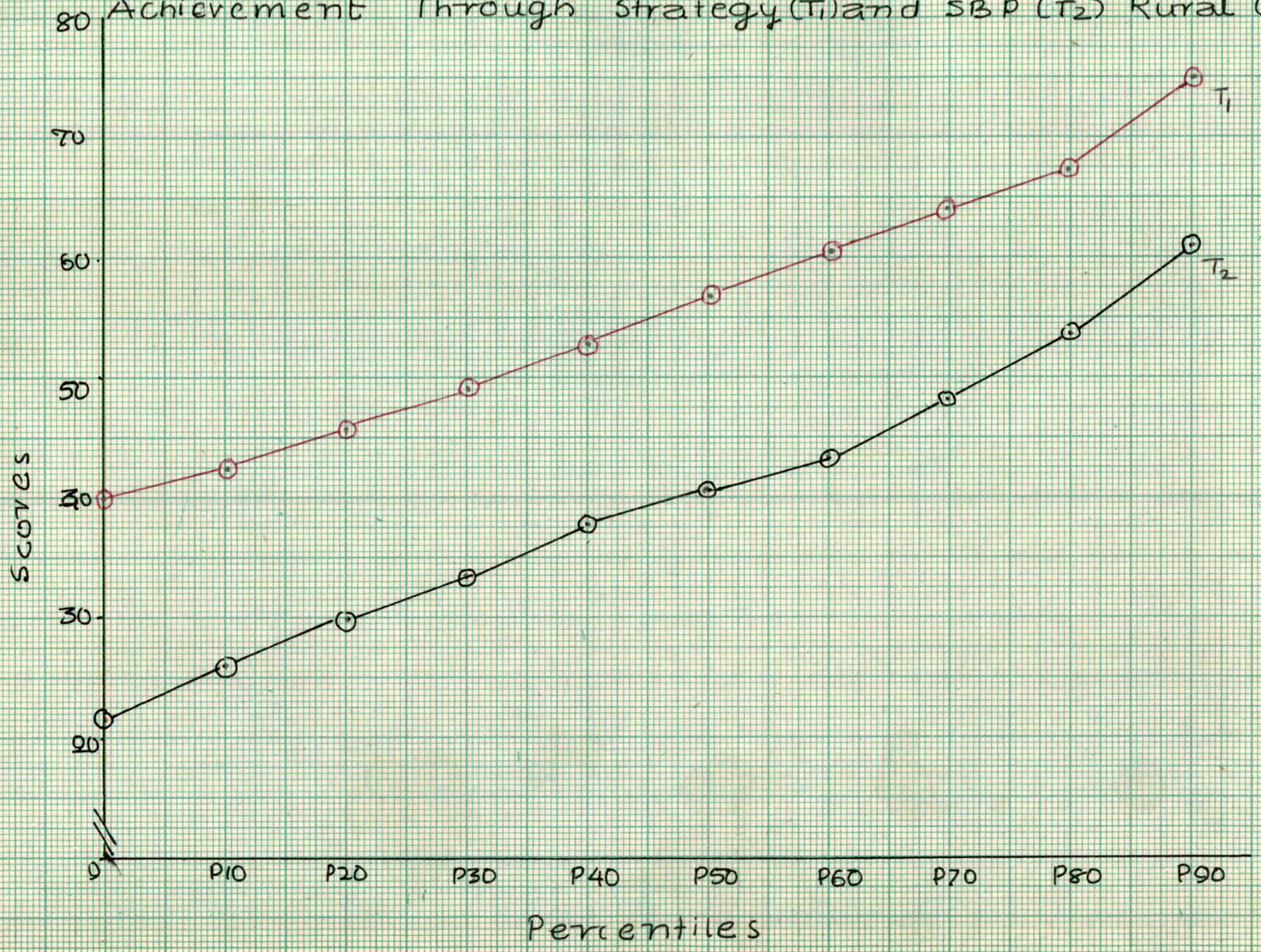


Figure 34. Graphical Representation of the Percentiles Points on Achievement Through Strategy (T_1) and SBP (T_2) - Rural G3

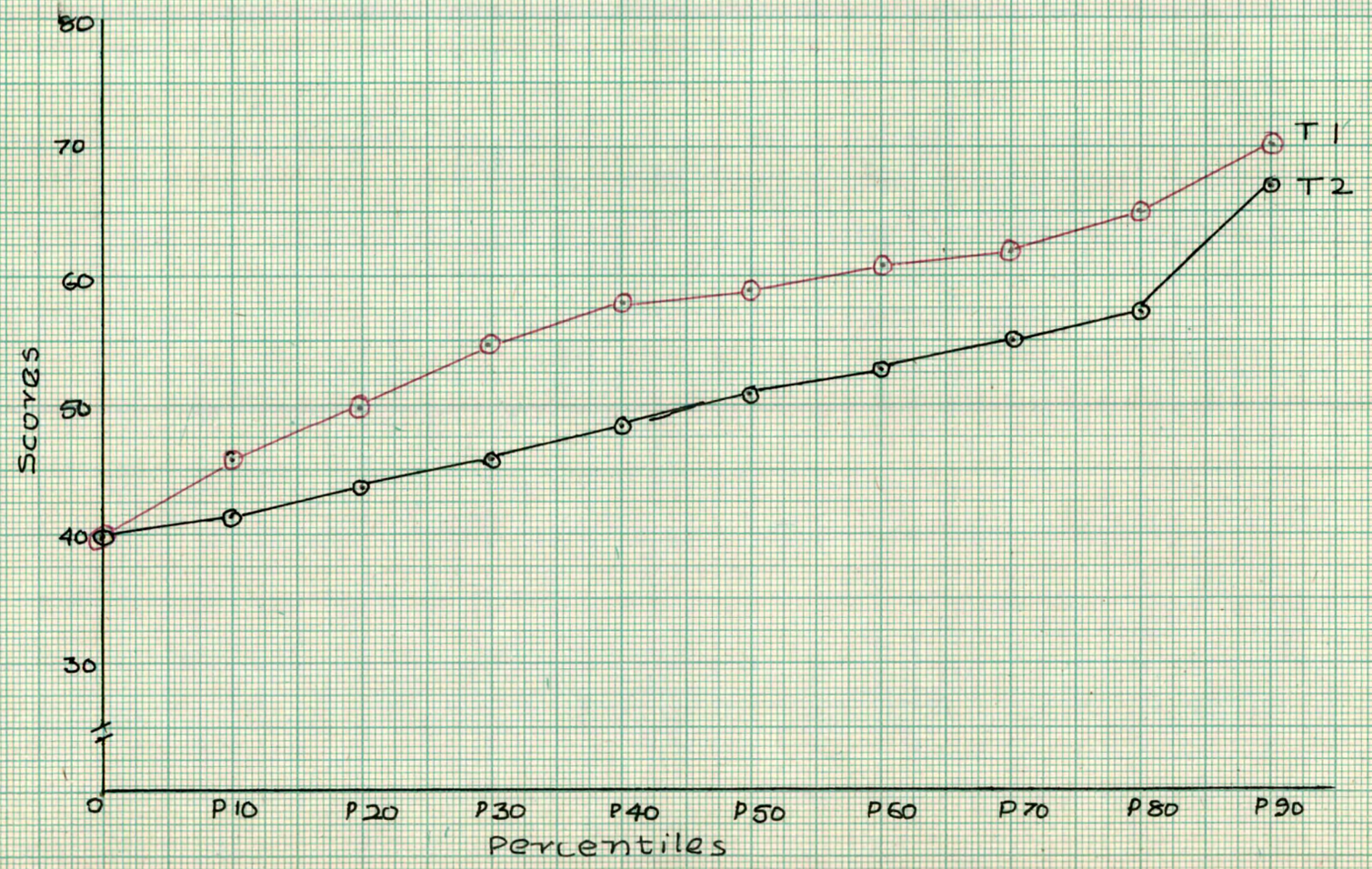


Figure 35 Graphical Representation of the Percentile Points on Achievement Through strategy (T_1) and SBP (T_2) Rural G4

