

**CO-OPERATIVE LEARNING IN THE  
TEACHING OF  
MAPWORK TO GEOGRAPHY STUDENTS  
IN TERTIARY EDUCATION**

*by*

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*Declaration*

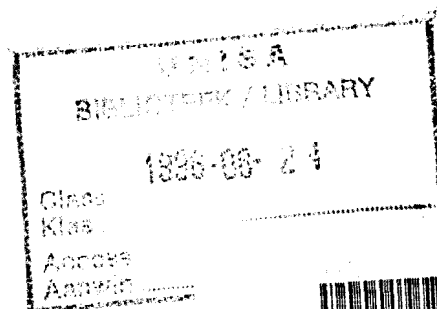
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AZWINDINI ERNEST TSHIBALO

*Dedication*

I would like to dedicate this dissertation to my wife, Tshifhiwa and children, Takalani, Rotshidzwa and Murendeni, from whom I borrowed the time needed for this study.



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I wish to express my sincere gratitude and appreciation to the following people without whose support and guidance this study would not have been possible:

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## *Summary*

This study investigates the use of co-operative learning in the teaching of mapwork to Geography students in tertiary education.

Diverse methods of teaching Geography mapwork and also theories of learning that are relevant to the teaching of mapwork are discussed. Co-operative learning, and how it can be employed in the teaching of mapwork is fully explained.

The study revealed that co-operative learning method can help students to achieve higher marks in mapwork. It is an instructional method that uses small groups of students working together to meet educational goals. The approach relies on interaction and interdependence and thus is especially suited to higher level conceptual tasks requiring problem-solving and decision-making.

## *Key terms*

co-operative learning; Geography; mapwork; teaching; methods of instruction; learning theories; student attitude; social support; co-operative learning methods; individual accountability; co-operative skills, team building; student achievement.

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# *Chapter One*

## *Introductory orientation*

### **1.1 INTRODUCTION**

"Geographical education has always incorporated the systematic teaching of map skills... The students' understanding of how they work and what they convey does not emerge spontaneously but requires a carefully-planned sequence of learning experiences" (Daugherty 1989:29).

The researcher agrees with this statement. Map skills in Geography do not develop spontaneously. Unfortunately the traditional teaching methods based on rote learning and poor planning still dominate our lecture rooms. The classical method, in which "telling" predominates and the learner is a passive listener, is ineffective for mapwork. This seems to have lessened the interest and achievement of students in this aspect of Geography.

The purpose of this study is to find methods and strategies of teaching mapwork that will arouse the students' interest and develop their basic mapwork skills.

### **1.2 ANALYSIS AND STATEMENT OF THE PROBLEM**

The situation in colleges of education is unsatisfactory as far as achievement in mapwork is concerned. Students arrive at the colleges of education without the basic mapwork skills that should have been developed at primary and secondary school levels. Apart from this, there are students whose measuring skills have not been developed even at teachers' college level. For example, they will start to measure from 1 instead of from 0.

In Grade 12, students are taught mapwork some few weeks before writing the examination. The method adopted by numerous teachers is to discuss previous examination questions, and students are encouraged to cram the answers.

It seems possible that teachers at primary and secondary level, as well as some lecturers at colleges of education, did not themselves master mapwork skills during their training.

The researcher was a member of the interview panel for applicants who wanted to teach Geography at a college of education in 1994. Many of these teachers could not differentiate between a topographical map and an ortho-photo map. The question is how do they teach what they do not know?

Sekete has identified teacher based problems in the teaching of mapwork. "Problems in mapwork teaching probably have their roots in the teacher. If teachers have no basic understanding of mapwork or how to link theory with practice, they will fail to lay a sound Geographical foundation for the primary school pupil" (Hall, Khubana, Nightingale & Sekete 1991:95). The two problems Hall and others have identified under teacher based problems are:

- (1) poor use of resources and,
- (2) poor methods of teaching mapwork.

With regard to poor methods of teaching mapwork, Sekete states, "Many teachers employ ineffective strategies in their lesson preparation. Poor questioning is one example" (Hall *et al.* 1991:96).

According to an informal assessment by the researcher, poor teaching methods are a major cause of the low achievements in mapwork by students. Many teachers still use outdated teaching methods. If students are to achieve better results in mapwork, they should be involved in activities that motivate them. For example, co-operative learning methods may be used where students can be involved while the teachers act as facilitators.

From the preceding it follows that the general research problem can be stated thus:

*Does co-operative learning improve (among others) first and second year Geography students' performance in the learning of mapwork?*

### **1.2.1 Problem 1**

Is there a significant difference between the average performance of a group of *first* year students who learnt mapwork by means of co-operative learning and another group who learnt mapwork by means of the traditional method?

### **1.2.2 Problem 2**

Is there a significant difference between the average performance of a group of *second* year students who learnt mapwork by means of co-operative learning and another group who learnt mapwork by means of the traditional method?

### **1.2.3 Problem 3**

Is there a significant correlation between *attitude* towards co-operative learning and *intergroup relations* for first year and second year students and for the two genders?

### **1.2.4 Problem 4**

Is there a significant correlation between *attitude* towards co-operative learning and *self-esteem* for first year and second year students and for the two genders?

### **1.2.5 Problem 5**

Is there a significant correlation between *attitude* towards co-operative learning and *social support* for first year and second year students and for the two genders?

### 1.2.6 Problem 6

Is there a significant correlation between *attitude* towards co-operative learning and *social skills* for first year and second year students and for the two genders?

### 1.2.7 Problem 7

Is there a significant correlation between *attitude* towards co-operative learning and *academic norms* for first year and second year students and for the two genders?

### 1.2.8 Problem 8

Is there a significant correlation between *attitude* towards co-operative learning and "*psychological health*" for first year and second year students and for the two genders?

### 1.2.9 Problem 9

Is there a significant difference between the *attitudes* of first year and second year students towards co-operative learning?

## 1.3 AIMS OF THE RESEARCH

### 1.3.1 Specific aims

The specific aims of this study are to enable Geography students to do the following:

- (1) identify and explain the title of a topographical map;
- (2) locate geographical features using grid references;
- (3) work out direction, bearing and azimuth;
- (4) calculate distances on a map in metres and kilometres;
- (5) calculate magnetic declination;
- (6) know and use three types of scales;
- (7) convert scales from one type to another;



- (8) calculate area in metres and kilometres;
- (9) work out the slope gradient;
- (10) draw a cross-section, and
- (11) interpret topographical maps.

Vitally linked to what the students learn is how they learn it. The study aims to investigate the viability of co-operative learning to enable students to acquire these skills.

### **1.3.2 General aims**

- (1) To better train Geography teachers to teach mapwork.
- (2) To improve the learners' attitudes towards mapwork.
- (3) To make students aware of the usefulness of maps to real life situations.

## **1.4 DEFINITION AND EXPLANATION OF CONCEPTS**

### **1.4.1 Teaching**

The *Pocket Oxford Dictionary* (Thompson 1994:992) defines teaching as "giving systematic information, instruction, or training to a person". The definition as it stands seems teacher centred, as if the teacher is the main or only authority in the teaching situation. He/she has the knowledge in a given form and this knowledge must be imparted to the student. This definition portrays the student as a passive learner who does little except wait for the subject matter and absorb it.

In contrast Curzon quotes Lefrancois' definition as:

"Teaching involves implementing strategies that are designed to lead learners to the attainment of certain goals. In general these strategies involve communication, leadership, motivation and control" (Curzon 1990:18).

This is an improvement on the first definition because according to the researcher's understanding, teaching is not 'giving' (as defined by the *Oxford Dictionary*) but is the

implementation of strategies which involve communication between the student and the teacher.

In this study, teaching means the situation in which the teacher's role is that of facilitator of learning. What is important here is the relationship between facilitator and learner.

Tough (Knowles 1990:84) sees the teacher in the "helping role". The ideal helper views his interaction with the learner as a dialogue, a true encounter in which he listens as well as talks. His help will be tailored to the needs, goals and requests of the unique learner. The helper listens, accepts, understands, responds and helps.

In this teaching-learning situation, the *learner* participates actively in the learning process. Ideally, this is what should happen in the teaching of mapwork. Bruner (Knowles 1990:84) also supports this teaching approach in what he calls "teaching in the hypothetical mode". In the hypothetical mode the teacher and the student are in a more co-operative position. "The student is not a bench-bound listener, but is taking part in the formulation and at times may play the principal role in it" (Knowles 1990:84).

Mapwork is a section of Geography impossible to teach successfully without actively involving the students. The teaching of mapwork is characterised by drawing, measuring, calculating, reading and interpretation.

### **1.4.2 Learning**

"The process of acquiring skills, knowledge, and/or competence" (Burke 1995:xii). The new approach encourages learning in a wide range of locations and by different methods. When educators recognise the skills and knowledge people already have, it will raise confidence and give them a flying start in any new programme they embark upon. Learning becomes more relevant when it relates more to the needs of individuals (Burke 1995:4).

### 1.4.3 Mapwork

The concept **mapwork** is a combination of two words, *map* and *work*, and means working with maps. Definitions of a map are the following:

- (1) "... a representation to scale of all or part of the earth's surface on a sheet of paper" (Ogonda 1991:42).
- (2) "A map is a scaled abstraction of reality. It is a representation of selected phenomena on a part of the earth's surface. Any definition of a map must be based on its essential quality of being a representation of objects in space" (Boardman 1983:17).
- (3) "... a map is the drawn representation of Geographical space" (Reinhartz & Reinhartz 1990:23).
- (4) "... a representation on a plane surface (paper, card, plastic, cloth or some other material) of the features of part of the earth's surface, drawn to some specific scale" (Monkhouse *et al.* 1983:208).

From these definitions we can deduce that a map: (a) is a representation of part of the earth's surface, (b) is drawn according to scale; (c) shows selected phenomena.

Maps graphically convey spatial features and relationships and are the point at which art and science meet. Maps are interdisciplinary, and are the source of much data which accordingly should be evaluated and taught.

This study of the teaching of mapwork will involve the following: map title, direction, location, scales, bearing and azimuth, gradient, contours, measurement of distance and the drawing of cross-sections.

#### 1.4.4 Geography

The definition and scope of Geography has undergone considerable change since the discipline was introduced. It is true that no single definition will satisfy all Geographers. Arjun (1990:15-16) has given the following recent definitions of Geography in his dissertation:

- (1) Eyer and Jones: "Geography is the study of aerial associations of all phenomena on the surface of the earth."
- (2) Hartshorne, R: "The function of Geography is to provide accurate, orderly and rational descriptions and interpretations of the variable of nature of the earth's surface."
- (3) Morrill: "... its object of analysis is the earth's surface, and its purpose is to understand how the surface is structured or differentiated."

These are three of the seven definitions quoted by Arjun. Monkhouse also has a contribution to make. His definition is as follows: The geographer "... seeks to describe the diverse features of the earth's surface, to explain if possible how these features have come to be what they are, and to discuss how they influence the distribution of man with his multifarious activities" (Monkhouse 1983:144).

The researcher agrees with Arjun when he says that many definitions of Geography share four basic characteristics:

- (1) the distribution of natural and cultural phenomena in earth-space;
- (2) the spatial organisation of these phenomena;
- (3) the location of phenomena; and
- (4) "man-environment relationships".

The provision of accurate, orderly and rational description and interpretation of variables is impossible without the use of appropriate maps. Accurate location, for example, can be given by using grid references.