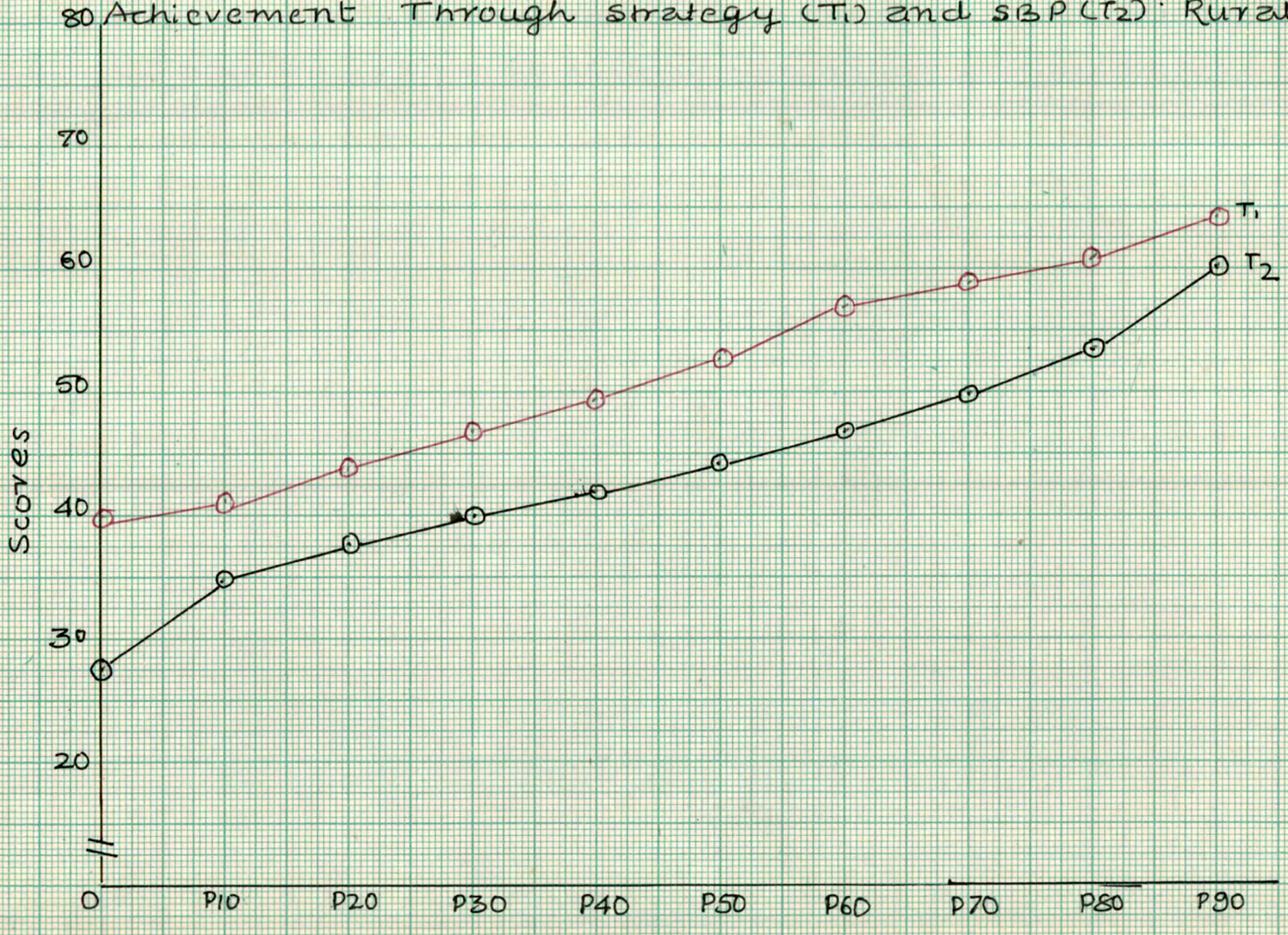


Figure $^{36}_{X}$ Graphical Representation of the Percentile Points on Achievement Through strategy (T_1) and SBP (T_2): Rural Sc I