### 1.4.5 Co-operative learning

- (1) Co-operative learning is "... an instructional strategy that requires students to work together in small groups on a structured task" (Wallace 1995:458).
- (2) Co-operative learning is, "an approach to learning that emphasises cooperation and mutual support among students rather than competition and strives to design learning environments and activities that encourage students to be actively involved in the learning process" (Tom 1997:194).
- (3) "Co-operative learning is a group intervention strategy that allows teachers and students to model, rehearse, and reinforce social skills needed for successful functioning groups. Social skills that are developmentally appropriate for young students can be taught within the meaningful context of daily classroom activities and embedded in the structure of the lesson or activity. Co-operative learning is more than just 'putting kids in groups and having them work things out', it is a technique that teaches children how to work together to accomplish a shared goal while using a targeted social skill" (Fad, Ross & Boston 1995:33).
- (4) Co-operative learning is "... the opportunity to learn things through the exploration and expression of diverse ideas and experiences in co-operative company. In the co-operative classroom, the pupils will be encouraged to work with one another, rather than in competition with one another, they will be predisposed to use the resources of the group in order to share ideas, deepen knowledge and understanding, and they will come to acknowledge the variety of perspectives which people bring to any issue or institution" (Cowie, Smith, Boulton & Laver 1994:48).
- (5) "Co-operative learning is an educational method that is based on student teams working together to meet educational goals. In this approach, students utilise each other as members of small groups to support, guide, answer, and teach each other' (Hagen & Moffat 1992:531).

- (6) "Co-operative learning is a teaching strategy that promotes the positive interaction of children in small groups. Instead of working alone, or in groups with children of similar ability, students are grouped by the teacher in heterogeneous groups" (Lyman & Foyle 1991:223).
- (7) Co-operative learning is "... instructional methods in which students of all performance levels work together in small groups toward a group goal. The essential feature of co-operative learning is that the success of one student helps other students to be successful" (Slavin in Bredenhof 1991:122).
- (8) "Co-operative learning is the instructional use of small groups so that students work together to maximise their own and each other's learning" (Johnson, Johnson & Smith 1991:3).

The word central to all nine definitions is "cooperation" which means "... working together to accomplish shared goals and to maximise one's own and others' success. Individuals perceive that they can reach their goals if and only if the other group members also do so" (Johnson & Johnson 1994:276; Slavin & Stevens 1995:242; Vermeulen 1997:76-78).

## **1.5 METHODS WHICH WILL BE USED**

To try and answer the research problem which was stated in section 1.2, two methods will be used, namely a literature study and an empirical investigation.

### **1.5.1 Literature study**

The social and economic changes that lie ahead will require new teaching approaches in schools and colleges. The traditional methods which are teacher centred cannot cope with this rapidly changing world. "What is important is how we structure learning experience at the points of contact between teachers and students" (Hopson 1981:111).

Gold *et al.* have stated the following as far as better practice in the teaching of Geography is concerned: "... rather than the traditional concern with the development and transmission of Geographical knowledge, they are-student-centred, concerned with the

development of students as Geographers and as individuals" (Gold *et al.* 1991:228). Gold *et al.* recommend student-centred education and have given ten guiding principles for the teaching of Geography. Of these ten principles, two are essential to the teaching of mapwork:

- (1) Good practice encourages cooperation among students. "Learning is enhanced when it is more like a team effort than a solo race. Good learning, like good work, is collaborative and social, not competitive and isolated. Working with others often increases involvement in learning. Sharing one's own ideas and reporting to others' reactions improves thinking and deepens understanding" (Gold *et al.* 1991:229). Thus co-operative learning encourages students' involvement.

This idea of co-operative learning among students has been recommended as one of the characteristics of good practice in the teaching of Geography by Her Majesty's Inspectorate, Department of Education and Science, Government of England and Wales. "Successful teachers organise their students in a variety of ways (groupings), according to the nature of the learning tasks involved, the available resources, and the learning styles of the children" (Her Majesty's Inspectorate Sept/Oct 1991:245).

- (2) Good practice encourages active learning. "Learning is not a spectator sport. Students do not learn just by sitting in class listening to teachers, memorising prepackaged assignments and spitting out answers. They must talk about what they are learning, write about it, relate it to past experiences and apply it to their daily life" (Gold *et al.* 1991:229).

This explanation emphasises involvement or active participation by the students in order to learn. In the teaching of mapwork, students must be given time to talk, write, relate and apply what they have learnt. Harnapp and King speak of a "hands on" approach to learning (Harnapp & King 1991:241).

Johnson and Gondensen, under the topic "Teaching latitude and longitude in upper elementary grades" have introduced "...an activity that requires students to complete a hurricane tracking map exercise" (Johnson & Godensen 1991:73).

Hopson and Barry have introduced what they call "working with small groups" in life skills teaching methods. "This method of teaching and learning is an essential feature of all the programmes, and our experiences suggest that it is not widely employed at present in many schools and colleges" (Hopson 1981:111).

One of the guidelines for the facilitation of learning by Knowles is: "Genuine participation (as compared to feigned participation intended to avoid punishment) intensifies motivation, flexibility and rate of learning" (Knowles 1990:81).

1. Lyman and Foyle have introduced co-operative learning in the teaching of Geography. "Co-operative learning is a specific methodology that is based on learning principles relating to individuals within groups" (Lyman & Foyle 1991:228). Co-operative learning in the teaching of mapwork may promote student motivation, build group skills, foster social and academic interaction among students and reward successful group participation. Low achievers can feel successful by making positive contributions to the group.

### **1.5.2 Empirical research**

Empirical research is practical research in which information is gathered by observing subjects who are involved in the educational problem that is being investigated. In this research the target group is the Geography I and 2 students at a college of education.

Students of each course will be divided into two groups. Group one will be an experimental group and group two will be a control group. The two groups will be selected by random sampling. These groups will be exposed to different types of teaching methods. The methods are the traditional teaching methods based on classical theory, and the new teaching strategies based on co-operative learning.

The research design can be represented as follows:



	X1	Y
R	.....	
	X2	Y

R = Randomly selected groups

X1 = Groups learning through Co-operative method (year I and 11)

X2 = Groups learning through Traditional method (year I and 11)

Y = Both groups write the same test.

### 1.5.3 Questionnaire

In the second part of the research a questionnaire is drawn up (see Appendix 5) Appendix six gives a summary of the questions indicating which statements are formulated positively or negatively.

All experimental groups (first and second year students) are requested to reply to the statements on the questionnaire by indicating their responses on answer sheets which could be read by an optical reader.

The aim of the questionnaire is to investigate the student's attitude towards co-operative learning and to indicate how well statements describe them in terms of the following variables:

- intergroup relations;
- self-esteem;
- social support;
- social skills;
- proacademic norms;
- "psychological health"; and
- attitude towards co-operative learning method.

### 1.6 PROGRAMME OF STUDY

The programme of study will adhere to the following structure:

**Chapter one** Introductory orientation

**Chapter two** Diverse methods and learning theories for teaching Geography, with particular reference to mapwork (Relevance for co-operative learning will be indicated.)

**Chapter three** Co-operative learning

**Chapter four** Research design

**Chapter five** Results

**Chapter six** Conclusions and recommendations

## *Chapter Two*

# *Diverse methods and learning theories for teaching Geography with particular reference to mapwork*

### 2.1 INTRODUCTION

The purpose of this study is to find an effective method for teaching mapwork in Geography. The research problem is formulated in the following question:

*Is there a significant difference between the average achievements of students who are taught mapwork by means of co-operative learning, and those who are taught mapwork by other methods?*

The general aim of the research, therefore, is to better the training offered to Geography teachers in methods of teaching mapwork.

Important concepts, such as 'Geography', 'mapwork', 'teaching' and 'co-operative learning' are explained in the first chapter.

This chapter describes the diverse methods used to teach Geography. These methods include fieldwork; lectures; the textbook method; the project method; role playing and games; and co-operative learning. How these methods can be used to teach Geography and mapwork, in particular - will be discussed. The advantages and disadvantages of each method will be explained with the aim of contrasting them to or using them with co-operative learning.

Finally, the theories of learning related to the teaching of mapwork will be identified.

## 2.2 DIVERSE METHODS FOR TEACHING GEOGRAPHY/MAPWORK

### 2.2.1 Fieldwork/Field study method

#### 2.2.1.1 Definitions

Fieldwork may be used in co-operative learning. A cross-section of definitions of fieldwork, reveals consensus among the various authors:

- (1) According to Manson and Ridd (1977:163), field study refers to "any first hand observation of geographic phenomena, generally out of the classroom, on the school grounds, in the neighbourhood, or beyond."
- (2) Gold, Jenkins, Lee, Monk, Riley, Shepherd and Unwin (1991:23), agree that fieldwork is "any arena or zone within a subject where, outside the constraints of the four-walls classroom setting, supervised learning can take place via first hand experience".
- (3) Tilbury and Williams (1997:190) similarly define fieldwork as "any activity that takes place outside the confines of the classroom which provides pupils with experiences, knowledge, understanding or skills that are part of the Geography curriculum".

Field-based teaching is provided in three phases:

- A planning phase which actively involves students;
- A fieldwork phase based upon the skills of observation, data collection and recording by means of tables, field sketches, sketch maps and transects;
- A post-fieldwork phase, to interpret and evaluate the data collected in the field (Fien, Gerber & Wilson 1989:104).

The researcher has synthesised the common aspects of the three definitions given above to arrive at the following interpretation: *Fieldwork is any supervised learning activity that takes place outside the school building to provide pupils with firsthand experiences, knowledge, understanding and skills that form part of the Geography curriculum.*

### **2.2.1.2 The purpose of fieldwork**

A variety of objectives can be achieved through fieldwork. These objectives can be divided into three classes, namely (1) attitudinal and aesthetic objectives, (2) knowledge objectives and (3) skills objectives (Fien *et al.* 1989:106).

A brief outline of these objectives now follows:

#### **(1) Attitudinal and aesthetic objectives**

Fieldwork aims to

- arouse students' curiosity;
- develop favourable attitudes towards learning;
- provoke students to identify problems and ask questions;
- sharpen students' perception, and appreciation, of the changing landscapes;
- offer the pleasure of discovery; and
- enjoy the active study of Geography and gain a deeper interest in the subject.

#### **(2) Knowledge objectives**

Fieldwork aims to

- develop better understanding of the work discussed in the classroom;
- enable students to observe, and think and learn;
- clarify the relationship between physical features and human activities; and
- develop awareness of problems caused by human influence upon the environment.

(3) *Skills objectives*

Fieldwork aims to

- develop the geographical modes of inquiry;
- orient the student in the field;
- learn to relate real features to map symbols; and
- develop skills in data collection, record keeping and analysis.

Thus, well-designed fieldwork should successfully:

- develop skills of observation

Fieldwork helps students to focus their observation of specific phenomena. The observation may take place without the guidance of an instructor. Hurry (1991:103) supports this idea when he says that observation teaches students to observe scientifically and critically (Morphet & Peck 1994:235; Gold *et al.* 1991:25; Winter 1992:145).

- facilitate learning by experience

According to this view one has to start in the field and then go to the classroom. When teaching Rural Settlement Geography, for example, the teacher would take students to the rural environment first, and follow up with classroom lessons. "This is known as the interpretative approach in which beliefs, feelings, attitudes and values are explored" (Arjun 1990:215). Benefits of the experience are tangible and contribute to the quality of the students' learning (Jackson 1995:221; Hurry 1991: 102-103; Gold *et al.* 1991:25).

- encourage students to take responsibility for their own learning

Students in field study are more responsible for their own learning than they are when material is presented in the typical classroom. Students are given the

opportunity to conduct their own research and to ask their own questions about the data (Cass, Burgess & Barrott 1997:81; Gold *et al.* 1991:25).

- develop analytical skills

After collecting data from the field, students have to analyse the information before making their conclusions. Fieldwork helps students to develop these skills. In an exercise for Geomorphology, for example, students may gather rock samples, then analyse and classify them into igneous, sedimentary and metamorphic rocks (Gold *et al.* 1991:25). "It can promote learning by the scientific method" (Opie 1992:36).

- offer experience of active research

This objective is achieved when students undertake simple data collection exercises in the 'learning by doing' mode (Klein 1995:359; Gold *et al.* 1991:25).

- develop a respect for the environment and help students to think geographically

Many geographers see fieldwork as an effective means to develop a sense of wonder and concern for the environment in students (Gold *et al.* 1991:25; Hurry 1991:102, 103).

- develop personal skills

Fieldwork brings a particular quality and depth to student learning. It enhances the students' sense of their individual worth, and contributes to the development of such social skills as group work, leadership and responsibility towards others (Gold *et al.* 1991:25). Fenoughty (1992:132) supports this idea when he states that personal skills, confidence and personality can be developed during fieldwork.

- break down teacher-pupil and interpersonal barriers

Fieldwork breaks down the barriers between students and staff. As students learn to trust each other, and overcome the distance between themselves and

staff, an environment conducive to learning is created (Gold *et al.* 1991:25; Opie 1992:36).

### **2.2.1.3 Types of fieldwork**

There are three basic types of fieldwork, namely:

#### *(1) Field demonstrations*

Here, the teacher explains the environment to the student. Classroom work is reinforced in the field. Students are expected to observe, listen and take notes.

Examples of field demonstrations may include the following:

- an interpretive trail, whereby a teacher takes the pupils along a predetermined route, and explains the environment as he/she goes along or draws a map of the trail; and
- an explanation of a soil profile.

Field demonstrations are recommended for the primary school phase.

#### *(2) Field studies*

Field studies involve the students more actively and can also be used in co-operative learning. The teacher guides students by means of worksheets or verbal instructions. Students are welcome to express their thoughts relevant to the exercise.

Field studies fall into one of the following four groups:

- (a) descriptive studies,
- (b) hypothesis testing,
- (c) problem solving, and
- (d) comparative studies.

A brief explanation of these four groups now follows:



(a) Descriptive studies

The students are asked to describe an activity or a region. The emphasis here is on observation and the recording of information. Examples: (i) To observe and record the geology of an area, and indicate that area on a map; (ii) To observe and record weather changes during the passage of a cold front.

(b) Hypothesis testing

The emphasis is on the observation, recording and evaluation of data. The hypothesis is supplied by the teacher. Students must devise their own research methods to verify the hypothesis. Examples: (i) In winter most winds blow from the interior of South Africa towards the coastal areas; (ii) In South Africa most canned food is not processed in the area in which it is grown. Mapwork can be incorporated into both examples.

(c) Problem solving

Here, a problem is presented and the student finds viable solutions for it. The emphasis is on the observation, recording and evaluation of data, with particular regard to the problem under investigation. Students decide which data to gather in order to solve the problem. Examples: (i) Littering of Thohoyandou town is a problem. What are the causes of this problem and how can it be solved? (ii) Many people are leaving rural areas to seek work in Pietersburg. What can be done to stop this trend? Mapwork can be incorporated into this second example by using a map of Pietersburg and the surrounding area.

(d) Comparative studies

In comparative studies, a student is asked to compare two areas or two sets of data, and to offer a simple explanation for the differences and similarities. The student gathers the required data and uses it to make the comparisons. Example: Compare your residential area with that of a neighbouring one, and note any similarities and differences. These areas can be identified on maps of the local area.

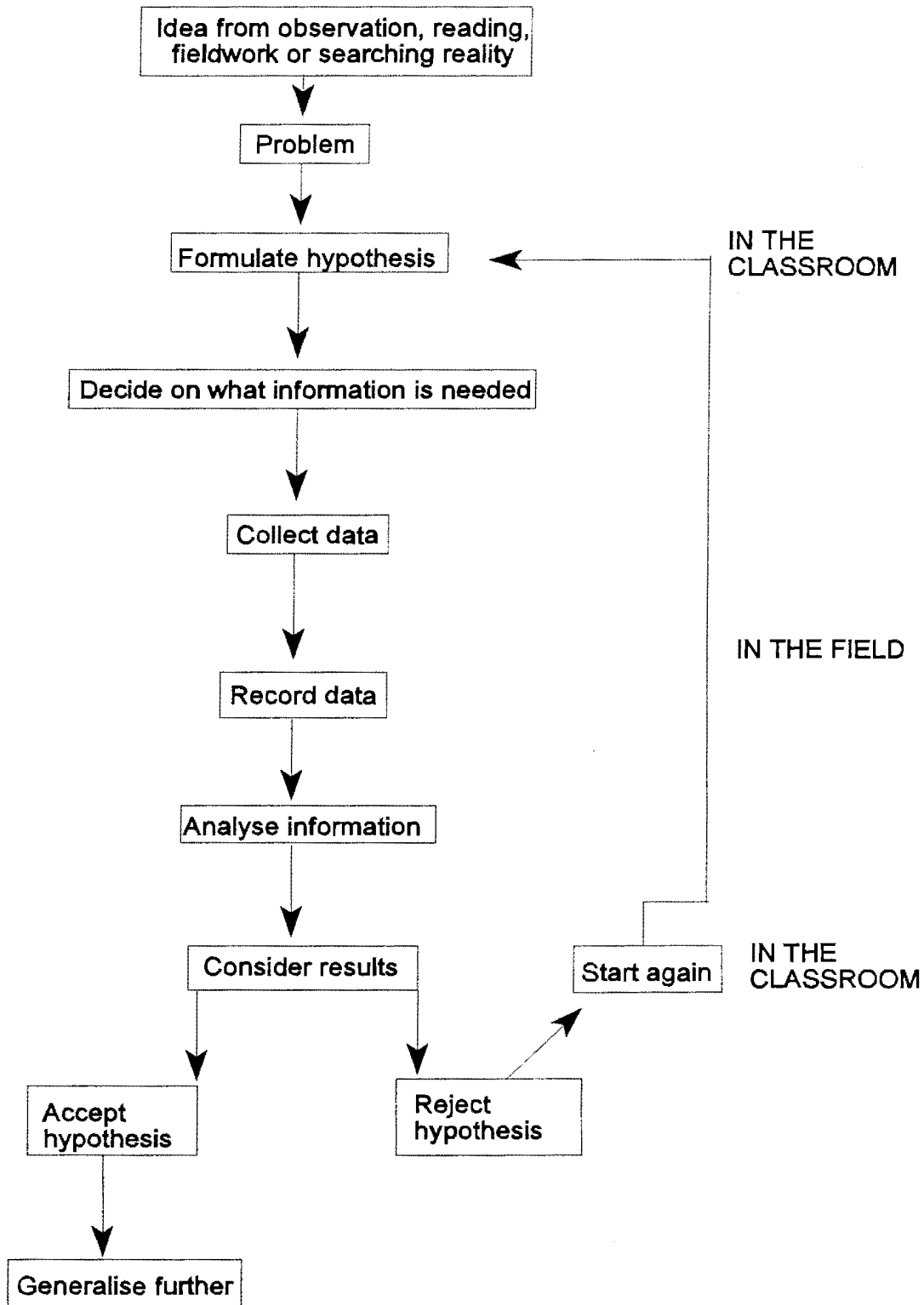
(3) *Field research*

In this type of research, students are confronted with an unfamiliar situation. They must propose an hypothesis and verify this hypothesis by research and/or experimentation. This type of research is open-ended and students do most of the work. Field research is suitable for senior secondary and tertiary students because it requires well-developed thinking skills.

Examples: (i) The more densely occupied the area, the higher the crime rate; (ii) The higher the standard of living in an area, the lower the birth rate.

There are a number of possible steps to follow in field research. These are summarised in figure 2.1.

Figure 2.1: The approach to field research (after Everson 1973)



#### 2.2.1.4 *Preparing effective fieldwork*

"Much study and preplanning must go into every field trip" (Swan 1995:3). General guidelines for preparing effective fieldwork are as follows:

##### (1) *Choose an appropriate location*

"The choice of a location for a Geography field course is often the most important decision to be made, yet too often it is chosen without much reference to educational criteria" (Gold *et al.* 1991:29). The following locations may be chosen for Geography fieldwork, including mapwork: 'Special' landscape or 'everyday' landscape, urban or rural, foreign or local, central or dispersed, and familiar or new.

It is the researcher's view that many factors influence the choice of an appropriate location. These include the age of learners, their standard, the topic under study, availability or unavailability of funds, etcetera. The location chosen must be accessible during the time of investigation (Williams 1993:2).

##### (2) *Personal visit to the site*

Make a personal visit to the site prior to making the actual trip with the class. This is the only way to avoid potential problems (Swan 1995:3).

##### (3) *Meeting with host or guide*

Meet with the host or guide and explain the purposes of the visit, the age group of the students, types of question that may be asked, the time available and the material to be covered.

##### (4) *Focus on key objectives*

When designing field courses, teachers need to prioritise the most important objectives. This idea is supported by Jenkins (1994:147) when he says: "We have to decide which

of them, though desirable, are not so important. We should be ready to give up those less important to protect those most important."

(5) *Checking material needed for the trip*

Check if any material is needed for the trip, such as special apparatus. Gold *et al.* (1991:31) have seen a carefully planned, data-gathering exercise in climatology fail for want of a screwdriver, and a video project fail because a student forgot the battery charger at college.

(6) *Supervision*

Adequate supervision should be planned, and school or college management authorisation obtained for the trip. A ratio of one adult per eight to ten students is usually recommended if effective supervision is to be maintained.

(7) *Attend to safety*

It is recommended that safety precautions during field trips be taken seriously. Some colleges make use of a safety officer who attends to the matter. Teachers are advised to have contingency plans available in case problems or accidents occur. According to Fenoughty (1992:133), "No school trip today can afford to overlook the potential dangers."

According to Howell (1990:187), "fieldwork could be made safer by an explicit consideration of the methods to be used for emergency communication and for evacuation of all or some of the members of the research team in case of need."

(8) *Encourage proper data analyses*

"Data once collected, deserve proper analysis" (Gold *et al.* 1991:31). Portable computers can be used to analyse data in the field.

*(9) Follow-up sessions*

Follow-up sessions at college or at school, especially after a short while has elapsed, are a cheap and effective means to encourage proper analysis and mature reflection. This is supported by Swan (1995:3) when he says: "Follow-up experiences are extremely important. When these call for a sharing and reviewing of the experiences on the field trip, they create a lasting impression."

**2.2.1.5 How fieldwork can be used to teach mapwork**

- Example: Teaching students to read and interpret topographical maps.
- Approach: Fieldwork.
- Topic: Reading and interpretation of topographical maps.
- Lesson presentation:  
Since the students are meant to discover most in the field, the teacher introduces the lesson in broad strokes so as not to pre-empt field discovery.
- The teacher distributes topographical maps of the local town among the students. In the field, the students are required to do the following:

They must relate the conventional signs and symbols on the topographical map to the real features on the ground. This may include the observation of (1) recreational facilities such as golf courses, swimming pools, motor car race tracks, etcetera; (2) communication routes such as railway lines, telephone lines, main roads, secondary roads, etcetera; (3) farming activities such as cultivated lands (crop farming) and orchards and vineyards (fruit farming), and (4) types of slopes and land-forms such as gentle slopes, steep slopes, concave and convex slopes, mesas, buttes, cliffs, etcetera.