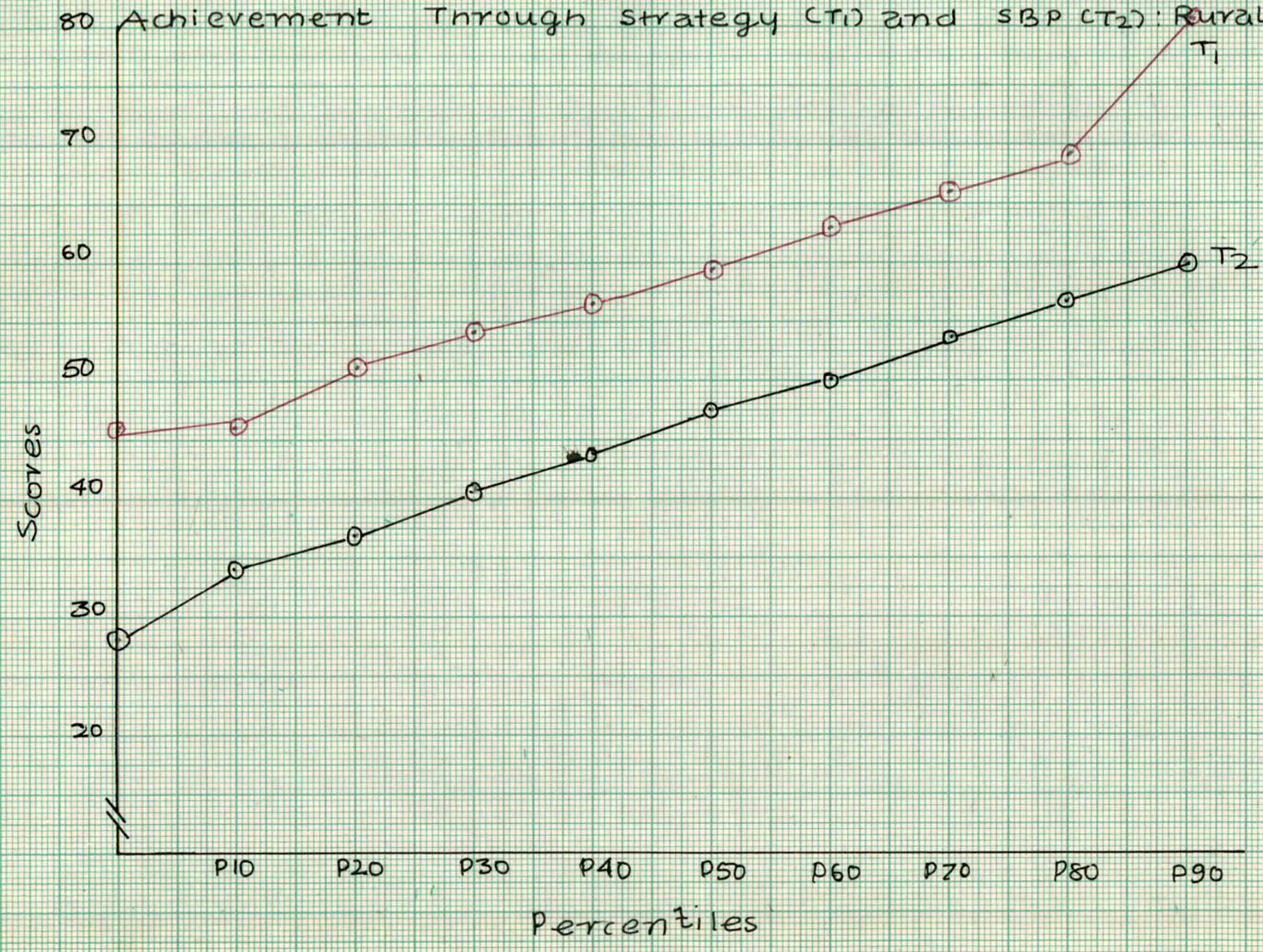


Figure 37 Graphical Representation of the Percentile Points on Achievement Through strategy (T_1) and SBP (T_2): Rural Sc2

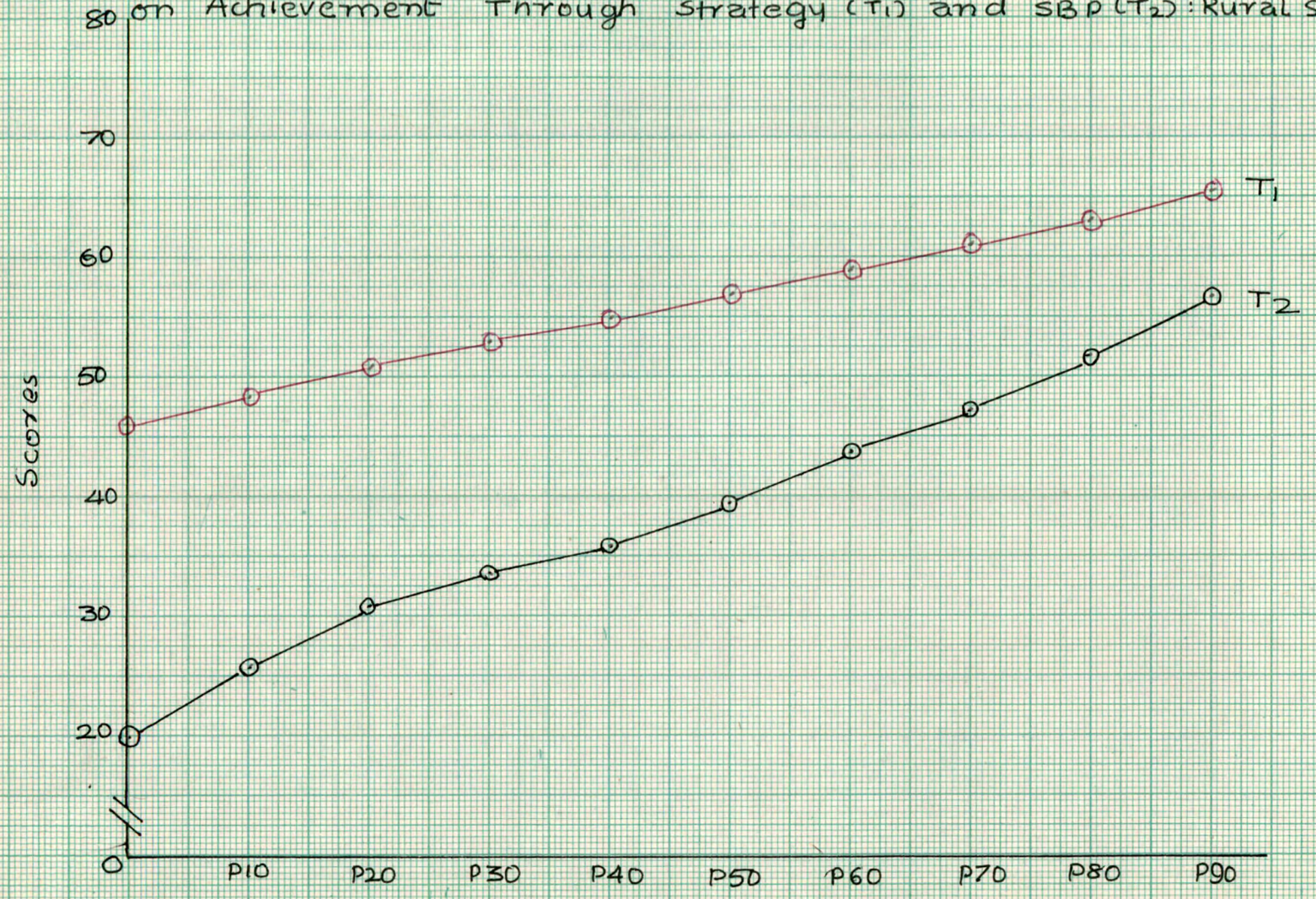


Figure 38 Graphical Representation of the Percentile Points on Achievement Through Strategy (T_1) and SBP (T_2) : Rural Sc3

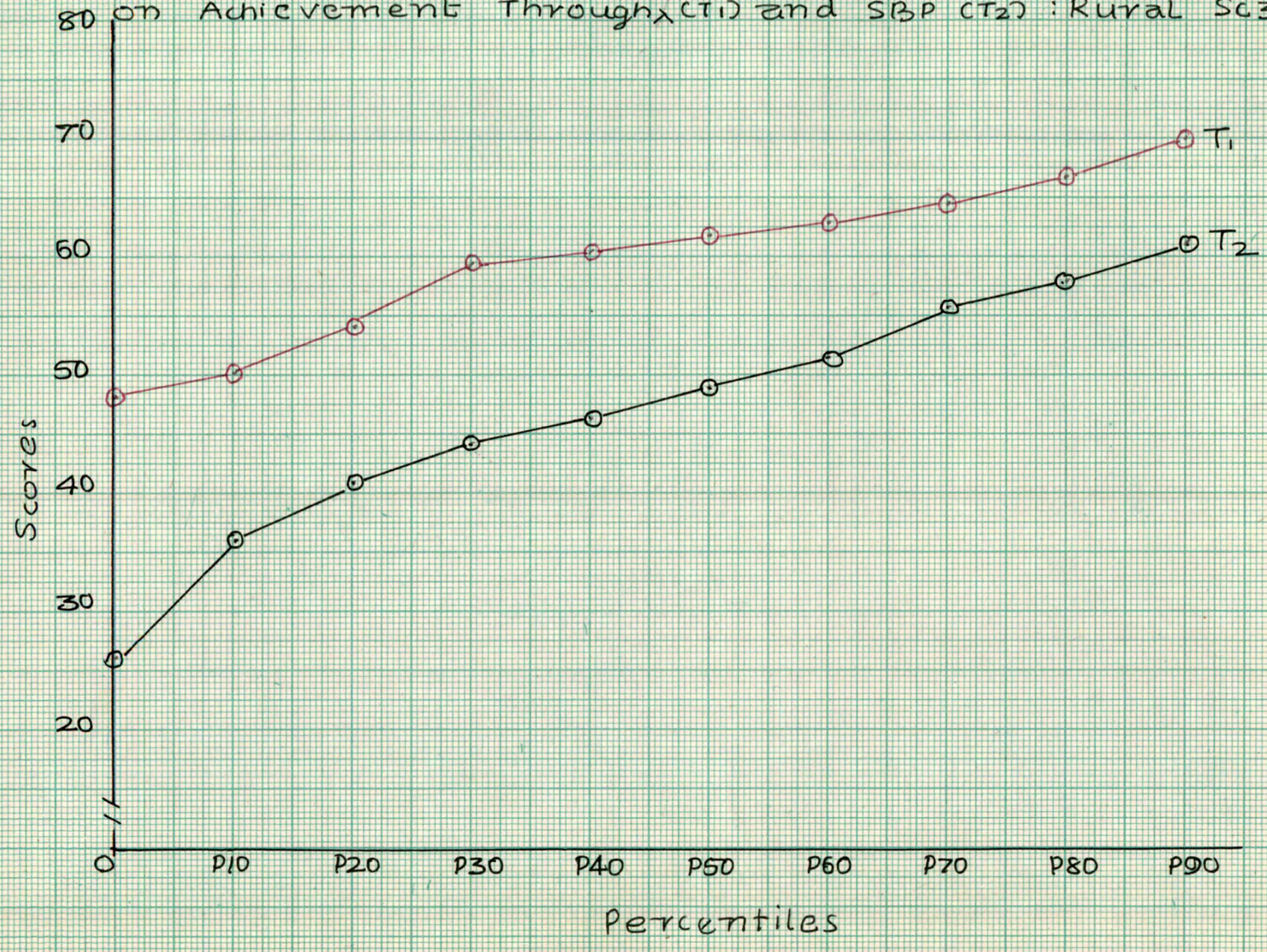
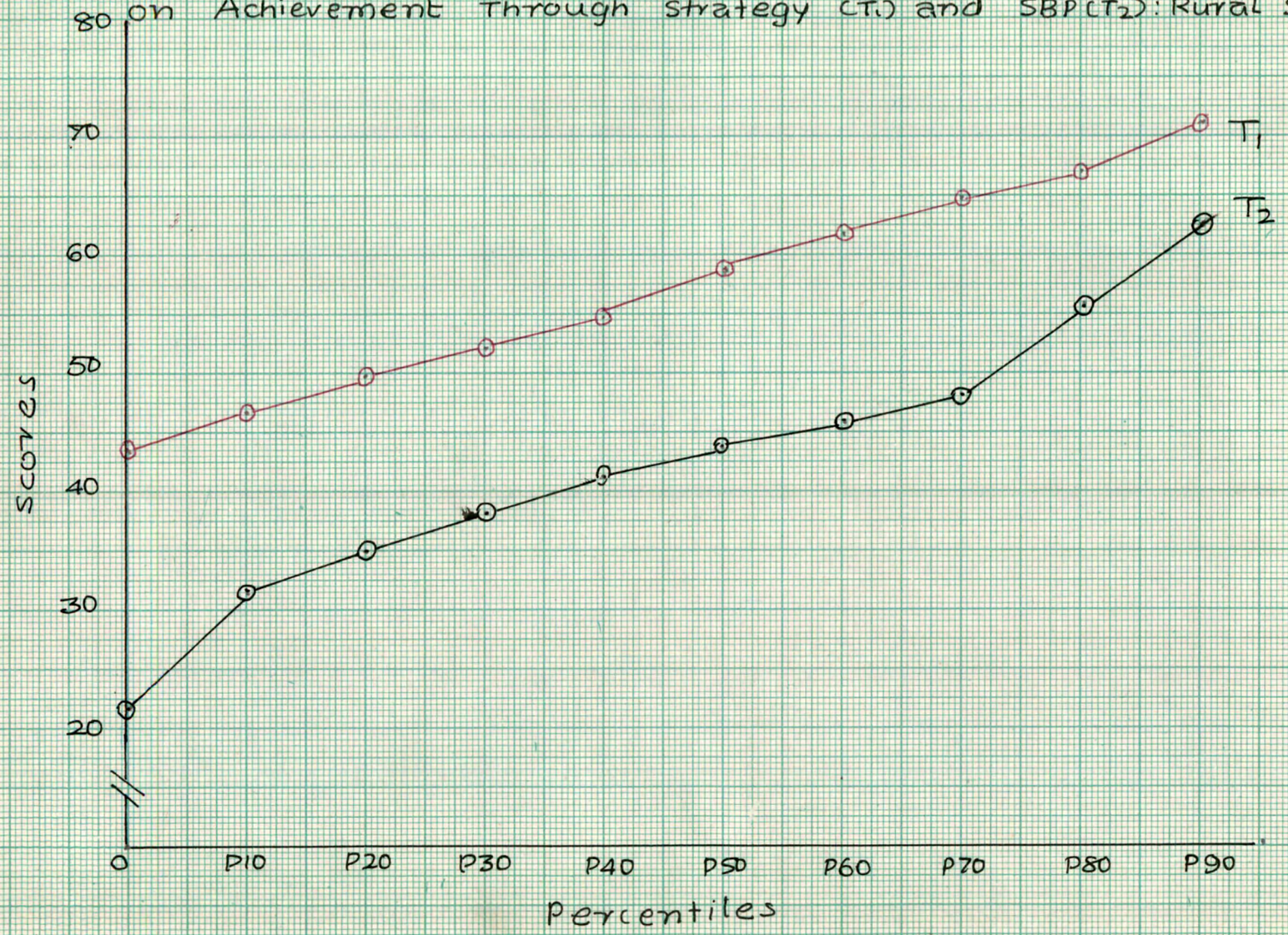


Figure 39 Graphical Representation of the Percentile Points on Achievement Through strategy (T_1) and SBP (T_2): Rural Sc4



Refering to the Table 5.5(A) and the corresponding graphs, it can be observed that in 13 out of 16 lessons, all students in the urban sample have scored above 30% marks which is considered to be the pass mark in various subjects. In the same line 90% of the students have scored pass marks in all the lessons. In 12 out of 16 lessons 50% of the students have scored marks above 60% which is generally considered as 1st Class. Thus, it shows the effectiveness of the strategies. In comparison to this it can be found that the urban students listening to radio programmes alone could not perform as well as the students who learnt through the strategies. Only in 5 out of 16 programmes all the students have got pass marks. In all the lessons, 50% students have scored more than pass marks. But only 20% of the students have scored above 60% of marks. This shows that in all the lessons the radio with strategy has influenced the urban students' achievement in comparison to those urban students who listened to SBP through radio alone.

Refering to Table 5.5(B), it is observed that in the rural school, in 15 out of 16 lessons all students have got pass marks (30%) and in the other lesson 90% of the students have passed. Fifty percent of the students in 15 lessons have scored above 50% marks. It can be seen, 40% of the students have scored more than 60% marks in 13 units. Regarding the students who learnt with only radio broadcast it is seen all of them have scored pass marks in two lessons only, where as only 60% have got pass marks in all the lessons. Only 10% of the students have got 60% or more than 60% of scores in 14 lessons. This comparison shows the effectiveness of the SBP with strategy through the percentile distribution of students scores.