In the field, students observe features on the map and compare them with the same real features on the ground, then they analyse, interpret and give an explanation of their discovery.

### **2.2.1.6 Advantages of the fieldwork method**

Advantages of the fieldwork method include the following:

- It provides concrete experiences which allow students to grasp new ideas and incorporate these ideas into their cognitive structures (Tilbury & Williams 1997:189; Hurry 1991:102).
- "Fieldwork provides the opportunity to apply ideas generated in the classroom to the real world, to test hypotheses by empirical methods and to learn new knowledge and concepts from first hand observation" (Tilbury & Williams 1997:189). Therefore, abstract concepts such as location, distribution, association, interaction, movement and change are brought to life.
- Fieldwork allows pupils to discover information for themselves. It provides "experience-centred education". Information obtained from personal experience is usually of the greatest value and significance to the student. This is because "it combines hearing, seeing and doing" (Opie 1992:36; Hurry 1991:102-103).
- It provides the motivation that many students need to arouse their interest in the study of Geography. It can provide the interest and stimulation that may be missing in the second-hand nature of some classroom lessons.
- It helps students consolidate their geographical knowledge and skills. It provides students with an opportunity to investigate the environment, to apply acquired knowledge, and to produce a synthesis of what they have studied (Cass *et al.* 1997:81; Hurry 1991:103).

It is the researcher's view that the fieldwork method, unlike the traditional (lecture/textbook) methods which are teacher-centred, is student-centred, and, therefore, can satisfy the requirements of Outcomes-based Education (OBE). The outcomes can be formulated in terms of what learners should know, and be able to do, by the time they complete their studies. The outcomes include:

- using research and other information-accessing skills;
- solving problems independently and co-operatively;
- thinking critically and creatively;
- using a range of skills and techniques in the Social Sciences (Geography-mapwork) context (Brogan 1995:14-15; Dreyer 1997:8-9; Dreyer 1997:7-9).

### **2.2.1.7 Disadvantages of the fieldwork method**

Disadvantages of the fieldwork method include:

- the difficulty of adequately supervising a large group of students, and therefore, of providing them with the assistance they need;
- alterations to the school time-table to allow for field trips;
- the time needed to plan worthwhile field trips and the cost of transport and accommodation;
- logistical problems of finding suitable accommodation, transport, etcetera (Jenkins 1994:144);
- the safety of students which is a top priority when planning activities (Fien *et al.* 1989:116);
- cost and the internal managerial and curriculum pressures (Tilbury and Williams 1997:200). Thomas and Grimwade (1996:39) discuss the problem of funding in research that was conducted in the United Kingdom. According to Grimwade's comment, "... dependence on parental contributions will present almost insurmountable problems for many schools" (Thomas & Grimwade 1996:39);
- the problem of limited local resources for firsthand data collection (Sadler 1997:30);



- increased strain on staff - as student numbers increase and student/staff ratio (SSRS) deteriorates, so the strain on staff resources (time, energy and motivation) increases (Jenkins 1994:144);
- "Fieldwork is difficult to assess and evaluate as an activity" (Morphet & Peck 1994:230).

## **2.2.2 The narrative/lecture method**

### **2.2.2.1 Definitions**

Gold *et al.* (1991:7) quote the definition of the 'lecture' from the **Oxford English Dictionary** as "a discourse given before an audience on a given subject, usually for the purpose of instruction".

Buxton and Schlebusch (1991:13) also refer to it as the "telling" method.

During the presentation of the subject matter, the teacher explains the content while students listen. Important facts are written on the board as chalkboard summary (Buxton & Schlebusch 1991:15).

Broadwell (1980:65) on the other hand defines the lecture as "a means of transmitting cognitive/factual data from a teacher to a group of students in an efficient manner".

It is interesting to note that authors have different names for the same method. Buxton and Schlebusch (1991:13) refer to it as the 'telling' method. Kellough and Kellough (1996:427) refer to this method as 'teacher talk'. "Teacher talk encompasses both lecturing to students and discussions with students." A lecture is considered as a formal teacher talk, whereas a teacher-led discussion is considered as an informal teacher talk.

### **2.2.2.2 Purposes of the lecture method/teacher talk**

According to Kellough and Kellough (1996:429) the lecture, formal or informal, can be useful to:

- Introduce a unit of study.
- Present a problem.
- Discuss the progress of a unit of study.
- Explain an inquiry.
- Promote student inquiry or critical thinking.
- Provide a transition from one unit of study to the next.
- Provide information otherwise unobtainable to students.
- Share the teacher's experiences.
- Share the teacher's thinking.
- Summarise a problem.
- Summarise a unit of study.
- Teach a thinking skill by modelling that skill.

### **2.2.2.3 Types of lectures**

Broadwell (1980:11-23) notes six types of lectures. They are

- (1) Straight lecture
- (2) Chalk-talk lecture
- (3) Guided note-taking lecture
- (4) Slide lecture
- (5) Lecture demonstration
- (6) Lecture discussion

A brief explanation of each mode of the lecture now follows:

#### **(1) *Straight lecture***

In this type of lecture, the instructor does all the talking, based on prepared notes, and the students listen, take notes and get their learning in whatever way they choose.

Students are not directly involved in this mode, and this is not useful for co-operative learning.

(2) *Chalk-talk lecture*

In the chalk-talk lecture, the lecturer does not only present the information in oral form, but also uses some device, such as the chalkboard or overhead transparency, to help explain the points. The use of the chalk adds the possibility of more words, drawing or a combination of both.

(3) *Guided note-taking lecture*

In this case, the lecturer prepares a set of notes or questions for the students that follow the same sequence as the lecture, and thus frees the students to listen with more concentration and direction, than without the guided notes.

(4) *Slide lecture*

The slide lecture makes use of visual aids, with reproduced transparencies or opaque drawings, film strips or silent movies that are narrated by the lecturer.

(5) *Lecture demonstration*

The lecture demonstration is used when the lecturer wants to present information about a piece of equipment or show specific procedures. Lecture demonstration can be done by bringing the actual machine or experiment into the lecture room, and then give the lecture demonstration on the subject. The lecturer speaks and demonstrates at the same time, which lets the students see as well as hear the procedures.

"Done well, demonstrations can be particularly effective, and they are in most cases relatively easy techniques to use" (Clark & Starr 1991:218). They may sometimes be useful in co-operative learning.

(6) *Lecture-discussion method*

Here the lecturer presents material, in lecture form, that is new to the students. The lecturer then engages students in a discussion about the material. The method has the advantage of giving the teacher and the students a chance to get feedback and to interact.

Clark and Starr (1991:213) note only three basic types of telling activities or lectures. They are (1) short teacher talks, in which the teacher presents or explains certain concepts, objectives or procedures, (2) the formal lecture, in which the teacher presents content in a relatively long discourse, and (3) teacher comments and reactions as other activities progress.

#### **2.2.2.4 Developing effective lectures**

Although the lecture method is not used to a great extent in co-operative learning, the researcher recommends the following guidelines, taken from different authors as important to the preparation and development of effective lectures.

(1) *Instructional objectives*

When instructional objectives are introduced at the beginning of a lecture, they tend to increase intentional learning. "in this way the objectives become 'advance organisers', giving learners a basis for new concepts" (Henson 1988:91). (Similarly, within the OBE approach, objectives are replaced with learning outcomes.)

Gold *et al.* (1991:12) define 'advance organisers' as, "... a skeletal outline, usually presented at the start of a lecture, which conveys the major elements of the lecture and perhaps the key questions to be asked".

Gold *et al.* (1991:12) are fully supported by Kellough and Kellough (1996:428) who state that "preparing an organiser helps you plan and organise the sequence of ideas, and its presentation helps students organise their own learning and become motivated about it."

(2) *Make the lecture interesting*

"Lectures should also attract student's interest and attention" (Clark & Starr 1991:214). This can be done by opening the lecture with a challenging question, a problem, or a perplexing fact.

(3) *Limit the content*

The warning here is that lecturers frequently attempt to impart too much information at one time (Gold et al. 1991:11). Clark and Starr (1991:215) echo this idea when they say, "students' memories are not capable of retaining new knowledge in overlarge doses."

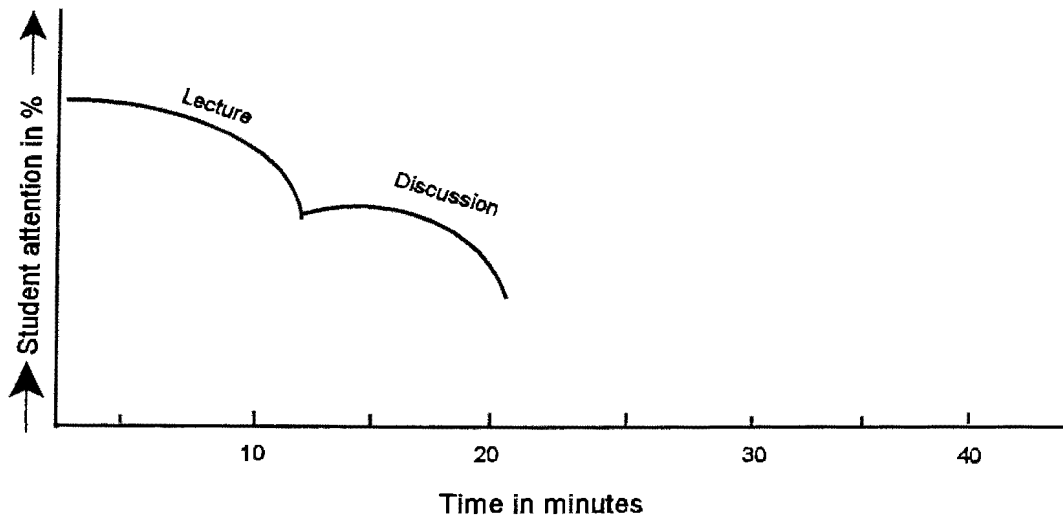
Lecturers are therefore advised to use relatively small steps and to follow them up with practice, elaboration, rehearsal and summary when new material is presented. Apart from this, lectures may be followed by co-operative learning.

(4) *Change instructional strategy*

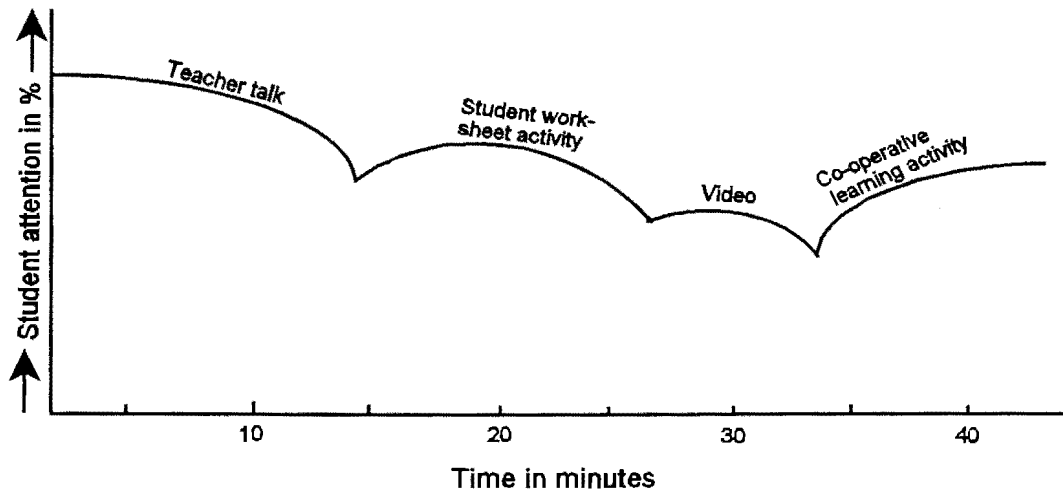
"Long lectures are inappropriate for most middle school classes; spontaneous and interactive informal talks of 5 to 12 minutes are preferred" (Kellough & Kellough 1996:430). Lecturers are advised not to give period-long lectures without teacher-student interaction or the student-student interaction of co-operative learning.