5.1.2.3.2 Analysis of Variance

The hypothesis stated under caption 5.1 was put in the form of null hypotheses separately for urban and rural samples in respect of each programme. They were :

(1) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme O_1.

(2) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme O_2.

(3) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme O_3.

(4) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme O_4.

(5) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme H_1.

(6) There is no significant difference between the Mean achievement of the urban students learning through the SBP

alone and that of the students learning through the strategies developed for the programme H_2.

(7) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme H_3.

(8) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme H_4.

(9) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme G_1.

(10) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme G_2.

(11) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme G_3.

(12) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme G_4.

(13) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme Sc_1.

(14) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme Sc_2.

(15) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme Sc_3.

(16) There is no significant difference between the Mean achievement of the urban students learning through the SBP alone and that of the students learning through the strategies developed for the programme Sc_4.

(17) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme O_1.

(18) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme O_2.

(19) There is no significant difference between the Mean achievement of the rural students learning through the

SBP alone and that of the students learning through the strategies developed for the programme O_3.

(20) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme O_4.

(21) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme H_1.

(22) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme H_2.

(23) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme H_3.

(24) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme H_4.

(25) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme G_1.

(26) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme G_2.

(27) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme G_3.

(28) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme G_4.

(29) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme Sc_1.

(30) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme Sc_2.

(31) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme Sc_3.

(32) There is no significant difference between the Mean achievement of the rural students learning through the SBP alone and that of the students learning through the strategies developed for the programme Sc_4.

Level of significance at 0.05 has been accepted for making decisions about rejecting or not rejecting the hypothesis.

The techniques of Analysis of Variance was used to test the hypotheses stated above. The steps of calculations were taken from Garrett (1969). For each SBP, the total sum of squares, sum of squares between groups and the sum of squares within the groups were calculated and the 'F' ratio found out. Further they were arranged in a table by putting the sum of squares, degrees of freedom, variance and the 'F' ratio for each SBP, for urban and rural samples separately. The Table 5.6 gives the obtained values of the sum of squares, variances and the corresponding 'F' ratios.

Table 5.6(A)
Summary of Analysis of Variance
of the Criterion Tests Scores
(Urban)

Topic	Source	Sum of Squares	Degree of Freedom	MS(V)	F	Signi-fica nce
O_1	B.M.	642.367	1	642.367		
	W.G.	3771.442	66	57.143	11.241	*
	Total	4413.809	67			
O_2	B.M.	582.914	1	582.914		
	W.G.	1779.429	68	26.168	22.275	*
	Total	2362.343	69			
O_3	B.M.	168.818	1	168.818		
	W.G.	2345.617	67	35.01	4.822	*
	Total	2514.435	68			
O_4	B.M.	2379.333	1	2379.333		
	W.G.	2452.61	68	36.067	65.96	*
	Total	4831.943	69			
H_1	B.M.	307.626	1	307.626		
	W.G.	1036.405	64	16.241	18.94	*
	Total	1344.031	65			
H_2	B.M.	581.547	1	581.547		
	W.G.	1465.618	65	22.54	25.80	*
	Total	2047.165	66			
H_3	B.M.	1407.956	1	1407.956		
	W.G.	1906.636	69	27.632	50.953	*
	Total	3314.592	70			
H_4	B.M.	591.973	1	591.973		
	W.G.	3083.970	67	46.029	12.861	*
	Total	3675.943	68			

Continued...

Table 5.6(A) continued.

Topic	Source	Sum of Squares	Degree of Freedom	MS(V)	F	Significance
G_1	B.M.	347.307	1	347.307		
	W.G.	1756.638	70	25.09	13.84	*
	Total	2103.945	71			
G_2	B.M.	442.829	1	442.829		
	W.G.	2417.254	71	34.045	13.006	*
	Total	2860.083	72			
G_3	B.M.	2819.561	1	2819.561		
	W.G.	1169.172	69	16.945	166.399	*
	Total	3988.733	70			
G_4	B.M.	1133.27	1	1133.27		
	W.G.	1568.834	71	22.096	51.288	*
	Total	2702.104	72			
Sc_1	B.M.	590.216	1	590.216		
	W.G.	3000.979	65	46.169	12.784	*
	Total	3591.195	66			
Sc_2	B.M.	421.055	1	421.055		
	W.G.	3948.894	75	52.652	7.996	*
	Total	4369.949	76			
Sc_3	B.M.	1920.044	1	1920.044		
	W.G.	1287.411	64	20.115	95.45	*
	Total	3207.455	65			
Sc_4	B.M.	1564.297	1	1564.297		
	W.G.	1695.487	72	23.548	66.429	*
	Total	3259.784	73			

* Significant at .05 Level.

B.M. = Between Means

W.G. = Within Groups

Table 5.6(B)

Summary of Analysis of Variance
of the Criterion Test Scores
(Rural)

Topic	Source	Sum of Squares	Degree of Freedom	MS(V)	F	Significance
O_1	B.M.	1619.99	1	1619.99		
	W.G.	4671.17	72	64.88	24.97	*
	Total	6291.16	73			
O_2	B.M.	2479.01	1	2479.01		
	W.G.	1603.04	72	22.26	111.37	*
	Total	4082.05	73			
O_3	B.M.	328.61	1	328.61		
	W.G.	1949.25	69	28.25	11.63	*
	Total	2277.86	70			
O_4	B.M.	561.06	1	561.06		
	W.G.	2928.73	74	39.57	14.18	*
	Total	3489.79	75			
H_1	B.M.	330.05	1	330.05		
	W.G.	2055.32	68	30.225	10.92	*
	Total	2385.37	69			
H_2	B.M.	519.14	1	519.14		
	W.G.	1897.00	72	26.35	19.7	*
	Total	2416.14	73			
H_3	B.M.	806.56	1	806.56		
	W.G.	2719.08	72	37.76	21.36	*
	Total	3525.64	73			
H_4	B.M.	3036.03	1	3036.03		
	W.G.	1928.64	73	26.42	114.91	*
	Total	4964.67	74			

Continued.....

Table 5.6(B) Continued

Topic	Source	Sum of Squares	Degree of Freedom	MS(V)	F	Signi-ficance
G_1	B.M.	1590.589	1	1590.589		
	W.G.	1254.096	71	17.663	90.052	*
	Total	2844.685	72			
G_2	B.M.	1127.586	1	1127.586		
	W.G.	2612.32	72	36.28	31.08	*
	Total	3739.906	73			
G_3	B.M.	243.522	1	243.522		
	W.G.	1524.79	75	20.33	11.98	*
	Total	1768.312	76			
G_4	B.M.	219.073	1	219.073		
	W.G.	1377.716	69	19.966	10.97	*
	Total	1596.789	70			
Sc_1	B.M.	627.175	1	627.175		
	W.G.	1997.825	62	32.223	19.463	*
	Total	2625.000	63			
Sc_2	B.M.	1374.068	1	1374.068		
	W.G.	1922.244	75	25.63	53.61	*
	Total	3296.312				
Sc_3	B.M.	631.31	1	631.31		
	W.G.	1294.89	78	16.60	38.03	*
	Total	1926.20	79			
Sc_4	B.M.	1025.04	1	1025.04		
	W.G.	1921.33	75	25.61	40.02	*
	Total	2946.37				

* Significant at .05 level.