In order to recapture student attention during the presentation of a lecture, Kellough and Kellough (1996:430) recommend that lecturers change to an entirely new strategy or learning modality. Thus, from the teacher talk (teacher-centred) strategy the lecturer might move to a student activity (student-centred) strategy. Figure 2.2 shows how change of the instructional strategy recaptures student attention.

Figure 2.2 Comparison of the recapture of student attention when the instructional strategy is changed (Kellough & Kellough 1996)



Example 1: Changing teacher talk (lecture) to more teacher talk (teacher-led) discussion



Example 2: Changing from teacher talk (teacher-centered activity) to co-operate learning activity (student-centered activity)

(5) *The use of audio-visual media, demonstration, illustrations and the like*

Henson (1988:92), Gold *et al.* (1991:15), Clark and Starr (1991:213) and Kellough and Kellough (1996:431) recommend the use of teaching media, demonstrations and illustrations when the lecture method is used. Multi-sensory stimuli help to clarify and pinpoint desired concepts. Visual representations give meaning to what might otherwise remain a confusing mass of words.

Brown (1994:133) makes the practical suggestion that diagrams and illustrations be included in the study guide, because it takes too much class time to distribute handout materials in large classes.

(6) *Student involvement*

Students are heavily involved when using co-operative learning. However, student involvement in a lecture may be encouraged by:

- (a) the provision of outline notes. Students are invited to work on them during and after the lecture. They may annotate them, highlight areas of difficulty and rework them after further reading. Kellough and Kellough (1996:429) simply state, "Encourage student participation during your talk."
- (b) provoking reflection on new knowledge. Lecturers and teachers can use various techniques to encourage students to reflect on the knowledge with which they are being presented. These may include classroom tests, and questionnaires, or outline handouts which require students to fill in the key elements in a system diagram (Gold *et al.* 1991: 13).

According to Brown (1994:134), students should be encouraged to contribute articles, stories and cartoons related to the topic under discussion.

**(7) Language**

The language used in a lecture should be clear. Slang and informality are more likely to "muddy a lecture than clarify it" (Clark & Starr 1991:213). The use of illustrations and figures of speech often makes lectures clearer and livelier.

**(8) Tempo**

"When the tempo or pace of a lecture is too slow, students become bored; when it is too fast, their inability to keep up with and understand the lesson discourages them" (Henson 1988:91). Kellough and Kellough (1996:431) advise lecturers to "avoid racing through the talk solely to complete it by class dismissal time."

**(9) Feedback**

"Finishing with a brief test is a good way to round off a lecture and provide students with feedback on how much they have understood and learnt in the lecture" (Gibbs, Habeshaw & Habeshaw 1985;63). These authors also recommend the use of instant questionnaires, because they offer a quicker way to obtain feedback than tests, which can be time-consuming to design and mark.

**2.2.2.5 How the lecture method can be used to teach mapwork**

- Example: Teaching students to read and interpret topographical maps.
- Approach: Lecture method.
- Topic: Urban land use zones.
- Aim: To enable students to read and interpret topographical maps.
- Outcomes: Students should be able to identify and explain various recreational facilities as they appear on topographical maps.
- Aids to be used: Topographical maps, orthophoto maps or vertical aerial photographs.
- Lesson presentation: The lecturer starts his/her lecture by explaining the various recreational facilities that appear on topographical maps.  
Example: Sports fields are indicated on a topographical



map by solid green shading. The abbreviation rec. is often added, or the name or function of the area is printed. The same method may be used to explain other recreational facilities such as golf courses; soccer, rugby, and hockey fields; tennis courts, swimming pools and bowling greens (Blackbeard 1992:42).

After the lecture students are given topographical maps, orthophoto maps or vertical aerial photographs of the same area to identify recreational facilities. Students may work in pairs.

- Conclusion: Students write a short test. Here students are given unfamiliar topographical maps and answer questions without help from one another.

#### **2.2.2.6 Advantages of the lecture method**

Although OBE has moved away from the lecture method, this method does have certain advantages:

- "The main advantage of this method is that a great deal of information can be imparted in a short time" (Buxton & Schlebusch 1991:13).

Gold *et al.* (1991:8) add the following advantages:

- Teachers and students can organise their time effectively, knowing that their commitments are straightforward and regular.
- Lecturers know that the teaching experience is almost entirely under their own control, that they can plan the course in detail in advance, that the content can be divided into convenient pigeon-holes and that the syllabus is fully covered.
- Good lecturing is an almost dramatic art that can be very satisfying for everyone involved: for the lecturer, the satisfaction of a job well done; for the audience the

stimulus and sense of occasion that a lecture well and enthusiastically delivered creates.

Henson (1988:90) notes the following advantages:

- A lecture is an extremely effective way to introduce a unit or to build a frame of reference. As an introduction it may also be useful in co-operative learning.
- It is a superior technique to demonstrate models and to clarify matters that may be confusing to students.

#### **2.2.2.7 Disadvantages of the lecture method**

- As opposed to co-operative learning, the lecture method subscribes to the view that people learn by acquiring, storing and organizing information in an internal filing system, which waits to be fed with knowledge.
- The standard length of a lecture is usually longer than the audience's attention span. Generally, attention reaches a peak about 5 minutes into a lecture, then fails away markedly after 20 minutes, and rises again towards the end.
- The lecture is an inadequate way to tackle higher-level objectives. It is less effective at encouraging skills of critical analysis and synthesis (Gold *et al.* 1991:9-10). These skills are encouraged by co-operative learning.
- The method can be boring if the teacher is poorly prepared (Buxton & Schlebusch 1991:13).
- According to the researcher's point of view, the teacher becomes the main authority in the class, and the learners become passive recipients.

The lecture method fails to meet the demands of OBE. Students are deprived of opportunities to demonstrate what they know. In OBE, "outcomes are clear, observable demonstrations of students' learning that occurs after a significant set of learning

experiences" (Spady, Marshall & Rogers 1994:29; Van der Horst & McDonald 1997:19). These demonstrations or performances reflect three key things:

- (1) What the student knows;
- (2) What the student can actually do with what he or she knows; and
- (3) The student's confidence and motivation in the demonstration.

The traditional lecture method does not provide for all of these features (Bell & O'Neil 1994:53; Dreyer, 1997:8-9; Guskey 1994:35; Manno 1995:20; Spady, Marshall & Rogers 1994:29).

### **2.2.3 The textbook method**

#### ***2.2.3.1 Introduction***

In co-operative learning a textbook may be used as resource. However, traditionally students are subjected to the use of the textbook for much of their time in class. There often exists a gap between what is available in the textbooks and what is needed for student use (Kellough & Kellough 1996:198). This directly affects the quality of education that students receive.

It is difficult to maintain quality with the increased number of students, unless teaching methods change. Some authors see a partial solution to some of the problems of teaching Geography is to make greater use of the textbook (Healy & Ilbery 1993:123). These books act as points of common knowledge and understanding between teacher and student.

The use of textbooks is, however, not without problems, and Gibbs (1992:36) for example, comments that "textbooks on their own... may be very limiting both in their range and in the form of learning which tends to take place when students rely on them."

### **2.2.3.2 How a textbook can be of help to students**

Buxton and Schlebusch (1991:27) refers to the textbook as a method of teaching Geography. According to them, the textbook can be used to cover background material before tackling a project by means of co-operative learning or joining a class discussion; to seek extra information on a point not fully understood during a lesson; to revise for tests and examinations.

According to Kellough and Kellough (1996:198-199) textbooks can help students in their learning provided that there is:

- base to build higher-order thinking activities (e.g. inquiry discussions, problem recognition and problem solving) that help develop critical thinking skills;
- a base for selecting subject matter that can be used to decide subject content;
- organisation of basic or important subject content by means of models and examples;
- references or access to other readings and resources to enhance the learning experiences of students; and
- previously tested practice activities and suggestions for learning experiences.

### **2.2.3.3 Preparing students to use a textbook**

If the teacher's purpose is to encourage students to learn an approach to a topic as presented by a textbook, two aspects need to be considered (Fien *et al.* 1989:226):

- (a) The book concerned needs to be as far as possible appropriate to the needs of the students;
- (b) The students need to be appropriately prepared for the task.

At this stage we will concentrate on the second aspect stated above, as it is the more relevant to this research.

Clark and Starr (1991:404) state that teachers are often surprised to discover that students find their textbooks difficult to read. According to these authors, it is not strange at all if students find their textbooks difficult because they are written in the jargon of the discipline and present new information and introduce new concepts. Instead of complaining that the students cannot read the text, Clark and Starr (1991:404) advise teachers to show them how.

"Ausubel (1968) suggests that students be presented with 'advance organisers', or general concepts to ensure that their cognitive structures can accommodate the new materials" (Fien *et al.* 1989:226).

The researcher can outline the following 'advance organisers' that may prepare students to use the textbook effectively. These 'advance organisers' are based on Clark and Starr (1991:405-408) and may also be useful if textbooks are used as resources in co-operative learning.

(1) *Preface and table of contents*

The preface of a book usually gives the rationale and purpose of the book, and the table of contents gives an outline of its organization. It is recommended that the lecturer should start the use of a new text by discussing its preface and table of contents.

(2) *Index and glossary*

In each unit the lecturer should give the students plenty of opportunity to look things up in the index. Sometimes students have difficulty in using the index because they do not know the alphabet, and for these students, special instruction and practice are necessary.

If the textbook contains a glossary, students should learn to use it and do so as part of every unit. Teachers can use exercises in which learners check out such things as

pronunciation and syllabication, as well as the meaning of important words. If the textbook does not have the glossary, students can be encouraged to compile one of their own. Kellough and Kellough (1996:200) recommend that every teacher should provide vocabulary lists to help students learn meanings of important words and phrases.

### (3) *Appendixes*

During the first lesson on using the book, the lecturer should point out the appendixes and explain what they are and how to use them.

### (4) *Chapters and their parts*

In most Geography textbooks the chapters are divided into major and minor headings that represent the author's outline of the chapter. Students should be taught the significance of the various headings so that they will be able to separate major topics from supporting detail.

### (5) *Typographical clues*

Authors use typographical clues to point out important facts and ideas. Italics, boldface type, underlining, parentheses, quotation marks, coloured print, and the like are the writer's signposts. Students must be taught to use them.

### (6) *Pictures, cartoons and diagrams*

Pictures, cartoons and diagrams in Geography textbooks are not included to make the book prettier, but to be actively examined. They help to illustrate what the authors want to say. The students may be asked to study a picture and its caption and then tell the teacher/other students what they see in it.

### (7) *Maps*

When a textbook contains maps, it is important to feature map study in the appropriate lessons and units, and to spend some time on map-reading skills. These include being

able to read the legend, use scale, find direction, use latitude and longitude, read elevation and recognise key symbols.