B.M. = Between Means

W.G. = Within Groups

The analysis of the results of the urban students through the technique of analysis of variance (Table 5.6(A)) shows that in all the lessons the observed 'F' ratios are greater than the 'F' ratios to be significant at .05 level of significance with reference to the degrees of freedom concerned. Also it is found that all the 'F' ratios except for the lesson on 'Bagala Baguli' in Oriya, are significant at .01 level of significance. Hence, in all the lessons the null hypotheses of no significant difference between the achievement of students with strategies and that of radio alone has been rejected. In this connection if table No.5.4(A) is observed, it can be found that all the mean scores of urban students in respect of different lessons through the strategy are greater than the mean scores of the students who learnt through radio alone. Therefore, it can be commented that in all the lessons, the strategy has its significant effect on the achievement of the urban students. Similarly, by going through Table 5.2(B) and Table 5.4(B) it can be observed that the strategy has also significant effect on the achievement of the students in the case of the rural students.

The above interpretation shows that in both urban and rural situation, the strategy has worked effectively to increase the achievement of the students.

5.1.2.8.3 Percentage Increase of Means

As mentioned in the design, the percentage increase of means were found out for all the 16 experimental situations for rural and urban sample separately. It is represented in Table 5.7.

Table 5.7(A)

Percentage Increase of Means
(Urban)

Subject	Sr.No. of Pgm.	M_1	M_2	$\frac{M_1-M_2}{M_2} \times 100$	Mean of the Percentage Increase of Means
ORIYA	O_1	62.48	48.42	29.04	27.71
	O_2	61.14	49.41	23.74	
	O_3	74.36	67.94	9.44	
	O_4	74.06	49.82	48.65	
HISTORY	H_1	67.17	57.20	17.43	26.59
	H_2	66.30	54.14	22.46	
	H_3	46.40	32.95	40.82	
	H_4	59.84	47.62	25.66	
GEOGRAPHY	G_1	42.68	33.58	27.09	36.22
	G_2	61.52	51.42	19.64	
	G_3	64.54	38.98	65.57	
	G_4	63.46	47.86	32.59	
GENERAL SCIENCE	Sc_1	61.04	48.36	26.22	30.36
	Sc_2	50.06	45.76	9.39	
	Sc_3	72.94	51.38	41.96	
	Sc_4	61.78	42.94	43.87	

M_1 = Mean of the students' achievement who learnt through the strategies.

M_2 = Mean of the students' achievement who learnt through SBP alone.

Table 5.7(B)

Percentage Increase of Means
(Rural)

Subject	Sr.No. of Pgm.	M_1	M_2	$\frac{M_1-M_2}{M_2} \times 100$	Mean of the Percentage Increase of Means
ORIYA	O_1	60.34	42.00	43.66	
	O_2	67.88	57.66	17.72	24.11
	O_3	65.74	57.42	14.48	
	O_4	66.34	55.00	20.61	
HISTORY	H_1	66.38	48.02	38.23	
	H_2	67.08	57.62	16.41	38.40
	H_3	43.49	32.75	32.79	
	H_4	62.16	37.40	66.2	
GEOGRAPHY	G_1	51.16	33.26	53.81	
	G_2	56.18	42.34	32.68	28.69
	G_3	58.56	52.06	12.48	
	G_4	53.16	45.90	15.81	
GENERAL SCIENCE	Sc_1	60.50	48.14	25.6	
	Sc_2	57.86	40.78	41.88	30.60
	Sc_3	61.20	49.24	24.28	
	Sc_4	59.06	45.20	30.66	

M_1 = Mean of the students' achievement who learnt through the strategies.

M_2 = Mean of the students' achievement who learnt through SBP alone.

From Table 5.7(A) and 5.7(B), it can be seen that the mean percentage increase of means among the urban sample is 30.22 and that among the rural sample is 30.45. This shows that there is no appreciable difference in the influence of the improvement brought about in the SBPs through the strategies in urban and rural students. Among the urban students, Geography is the subject where the percentage increase of means is found to be the maximum where as among the rural students it is History, But History seems to be the subject where the percentage increase of means is minimum among urban students where as it is Oriya among the rural students.

DISCUSSION

The results, by and large, endorse the theoretical frame work which constituted the basic premise of the experimentation that a single medium may not by itself be able to realise the entire spectrum of instructional objectives. As Saloman (1970) defined, media are unique presentation modes which fulfill unique psychological functions. Therefore, a single medium may not be versatile enough to bring about varying psychological functions which fulfill diversified instructional objectives.

It was for this reason that the strategies developed, involved different media with diversified attributes which were meant to supplement the school broadcast programmes. However, it may be mentioned that the adoption of the different media also facilitated more time for the students to interact with the content matter. (In normal conditions, though the period meant for the SBP ranges from 35 to 45 minutes, only 20 minutes are utilized for SBP proper. The rest of the time is left poorly utilised. The developed strategy, however, takes care of this time. Each of the strategies is more or less of 45 minutes and as such is not affecting the time economy as far as the school schedule is concerned). The evidence that the mean performances of the students who underwent the developed strategies were significantly greater than that of the students who underwent SBP alone, therefore, is a clear testification to the theoretical framework and the research hypotheses that were generated thereof. Also, the study of the percentage increase of means clearly show that the strategy has an appreciable advantage over SBP alone.

SECTION II

REACTIONS TOWARDS STRATEGIES

5.2 REACTIONS OF STUDENTS TOWARDS THE STRATEGIES

5.2.1 Instrumentation

For studying the reactions of the students towards the strategies a questionnaire was prepared by the investigator on different components of the strategy. The questionnaire had three different sections viz., Pre-broadcast, Broadcast and Post-broadcast (Appendix-X). Each section contained items on the various techniques used during the experiment like question-answer, story telling, work book, projected pictures, field trips, quiz, team teaching, etc. Most of the questions were in the open-ended form requiring brief answers. Some were also of Yes/No type.

5.2.2 Sample

All the 85 students of Grade-VII from O.T.M. High School, Choudwar (Urban) and 84 students of Grade-VII from Salipur High School (Rural) who were taken as the subjects of the experiment, were included in the sample.

5.2.3 Collection of Data

After completion of all the experiments the investigator met the students in groups and distributed the questionnaires

after giving necessary instructions to fill in the questionnaires. After a week's interval the questionnaires were collected from 108 (55 Rural, 53 Urban) students again by meeting them in groups. Data from other students could not be collected due to the absence of those students. So all the 108 (64 per cent) questionnaires received were subjected to analysis.

5.2.4 Analysis and Interpretation

Data collected were analysed qualitatively by finding out the percentages of the responses given by the students. Reactions of the respondents towards different techniques used in the pre-broadcast, during broadcast and post-broadcast sessions are presented below.

Pre-broadcast Activities: In the pre-broadcast session, three different techniques such as question-answer, display of maps/models and story telling were used to introduce the topic of broadcast wherever necessary. The students who responded, felt that these techniques have helped them in recollecting the past experiences, enriching their interest towards the topic, and providing better understanding of the subject matter. Sixty seven per cent of rural and sixty one per cent of urban children have reported that the time taken by the teacher before the broadcast was sufficient for them. Most of the students (91 per cent rural, 79 per cent urban) have expressed

the need of the presence of their teacher to do the activities in connection with SBP use. The idea of the organization of these activities in the class by a person other than their teacher has been rejected by a majority of the students (63 per cent rural, 71 per cent urban). Those who have given a favourable opinion have stated that the teacher should remain present if the activities are to be conducted by any other person.