*(8) Graphs and tables*

When authors put graphs and tables into their books, they are presenting the crux of the matter in abbreviated form. The following techniques can help the teacher to make graphs and tables more accessible to the learners:

- (a) The teacher may give definite assignments that specifically involve the reading and interpretation of tables, graphs and other aids.
- (b) Students can be asked to use tables and graphs to highlight ideas and support conclusions.
- (c) Teachers can directly teach the reading and interpretation of tables and graphs.

**2.2.3.4 Methods of studying from textbooks**

Sometimes co-operative learning may be preceded by some study from textbooks. Kellough and Kellough (1996:200) note three methods that can be used by students to study from textbooks. The description of these methods now follows:

*(1) The SQ4R method*

The method can be described as follows: Survey the chapter, ask questions about what was read, read to answer the questions, recite the answers, record important items from the chapter into the notebooks, and then review it all.

*(2) The SQ3R method*

This method is described as follows: Survey the chapter, ask questions about what was read, and then read, recite and review.

(3) *The PQRST method*

This method can be described as follows: Preview, question, read, state the main idea, and test yourself by answering the questions not answered earlier.

**2.2.3.5 *The student reading level***

In order for students to learn effectively from their Geography textbook, the teacher needs to ascertain the reading levels of the students.

Clark and Starr (1991:410) recommend the following techniques in order to determine the reading level of students.

(1) *Standardised tests*

These may be given as part of the school testing programme. Analysis and diagnosis of the text can be done by reading and guidance specialists.

(2) *Informal tests*

There are two informal tests that can be used to determine whether the textbook is too difficult for the students. They are:

(a) *The silent oral inventory*

To conduct the silent reading inventory, students read silently four or five pages of a book at their supposed grade level. A ten-question test on these pages is administered. Test results can be interpreted as follows: Students who score above 90% are presumed to be independent readers at that grade level. Those who score between 75 to 89 percent are reading at the instructional grade level, and those who score below 75 per cent are reading below grade level.

(b) *Oral reading inventory*

In this case students read a 100 word passage from the Geography textbook aloud. All students who can read 95 percent or more of the words are reading at



grade level or above; all who cannot read 95 per cent of the words are reading below grade level and need help.

(3) *The CLOSE procedure*

To use this procedure, select from the textbook several typical passages until a total of 400 to 415 words is reached. Delete every eighth word in the passage except for words in the first and last sentences, and proper names, numbers, and initial words in sentences. Duplicate the passages with ten to fifteen space blanks to replace the eliminated words. Pass out these "mutilated" readings to the students. Ask them to fill in the blanks with the most appropriate words they can think of.

Collect the papers. Score them by counting all the words that are the exact words in the original text, and dividing the number of correct responses by the number of possibilities.

$$\text{Score} = \frac{\text{Number of correct responses}}{\text{Number of possibilities}}$$

Interpretation of scores: Students who score more than 50 percent can read the textbook quite well. Students who score between 40 and 50 percent can read the book at instructional level, and those who score below 40 percent find the book difficult.

### **2.2.3.6 Selecting a good Geography textbook**

According to Muller (1995:341) "a good textbook not only organises and effectively communicates the subject-matter it covers, but must also engage the interest of the reader". Muller is supported by Butt and Lambert (1997:147) when they state that textbooks should "offer the student opportunities to learn in varied and interesting ways."

To select a good Geography textbook as a resource for co-operative learning is not an easy task. Clark and Starr (1991:411) recommend that this selection should be made with care.

Butt and Lambert (1997:147) provide a useful checklist for the evaluation of Geography textbooks. Their checklist includes the following:

- (a) Does the textbook provide a range of assessment activities? Do these involve open-ended enquiry and decision-making tasks likely to allow students to perform at a high level of the Geography national curriculum?
- (b) Is there sufficient challenge within the activities for students to show evidence of performing at the highest level, including the possibility of extended writing?
- (c) Are all the assessment activities expected to be answered in writing? Are there opportunities for oral assessment, project work, presentation, displays and fieldwork?

Clark and Starr (1991:411-412) have a contribution to make in this regard. Their checklist includes the following:

- (d) Will the use of this book lead to the attainment of your course objectives? Does the book cover the proper topics with the proper emphasis? Is any content omitted?
- (e) Is the content accurate and accurately presented? Is the book free from bias?
- (f) Are the vocabulary and language appropriate for the students of the class? Does the book presume background knowledge and experience that the students do not yet have?
- (g) Are the table of contents, preface, index, appendixes, and glossary adequate? Does the book provide a variety of suggestions for stimulating, thought-provoking instructional activities?
- (h) Does the book have suitable maps, charts and tables? Are they clear and carefully done? Does the author refrain from trying to cram too much data onto the maps and charts? Muller (1995:341) recommends that diagrams and photos should also be included.

### 2.2.3.7 How the textbook method can be used to teach mapwork

- Example:
- Topic: Gradient.
- Objective: That students should be able to define and calculate gradient, using a contour sketch map or a topographical map. This may be done in a group as in co-operative learning.
- Method to be used: SQ4R
- Lesson presentation: The SQ4R method requires the students to follow these (Kellough & Kellough 1996:200):

**Step 1:** Survey the chapter or study unit. Students are expected to survey the study unit on gradient.

**Step 2:** Ask questions about what was read. In this case the following questions may be asked: - Define the term 'gradient'.

- What is the formula for calculating gradient?
- If the gradient of a slope is 1:50, what does it mean?
- Calculate the gradient from point A to point B on the map.

**Step 3:** Read to answer the questions. At this stage students read the text in order to answer the questions from Step 2.

**Step 4:** Recite the answers. Students should be able to recite answers. Example:

- Gradient is simply defined as "the average steepness of a slope" (Blackbeard 1995:11).
- The formula for gradient is  $G = \frac{H}{D}$

Where G = gradient

H = difference in height between two points

D = horizontal distance between these to points

- 1:50 means that for every 50 metres you have moved horizontally you rise 1 metre.

**Step 5:** Record important items from the chapter into notebooks and review it all. At this stage students will record the definition, formula, meaning of gradient and how the gradient is calculated.

### ***2.2.3.8 The advantages of the textbook method***

The following advantages have emerged from a research undertaken in the United Kingdom by Healy and Ilbery (1993:125-126).

- Students clearly like to use a course text which covers the majority of the course material. It reduces the need for students to search through a diversity of information sources.
- The use of a course text encourages students to become more self-reliant.
- Guided reading helps to cover more material than could be dealt with in lectures.
- A course text helps to alleviate pressure on library resources.

Schug, Western and Enochs (1997:99) note the following advantages:

- Textbooks assist teachers in planning courses, units and lessons.
- Teachers believe that textbooks assist students in learning.
- Textbooks act as points of common knowledge and understanding between teacher and student, as well as between students (Holmes 1995:340).
- Students need something to hold onto, so they should have a book to work with during their studies and to come back to afterwards (Werner 1995:350).
- "Textbooks play an important role with their major contribution being to guide the curriculum" (Mesbah-us-Saleheen & Monzurul Hug 1995:351).

### **2.2.3.9 Disadvantages of the textbook method**

Healy and Ilbery (1993:123) have noted the following disadvantages of the textbook method:

- Students are in danger of being exposed to just one viewpoint.
- Where course texts are used students gain little experience of selecting and synthesising material from different sources.
- It is possible that students will reproduce the views expressed in the course text rather than develop their own perspectives and critical approaches. In this regard co-operative learning may produce diverse views.

According to Lindstone (1995:336) there is a feeling that "the use of a textbook represents an admission of academic or teaching inadequacy".

Hill (1996:15) states the following disadvantages:

- Traditional textbooks are fact- rather than process-oriented. They stress "what" instead of "how" and "why".
- Textbooks are unlikely to meet today's educational demands for critical thinking, problem solving, skill building, and inquiry about the real world which is so important in OBE.
- Textbooks demonstrate a fairly consistent level of dullness, lacking in explanation of ideas and written without conflicts (Schug *et al.* 1997:97).
- "... no textbook can stay abreast of the rapidly changing world scene for more than a few months" (Muller 1995:342).
- According to the researcher's point of view, the textbook method cannot serve the demands of competency-based education, because it requires the prospective learner to demonstrate mastery, or attainment of special criteria. These criteria include areas in the cognitive, affective and psychomotor domains, and

encompass all phases of education from the preprimary to the graduate phase (Nickse & McClure 1986:48). Thus in OBE, there has been a move away from the textbook method. The textbook method does not provide the development for self-directed learners, co-operative contributors, creative problem solvers and effective communicators as demanded by OBE (Rowe 1994:10-11).

## **2.2.4 The project method or "hands-on" approach**

"... Educators agree that learning should be an active process, with students participating in hands-on experiments and explorations, not just sitting back and listening to the teacher" (Papert & Harel 1991:151; Harnapp & King 1991:241).

### **2.2.4.1 Definitions**

Hindle (1993:11) loosely defines the project method as "consisting of a substantial piece of work on an original problem, undertaken with minimal supervision".

Buxton and Schlebusch (1991:21) describe a project as "a piece of written work which could also be a model, map or chart which is constructed by the learners with help from the teacher." They further explain that projects can be completed by individual students working alone, by a group of students all working on the same theme, or by a group of students each completing a certain aspect of a larger topic. Thus this method may be used in co-operative learning.

Clark and Starr (1991:282) on the other hand define a project as "a natural, lifelike learning activity involving investigation and solving of problems by an individual or small group. Ideally, it should consist of a task in which a student sets out to attain some definite goal or real personal value. Projects frequently involve the use and manipulation of physical materials and result in tangible products".

Henry (1994:12) argues that there is no universally agreed definition of the term "project". According to her the following six criteria can act as a working definition:

The student or group -

- (i) (usually) selects the project topic;
- (ii) locates his/her own source material;

- (iii) presents an end product (usually a report and often for assessment);
- (iv) conducts an independent piece of work (though there are also group projects);

the project -

- (v) lasts over an extended period;

the teacher -

- (vi) assumes the role of adviser.

On the other hand Henry (1994:13) defines an 'educational project' as "an investigation carried out by the student in an area he or she selects, plans and subsequently reports on."

It is interesting to note that the project method serves the demands of competency-based education (or OBE), because according to Oliver, Mitchell and McKenzie (1995:4) "competency is concerned with what people can do rather than with what they know."

#### **2.2.4.2 Types of projects**

According to Gold *et al.* (1991:38) three types of projects can be distinguished:

- (1) Controlled exercises, which are wholly devised by the teacher for completion in one or two supervised classes and which usually yield a well-known result.
- (2) Experimental investigation, which offers choices of procedure and may extend over several formal classes with limited supervision.
- (3) Research projects, which are significant pieces of work in which an original problem is assigned to, or selected by the student who then pursues it over an extended period of time with minimal supervision.

### **2.2.4.3 Selecting the project**

Selecting the Geography project is not an easy task. The lecturer must help the students. One way of doing this is to guide students in their selection of a suitable project. The instructor may provide a list of possible projects from which students can choose. He or she may suggest readings in which the students can find project ideas (Clark & Starr 1991:283).

The following criteria may help in selecting useful projects (Clark & Starr 1991:283).

- (1) The project should consist of real learning activities. Tutors are advised to ask themselves the following question, "What learning will result from this project?" Hurry (1991:140) advises tutors to consider the outcomes of the project.
- (2) The project should be pertinent to the course. Projects often include materials and activities from other fields, so there is the constant danger that the project may go off the subject completely. This is the reason why Hay and Miller (1992:203) recommend that "once a topic is selected, students are advised to speak to appropriate staff members about their chosen area or study."
- (3) The learning to be gained from a project should be worth the time spent on it. The tutor would be wise to gauge the length of time the project will take and decide whether there is not another and more economical method to reach the same learning outcome.

Hay and Miller (1992:203) recommend that the topic chosen must "be capable of being researched satisfactorily within time and personal budgetary constraints."

- (4) The necessary materials and equipment must be available at reasonable cost. Projects may require space, equipment and consumables (Gold *et al.* 1991:156). Hurry (1991:140) recommends that there should be sufficient reference books or magazines available for students.



#### **2.2.4.4 Preparation and organization of the project work**

"Project work and practicals require considerable preparation and supervision" (Gold *et al.* 1991:55). To ensure that classes run smoothly through the year, tutors are expected to make full preparation for the project well before the course starts.

According to Tinsley (1996:61), a well prepared field project can avoid the type of field course referred to by Haigh and Gold (in Tinsley 1996:61) which "can resemble tourist excursions with groups of passively disinterested students being bussed from site to site."

For the project to be educationally beneficial, the tutor can do the following preparation (Kellough & Kellough 1996:420):

(1) *Help students generate ideas*

Ideas can be stimulated by lists of things students might do, have former students tell them about their projects, show the results of other students' projects, suggest readings that might inspire ideas or use class discussions to brainstorm ideas.

Hill and Nijman (1991:102) recommend that the project should start with introductory lectures. Introductory lectures which give the theoretical background to the project area ensure that students are familiar with basic techniques of sampling and "introduce students to the application of statistical techniques ..." (Tinsley 1996:61).

(2) *Provide options but insist that writing be a part of the student's work*

Tutors are advised to insist that the writing of a project be part of the student's project. Staff can assist students to write up projects in a number of ways, "most obviously by providing a suggested format which at least makes it clear to the students what sections are supposed to be covered in the report" (Henry 1994:84). This aspect is also applicable if projects are done in groups.

(3) *Provide coaching and guidance*

Tutors are advised to work with each student or student team in topic selection, as well as in the process of writing and oral reporting. Students should be provided with written guidelines and agreed deadlines for the outlines, drafts, and completed projects.

(4) *Assessment*

The method of grading should be clear to students from the beginning, as well as the weight of the project grade towards the term grade. Provide students with clear descriptions of how the assessment will be done.

(5) *Sharing*

Give students time to share both the progress and the results of their study with the rest of the class. The value of the project method comes not only from individual contributions, but the learning that results from the experience and the communication of that experience with others.

#### **2.2.4.5 Assessment**

According to Hurry (1991:142) teachers experience difficulty in assessing project assignments. This is because there are various aspects of an assignment that demand attention. Neatness, layout, use of diagrams and the contents of the assignment are aspects of the assignment that must be considered when awarding marks.

"There are two common approaches to assessing project work: use of a final report and staged assessment" (Henry 1994:113). The researcher will concentrate on the assessment of the final report as it is more relevant to this research study unit.

Employment of the large final report is the most common approach to project assessment. The student is expected to undertake the project and submit a report on his/her findings and progress. With group projects, students are each expected to submit a separate report, on the project as a whole, for assessment.

According to Kellough and Kellough (1996:420) the final grade for the study should be based on four criteria:

- (a) how well it was organised, which includes meeting the draft deadlines;
- (b) the quality and quantity of knowledge gained from the experience;
- (c) the quality of students' sharing of that beaming experience with the rest of the class; and
- (d) the quality of the student's final written or oral report.

In order to achieve a standard of marking, and to speed up marking as much as possible, a marking matrix is recommended" (Hurry 1991:142). A marking matrix is a scheme of marking which divides the work up into its various aspects. Each aspect is awarded marks up to a certain maximum, and the total for the assignment is obtained at the end.

Table 2.1 illustrates Jackson's suggested guidelines for the assessment of project work (Henry 1994:127). This is what Hurry (1991:142) refers to as the 'marking matrix'.

**Table 2.1: Project assessment form**

	%
<i>Assessment of project work</i>	
1	10
2	15
3	15
4	10
<i>Report presentation</i>	
1	10
2	10
3	10
<i>Assessment of initiative</i>	
1	10
2	10
Total	100

(Jackson 1987)

### **2.2.4.6 How the project method can be used to teach mapwork**

- Example:
- Topic: Regionalisation  
Regionalisation is "the process of determining the what and where of a region ..." (Delaney 1989:50).
- Approach: The project method

Objectives of the project exercise:

#### *(1) Geographical skills development*

The exercise provides a hands-on introduction to the regionalisation process. It encourages students to acknowledge the characteristics of regions. Students must distinguish between functional and homogeneous regions and they gain experience of the subjective nature of the regionalisation process.

#### *(2) Interpersonal skills development*

The exercise requires students to work in small groups and to negotiate consensus about their answers within given time constraints.

- Implementation (relevant for co-operative learning)

#### **Phase 1**

Provided with outline maps of South Africa, the students must draw the boundaries for four homogeneous regions, commonly used in newspaper and magazine articles. Students are asked, further to draw boundaries for four functional regions, for example, their estimate for a familiar shopping mall or the circulation region for a major regional newspaper. In this case students are provided with large scale maps, because functional regions cover less area than the homogeneous regions.

Once the boundaries are drawn, students must indicate what the criteria were for the location of boundaries, which regions were functional and which were homogeneous, and whether a precise boundary could be found for each. (Students work alone in Phase 1.)

### **Phase 2**

In this second phase students work in groups of three to four. The group members must reach consensus with one another on the boundaries for each region. These are drawn on a fresh outline map and if possible, coloured pens should be used. Groups should indicate what the consensus criteria were for the selection of boundaries, which regions were functional and which were homogeneous, and whether precise boundaries could be found for each.

### **Phase 3**

After the groups have completed Phase 2, the consensus maps are collected and taped to the classroom's chalkboard to increase their visibility. Students stand and visually compare the other group's maps with their own.

The instructor can examine each map and ask why the boundaries are drawn as they are and what criteria were used in the selection process.

One member of each group is spokesperson. Differences and similarities between the maps are highlighted, and discussed, and explanations are suggested by the students.

### **Phase 4**

At the end of the lecture period, the students' maps are collected for review by the instructor. Transparencies can be prepared, which take examples from student work and compare them with the instructor's own work.

The students' maps are returned at the beginning of the lecture so that the students can compare their work with the examples selected.

According to Harnapp and King (1991:241), a project such as the construction of a raised-relief map, for example, in the classroom must embody four overall objectives:

- (1) the project must be a geographical learning experience;
- (2) it must be simple enough for construction by the students;
- (3) the materials must be inexpensive and readily available; and
- (4) the end product must be aesthetically pleasing.

#### **2.2.4.7 Advantages of the project method**

Hindle (1993:1) outlines the advantages of the project work method as they appear in Gold et al. (1991):

- It trains students to understand, define and solve problems and to think critically.
- It encourages students to be practical, creative and communicative.
- The relevance of project work to real problems and to the student's needs is readily perceived.
- Projects alter the relationship between staff and students. The lecturers become consultants who offer advice and feedback, which places more responsibility upon the students for their own learning.
- Projects allow students to learn through concrete experience and active experimentation.

Another advantage mentioned by Buxton and Schliebusch (1991:20) is that the method is student-centred, and encourages self-activity and discovery. As such it is in accordance with OBE. It is also used in co-operative learning.

In addition Kellough and Kellough (1996:419) note the following advantages:

- Students find more meaning in learning when individual interests, learning styles, and life experiences are accommodated.

- Students become intrinsically motivated to learn when they work on topics of personal significance, with outcomes and time limits that are relatively open-ended. This advantage is also noted by Tinsley (1996:55).
- Students develop skills in writing and in higher-level thinking, especially when properly guided by the teacher.

"The research project provides a presentation for the world of work" (Tinsley 1996:55-56). This method therefore satisfies the demand of competency-based education which, according to Oliver *et al.* (1995:4), emphasises the "possession and development of sufficient skills, knowledge, appropriate attitudes and experiences for successful performance in life roles". As a learner-centred, results-oriented instructional strategy, the project method can enhance the probability of success for every learner (Boschee & Baron 1994:50; Boschee & Baron 1996:574; Dreyer 1997:8; Manno 1995:725;).

#### **2.2.4.8 Disadvantages of the project method**

Buxton and Schlebusch (1991:20-21) notes the following problems:

- It is difficult to allocate marks for projects since each one is unique. Hindle (1993:12) points out the problem of assessment.

These authors are supported by Henry (1994:12) when she says that project work is "harder to assess due to the difficulty the assessors are expected to have ensuring they are applying the same standard to projects on widely differing topics".

- Projects require substantial administrative and academic back up.
- Projects are time-consuming to prepare and to complete.

## 2.2.5 Role playing and simulation games

### 2.2.5.1 Definitions

#### (1) *Role playing*

Clark and Starr (1991:287) define 'role playing' as "an unrehearsed dramatisation in which the players try to act out what they would do and how they would feel in a certain situation."

"As with simulations, role plays have roles but the emphasis is usually on 'play' - that is, acting a part, mimicking and imitating" (Jones 1995:18).

"Role playing exercises are concerned with the simulation of meetings at which such issues as environmental conflicts or local decisions are discussed" (Gold *et al.* 1991:77-78).

#### (2) *Simulation/educational games*

Simulation and games, as methods of teaching Geography, can be defined in the following way:

- (a) "A simulation accurately reflects some parts of reality. Therefore when students are involved in a simulation, they are manipulating a model or playing roles which assist them to develop an understanding of, and a feeling for, reality being presented" (Fien *et al.* 1989:252).
- (b) "An educational game, on the other hand, is an activity in which students use data and/or skills in a competitive situation against themselves, each other, the teacher as game master, chance or the environment" (Fien *et al.* 1989:252).

According to Boardman (1986:79), simulation and games vary from simple to quite elaborate structured activities, but they all have one common element - they invite



students to imagine themselves in other people's shoes and to exercise thought and reflection to make a decision of some kind.

### ***2.2.5.2 Use of role playing***

According to Clark and Starr (1991:287) role playing can be used to achieve the following:

- (1) clarify attitudes and concepts;
- (2) demonstrate attitudes and concepts;
- (3) deepen understanding of social situations;
- (4) plan and try out strategies for attacking problems;
- (5) test hypothetical solutions to problems; and
- (6) practice leadership and other social skills.

### ***2.2.5.3 Staging the role playing***

Role playing can be staged in the following way (Clark & Starr 1991:288-289):

#### ***(1) Preparing for role playing***

Thorough preparation is required for effective learning to take place through role playing. Students must understand the situation presented to them. Gemmell (1995:34) recommends that in the first stage of the implementation, students should be given "introductory talk about the exercise". Students must realise the purpose of the role playing and their parts in it.

#### ***(2) Selecting the cast***

Role playing requires serious effort on the part of each player. Instructors are therefore advised to select the players carefully or to use volunteers.

**(3) *Playing roles***

Role players sometimes feel extremely nervous. Students need help and encouragement to lessen this. The opportunity to rehearse the first few lines, and to prepare a general plan for the development of role playing, may help students to play their roles with more confidence. According to Clark and Starr (1991:284) "Zeieny and Gross suggest that teachers use dyadic role playing (i.e. role playing in which only two players participate) to give students experience before they attempt to role play more complex situations."

**(4) *Follow-up***

A discussion period after the role playing can be beneficial to the entire lesson. Students must be given an opportunity to discuss and analyse the action and interpret its significance. Students' written comments at the end of the role play exercise can indicate whether the exercise worked well (Masilela 1994:118-119).