Activities During the Broadcast: Observing the reactions of the students towards different activities like use of projected pictures, models, work book, writing during listening and teacher's behaviour during the broadcast, it can be commented that these techniques have attracted the students to perceive the usefulness of the techniques at the time of listening to the radio. For example, about the use of projected pictures while listening to the radio, all the rural and urban students have expressed that they were benefitted by this techniques. Ninety one per cent of rural and ninetysix per cent of urban children have reported that their attention towards listening was sustained by seeing the pictures at the time of listening. It is also important to note that 28 per cent of rural and 25 per cent of urban children have stated to have faced difficulties in listening to the programmes due to lack of speech clarity, absence of coloured pictures, more attention having been given towards seeing the pictures, lack of proper sequence of the pictures and static nature of the figures.

Eighty nine per cent of the rural and 83 per cent of the urban students have desired to have colour pictures instead of black and white. It is also interesting to observe that all the rural students and more than 3/4th (83 per cent) of the urban students have appreciated the use of a model at the time of listening on the topic of the broadcast. For instance, at the time of listening to the programme on human skeleton, a skeleton was kept before the students instead of the slides. Similarly, use of a work book during the broadcast has benefitted the students in sustaining attention, remembering facts and understanding the subject matter. A considerable number of students (25 per cent) have expressed that they have faced difficulties like missing some concepts of broadcast and inability to cope with the speed of the broadcaster, while answering the questions through the work book at the time of listening during the broadcast. Also the technique of writing the key points in an abbreviated form at the time of listening has been appreciated by 89 per cent and 96 per cent of rural and urban children respectively. Almost all the respondents feel that these points should be discussed after the broadcast. Eighty five per cent of rural and 79 per cent of urban children have reported that they read those points again after going home. Teacher's role of pointing to the various parts of the objects/projected pictures has been liked by all the students of both urban and rural schools. Commenting on the voice of the participants 92 per cent of rural and 84 per cent of the

urban children have expressed to have liked the female voice. While answering the questions on the participants of SBP, 10 per cent, 34 per cent and 24 per cent of the students have desired the participants to be only students, both teachers and students and only teachers respectively.

Post-broadcast Activities: In the post-broadcast session, techniques like discussion, team teaching, field trip, role playing, quiz, guest talk, reprojection of slides and home assignment were used by the teacher for revising the contents of the broadcast programmes wherever necessary.

Reporting on the use of discussion session after the broadcast, 78 per cent of the rural and 92 per cent of the urban children have stated that they had taken the advantage of the session by asking questions to the teacher freely. By this, they were benefitted in having their doubts removed, understanding the subject matter and being less fearful of committing mistakes while answering the questions put by the teacher. Almost all the children (98 per cent rural, 92 per cent urban) have reported to have gained by the intervention of the teacher to give the right answer while students respond incorrectly during the course of discussion. Students, who could not take part in the discussion upto their satisfaction have stated the causes like lack of sufficient time and fear of committing mistakes. Eightyfour per cent of rural and 70 per

cent of urban children have expressed that they also discuss among themselves about the programme while going back home and also at the time of coming to school. A few (7 per cent each in urban and rural) have expressed that this discussion on the way back to school comes spontaneously and through this they ask their friends the questions which they could not ask in the class. Twelve per cent of rural and 8 per cent of urban children have felt that this discussion helps in remembering the subject matter and getting pleasure.

About team teaching, 71 per cent of rural and 87 per cent of urban children have stated that this technique helped them in understanding the subject matter. A few (5 per cent rural, 15 per cent urban) have reported that they were confused through this approach. Some more (13 per cent rural) have felt that they were confused in the beginning but their doubts were clarified at the end. A majority of the respondents (68 per cent rural, 92 per cent urban) have expressed that they would like to have two teachers to conduct this session. They have stated that the presence of two teachers would be helpful for getting pleasure (25 per cent rural, 62 per cent urban) and better understanding of the subject matter (25 per cent rural, 62 per cent urban).

On their reactions towards the field trip after listening to a broadcast, 45 per cent of rural and 80 per cent

of urban children have responded that they were benefitted by seeing the things in reality. Seventy two per cent of rural and 55 per cent of urban children have desired to have this activity on most occassions.

Giving their views on the conduct of role playing situation in the post-broadcast session, 90 per cent of rural and 92 per cent of urban children have reported that this was enjoyable for them. Also a majority of the children (69 per cent rural and 80 per cent urban) have expressed that at the time of role playing they were thinking of becoming actors, and act in the classroom. However, it has been reported by 84 per cent rural and 90 per cent of urban children that they failed in understanding of the subject matter.

Quiz technique adopted by teachers was liked by 76 per cent of rural and 91 per cent of urban children. It has been stated by the students (65 per cent rural and 63 per cent urban) that the entire subject matter could be discussed through this approach. That helped in developing the ability to participate in competitions among themselves, was the report of 18 per cent of rural and 24 per cent of the urban children. Also a considerable number of students (25 per cent rural and 36 per cent urban) have stated to have profitted by this approach in remembering facts.

On their reaction towards the technique of guest talk, all the students have expressed that they were influenced by the discussion of the guest. All the rural children and more than half of urban children (62 per cent) have stated that this talk prompted them to know more about the subject matter. To have a person of this kind for various broadcast programmes has been desired by 83 per cent of rural and 59 per cent of urban children.

Responding to questions on reprojection of pictures, 95 per cent each of rural and urban children have reported that they gained by seeing pictures again in the post-broadcast session. Fourteen per cent of rural and 29 per cent of urban children have reported that they appreciated in getting the pictures which they missed during the broadcast. Similarly, 28 per cent and 36 per cent of rural and urban children respectively have expressed that seeing the pictures again has helped them for better understanding of the topic. About 3/4th of rural and nearly half of the urban children have desired to continue this practice of reprojection for most of the lessons.

While answering the questions on home assignment, most of the children (91 per cent rural and 89 per cent urban) have stated that they feel the necessity of reading the topic again at home. Many of them (82 per cent rural and 91 per cent urban) have expressed that they could clearly understand the topic by reading at home. However, 82 per cent of rural and 94

per cent of urban children feel that they do well in the test after doing the home assignment given to them. It has been stated by 40 per cent rural and 23 per cent urban children that the study of other subjects were disturbed due to this assignment.

Most of the students (96 per cent rural and 91 per cent urban) have reported that they were benefitted by appearing in the criterion test on the day following the broadcast. Forty seven per cent of rural and 74 per cent of urban children have liked the size and style of the test. But a few students (7 per cent) have desired to have the test immediately after the broadcast instead of having it the next day.

Sixty nine per cent of rural and 58 per cent of urbam respondents felt that they missed something when they remained absent from some programmes of SBP due to some reason or other. However, more than 3/4th of children (75 per cent rural and 77 per cent urban) have expressed their satisfaction in listening to the SBP through this new approach.

5.3 REACTIONS OF THE TEACHERS

5.3.1 Instrumentation and Sampling

For studying the reactions of the teachers towards the implementation of the strategies a non-structured interview was proposed to be conducted on all the eight teachers (4 each from

urban and rural) involved in the use of the strategies in connection with the experiment.

5.3.2 Collection of Data

After the completion of the experiment, in both the schools, the concerned teachers were interviewed during their leisure hours. They were asked questions on the aspects like orientation of teachers for broadcast use, physical facilities necessary and the relationship of this new way of utilization of SBP with other day to day teaching practices.

5.3.3 Analysis and Interpretation

All the eight teachers have felt that orientation of teachers for SBP use is a must for the implementation of this strategy for effective utilization of the radio instruction programmes. A majority of them (six) feel that this training should be included in the pre-service teachers training programmes conducted in the teachers' training colleges. Teachers, in service, should be trained over teachers' broadcast programmes along with support materials. They also feel that complete packages should be given to the concerned subject teachers in the school well in advance so that they can prepare themselves for the classroom use of SBP. Need of co-ordination between the A.I.R. station and the school headmasters to make use of this new way of utilization of SBP in a large number of schools has been felt by all the teachers interviewed.

Responding to the questions on necessary physical facilities in the school in connection with the SBP use, five teachers have desired for provision of a separate listening room where as three teachers have expressed that existing science rooms can be used for this purpose. All the teachers feel the necessity of having a tape-recorder for every school utilizing SBP. They feel that through this gadget, it will be more convenient for them to use the programmes with this strategy by adjusting time for pre and post-broadcast activities. They feel, if necessary, a programme for a particular class can be used again for the same class or any other class depending upon the need of the students. All the respondents have also voted for formation of a broadcast planning committee in every school utilizing this programme. Seven out of eight teachers have expressed that conduct of a broadcast lesson by two teachers will be an ideal situation. This would reduce the burden of a single teacher and also it will be convenient to conduct the activities like team teaching, field trips, small group discussions, etc.

Talking on the usefulness of this strategy in relation to the regular day-to-day teaching programmes, all the teachers have expressed that the techniques used through this strategy may have some influence on teaching in ordinary

classroom situation. They felt that teachers would be prompted to use these techniques while teaching various subjects in their regular schedule.

Discussion

The reactions of the students towards the activities show that for all the techniques almost all the students have given favourable opinion about their usefulness in the use of the SBP. This shows that this strategy if implemented may be liked by the students in large numbers and it would help in influencing their academic achievement. But the investigator is of the opinion that the students have responded to the questionnaire superfluously. As the questionnaire was a long one and the students have responded within a short time perhaps they have not given adequate thought while answering the questions. So their reactions towards the strategies may be accepted carefully although it shows the success of the strategies. However, the validity of their reactions could be found out through continuous experimentations and indefth analysis of their responses. Further, the reactions of the teachers towards the implementation of the strategy shows that if oriented properly and physical facilities provided in the schools according to the need of SBP, the strategy can be implemented in the schools utilizing SBP. This may prompt the non-user schools to feel the importance of radio instruction and use the educational radio programmes for their students. So

the educational planners and administrators working at the A.I.R. and other levels of school education should come forward to modify their programmes in the line of the strategy. If this is done, no doubt, the school broadcast programme will find its real place in the instructional process.

REFERENCES

A.I.R., Cuttack, Satyara Pujari Acharya Harihara, Radio Transcript on Oriya for Grade VII, A.I.R., Cuttack, 1978.

_____ Bagala Baguli, Radio Transcript on Oriya for Grade VII, A.I.R., Cuttack, 1978.

_____ Paribartana, Radio Transcript on Oriya for Grade VII, A.I.R., Cuttack, 1978.

_____ George Bernard Shaw, Radio Transcript on Oriya for Grade VII, A.I.R., Cuttack, 1978.

_____ Shikari Krishaka Hela, Radio Transcript on History for Grade VII, A.I.R., Cuttack, 1978.

_____ Ama Nadi Kulara Adi Savyata, Radio Transcript on History for Grade VII, A.I.R., Cuttack, 1978.

_____ Europia Savyatara Adipeetha. Radio Script on History.

_____ Bigyanara Punarjagaranara Patha Pradarshaka - Copernicus, Galileo, Harvey and Newton, Radio Transcript on History for Grade VII, A.I.R., Cuttack, 1978.

A.I.R., Cuttack, Prakrutiya Chidiakhana, Radio Script on Geography for Grade VII, A.I.R., Cuttack, 1978.

_____ Ketoti Pradhan Silpa - Louha, Ispat, Karpasa, Radio Transcript on Geography for Grade VII, A.I.R., Cuttack, 1978.

_____ Pruthivira Janabahula O Janabirala Anchala, Radio Transcript for Grade VII, A.I.R., Cuttack, 1978.

_____ Krishna Hiraka, Radio Transcript on Geography for Grade VII, A.I.R., Cuttack, 1978.

_____ Phularu Phala, Radio Transcript on General Science for Grade VII, A.I.R., Cuttack, 1978.

_____ Nakshyatra Mandala, Radio Transcript on General Science for Grade VII, A.I.R., Cuttack, 1978.

_____ Manusyara Bhabisyata Basasthana - Chandra, Radio Transcript on General Science for Grade VII, A.I.R., Cuttack, 1978.

_____ Manusya Kankala O Tahara Sanchalana, Radio Transcript on General Science for Grade VII, A.I.R., Cuttack,1978.

Cochran,W.G. & Cox,G.M., Experimental Designs (2nd ed.) N.Y., Wiley, 1957. Quoted in Gage,N.L. Handbook of Research on Teaching, Rand McNally & Co., Chicago, 1963, P.220.

Gage,N.L., Handbook of Research on Teaching, Rand McNally, Chicago, 1963, Pp.220-221.

Garrett,H.E. & Woodworth,R.E., Statistics in Psychology and Education, David McKay Co. Inc., 1966.

Govinda, R., Development of a Programmed Text on Educational Evaluation and Experimentally Studying Its Effectiveness as Instructional Material for B.Ed. Students, Ph.D. Thesis, CASE, M.S.University, Baroda, 1977.

Kempthorne, O., The Design and Analysis of Experiments, New York, Wiley, 1952, Quoted in Gage, N.L. Handbook of Research on Teaching, Rand McNally & Co., Chicago, 1963, P.220.

Mc Call, W.A., How to Experiment in Education, Macmillan, N.Y., 1923, Quoted in Gage, N.L., Handbook of Research on Teaching.

Menon, S.B., Relative Effectiveness of Different Instructional Media in Teaching Physics at Secondary School Level, Unpublished M.Ed. Dissertation, CASE, M.S.University, Baroda, Pp.51-54, 1978.

Padma, M.S., Teaching Patterns and Pupils' Attainment, Unpublished Ph.D. Thesis, CASE, M.S.University,Baroda,1975.

Saloman, G., What Does It Do To Johny? A Cognitive Functionalistic View of Research on Media, Quoted in Menon,S.B., Relative Effectiveness of Different Instructional Media in Teaching Physics at Secondaryy School level, Unpublished M.Ed. Dissertation, CASE, M.S.University, Baroda, 1978.

Sansanwal, D.N., An Experimental Study in Programmed Learning for Teaching Research Methodology Course at M.Ed. Level,1977, Vol.1.

Underwood,B.J., Experimental Psychology, Appleton-Century-Crofts, New York, 1949, Quoted in Gase,N.L., Handbook of Research on Teaching.

Van Dalen,D.B., Understanding Educational Research,McGrow Hill Co. 1973.