**2.2.5.4 *Procedure to conduct simulation games***

Clark and Starr (1991:290) suggest the following procedure for conducting simulation games:

- (1) Make ready any props, equipment or material that will be needed in the simulation.
- (2) Introduce the simulation. (Explain (a) the reason for it and (b) how it is played.)
- (3) Assign students to roles. It is usually best to assign roles in accordance with students' potential as role players.
- (4) Follow up the simulation by discussion or activities in which the students draw inferences and make generalisations from the simulated activity.

Gemmell (1995:36) recommends that the exercise should be concluded by "a general briefing at which students are asked to provide feedback to the tutor as to what they consider to be particularly strong and weak points of the exercise".

### **2.2.5.5 How simulations and games can be used to teach mapwork**

According to Hurry (1991:45-56), the "treasure hunt" is a useful game to learn direction and bearing in mapwork. The class is divided into groups of four or five learners for the treasure hunt. Each group is given a set of instructions to follow, which, if properly followed, will lead to a "treasure". Thus games may be used in co-operative learning.

Learners may also play "taxi games" to locate features on a map by using the letter/number coordinates; for example, one may play the controller, who directs others to specific pickup points on a map.

### **2.2.5.6 Advantages**

Gold *et al.* (1991:76-77) have noted the following advantages of role playing, simulations and games:

- (1) The mixture of learning activities and social interaction makes these methods ideal for a course's introductory sessions.
- (2) They provide a high level of motivation and intense social interaction.
- (3) Simulations provide incisive approaches to issues which involve problem-solving, decision-making and forecasting.
- (4) They free teachers from formal teaching and allow them to use their time to monitor student learning strategies.
- (5) They foster communication and collaborative skills training.

### **2.2.5.7 Disadvantages**

- (1) "They require considerable preparation, make demands on time and resources and fill up large amounts of class-contact time that could have been occupied in

other ways" (Gold *et al.* 1991:80). They demand time "to develop an effective exercise" (Masilela 1994:114).

Clark and Starr (1991:288) add to this the following disadvantages:

- (2) Students do not always take role play seriously. They often think of it as entertainment.
- (3) If students are not well prepared, role playing may become superficial and result in stereotypical thinking.
- (4) Unless students know the role players well, they are inclined to mistake the characteristics the players assume in their role for real life qualities.

According to Cherrington and Van Ments (1996:10):

- (5) Students who lack self-confidence are easily upset and inhibited from continuing classes if asked to participate in cases they find embarrassing.
- (6) If handled without sensitivity, "it could end in tears", or worse, the students go home in a state of heightened anxiety.

According to the researcher's analysis of this method, it can meet some of the demands of OBE. According to Boschee and Baron (1996:574) any OBE programme should, amongst others, accommodate each learner's needs through multiple instructional strategies and assessment techniques. This can be used together with other strategies to help the learner acquire certain competencies, for example, the ability to communicate effectively, which is one of the critical, cross-field outcomes (Department of Education 1997:16).

### **2.2.6 Co-operative learning method**

Co-operative learning can be defined as "an organisational structure in which a group of students pursue academic goals through collaborative efforts. Students work together

in small groups, draw on each other's strengths, and assist each other in completing the task. This method encourages supportive relationships, good communication skills and high-level thinking abilities" (Hike in Bull 1995:11).

This method is compatible with OBE and will be explained in more detail in the next chapter.

## **2.3 THEORIES OF LEARNING RELATED TO THE TEACHING OF MAPWORK**

Geography education is concerned with the systematic teaching and learning of map skills. Authors such as Boardman (1986), Foley and Janikoum (1992), Wiegand (1993) and Catling (1995) have written detailed accounts of appropriate teaching and learning programmes (Tilbury & Williams 1997:175).

According to the researcher's point of view, theories of learning relevant to the teaching and learning of mapwork include the following:

- (1) Piaget's developmental theory;
- (2) Information processing models;
- (3) Interactional theories of cognitive development;
- (4) Gagné's theory of instruction; and
- (5) Constructivism: a constructing theory.

### **2.3.1 Piaget's developmental theory**

Piaget's model suggests that cognitive development occurs in a series of stages, namely, the:

- (1) sensory motor;
- (2) preoperational;
- (3) concrete operational; and
- (4) formal operational stage.

Each stage of development is associated with a certain mental age. For example, a mental age of eight typically goes with the concrete operational stage, while a mental age of four is associated with the preoperational stage (Benjafield 1992:290-293; Majoribanks 1991:147:152; Tarpy 1997:551).

When this model is applied to the teaching and learning of mapwork, it is clear that learners benefit if they first learn about maps in a concrete manner, in an environment they are familiar with (classroom, school, locality), and only at a later stage move on to more abstract maps (Anderson 1990:402; Anderson 1995:415; Anderson 1996:243-244; Mazur 1990:283-284; Olson & Hergenhahn 1993:282-284; Tilbury & Williams 1997:176).

Educators have interpreted Piaget's theory and derived from it broad instructional principles. According to Driscoll (1994:196), Piagetian theorists generally agree on three basic instructional principles. A brief explanation of these principles now follows:

(1) *The learning environment should support the activity of the learner*

According to Piaget, learners acquire knowledge through their actions, and thinking is considered to be action-based. Thus, to teach mapwork, a learning environment should be created that encourages learners to initiate and complete their own activities.

"Good pedagogy must involve presenting the child with situations in which he himself experiments, in the broadest sense of the term - trying things out to see what happens, manipulating symbols, posing questions and seeking his own answers, reconciling what he finds one time with what he finds at another, comparing his findings with those of other children..." (Duckworth in Driscoll 1994:196; Kelley 1993:441; McGilly 1996:41). This is also in accordance with OBE.

During mapwork lessons, learners should be given time to handle maps, measure distances, calculate areas, read and interpret maps. Students are able to perform these actions with the help of the teacher or peer members and this can be done in groups.

Driscoll (1994:196) is supported by Ormrod (1990:138) when he says, "people are active processors of information". According to Ormrod (1990:138), "Piaget portrayed human

beings as being acutely involved in the learning and interpretation of events around them. Rather than us responding to stimuli, people act on those stimuli and observe the effects of their actions."

(2) *Learners' interaction with their peers is an important source of cognitive development*

Piaget believed that peer interactions are essential to help learners move beyond egocentric thought (Bruning 1993:33). This is in accordance with co-operative learning. In this regard, Ormrod (1990:139) says, "cognitive development results from the interactions of individuals with their physical and social environments". Interaction with the environment allows individuals to develop and shape 'schemata'. A 'schemata' is "a data structure for representing the generic concepts stored in memory" (Anderson 1996:23; Driscoll 1994:144; Olson & Hergenhahn 1993:277-278).

When reading and interpreting, for example, topographical maps, learners begin to realise through their social interaction that they hold a perspective of the map uniquely their own.

(3) *Adopt instructional strategies that make learners aware of conflicts and inconsistencies in their thinking*

According to Piaget, learners must experience disequilibrium, or an imbalance between their current cognitive structures and the new information to be 'assimilated', in order for them to move to a new stage of development. 'Assimilation' refers to "the process of retention, whereby new information tends to be reduced to (or assimilated by) the meaning of the stable, more established anchoring idea" (Driscoll 1994:122; Olson & Hergenhahn 1993:279)

One point to understand about the third Piagetian principle, is the critical importance of diagnosing what learners already know and how they think. Content is not introduced until the learner is cognitively ready to understand it. In the teaching of mapwork, the calculation, for example, of an area in square metres or kilometres should be taught after learners have mastered the use of scale.

For effective learning to take place, "new elements are grafted onto existing structures and new ideas are understood in terms of existing understanding" (O'Loughlin 1992:794).

### **2.3.2 Information processing theory**

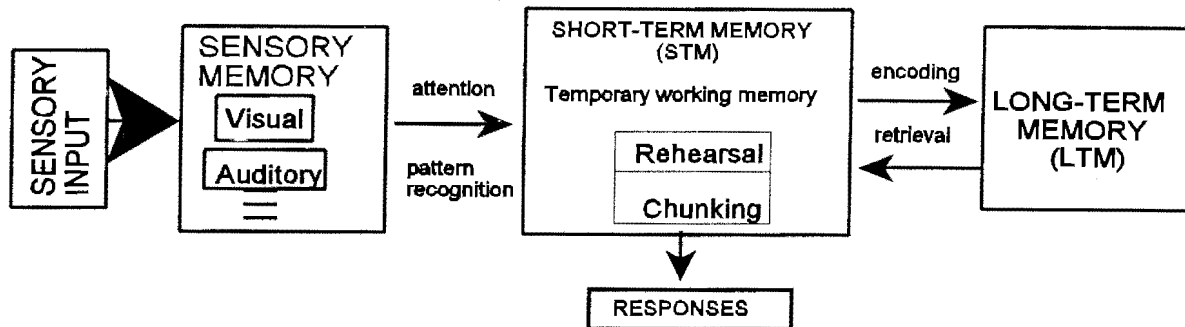
According to the cognitive information processing theory, the human learner is designed to process information in much the same way as a computer. "When learning occurs, information is input from the environment, processed and stored in memory, and output in the form of some learned capability" (Anderson 1990:12-13; Anderson 1995:12; Benjafield 1992:30-31; Driscoll 1994:68; Majoribanks 1991:141-142; Walker 1996:3).

According to Schunk (1991:127) information processing theories focus on how people attend to environmental events, encode information to be learned and relate it to knowledge in memory, store new knowledge in memory and retrieve it as needed (Evans 1991:167-170; Harris & Lebey 1989:100-103; Lutz 1994:244-245; Spada & Reimann 1996:24).

Figure 2.3 below shows the flow of information as generally conceptualised in information processing theory.



**Figure 2.3: The flow of information as conceptualized in Information Processing Theory**



(Driscoll 1994:69)

### Assumptions

Assumptions for an information processing system that are related to the teaching and learning of mapwork include the following:

- (1) *Individuals are actively involved in the learning process*

Learners are not passive victims of environmental conditions. They are active participants in the learning process. When learning mapwork, Geography students must, for example, actively locate features on a map using lines of longitude and latitude.

- (2) *Knowledge is organised*

Students' knowledge, beliefs, attitudes, and emotions are not isolated from one another, but are all associated and interconnected. It is advisable to graduate mapwork content from the simple to the complex.

- (3) *Learning is a process of relating new information to previously learned information*

New information is most easily acquired when people can associate it with things they have already learned. For example, students can accurately locate (absolute location)

features on a map using the grid reference, if they have first mastered the concepts of seconds, minutes and degrees (Keeton, Alien & Sheckley 1993:60-61; Ormrod 1990:150-151).

### **The terminology of human information processing**

Ormrod (1990:152) notes important terms used in information processing. Understanding these terms and their implications is essential if Geography teachers are to teach Geography effectively.

This terminology includes -

(1) *Cognitive process*

This refers to any internal mental event and includes such phenomena as perceiving, paying attention, interpreting, understanding, and remembering.

(2) *Learning vs memory*

Learning is viewed as the acquisition of new information. Memory on the other hand, is related to the ability to recall information that has been previously learned.

(3) *Storage*

Storage is the process by which new information is placed in memory.

(4) *Retrieval*

Retrieval is the process by which people "find" the information they have previously stored so that they can use it again.

(5) *Encoding*

"Encoding refers to the process of relating incoming information to concept ideas already in memory in such a way that new material is more memorable" (Driscoll 1994:84). All these terms should be understood and applied by the Geography teacher who wants to teach mapwork effectively (Lieberman 1990:355-358; Lieberman 1993:431-434).

### **2.3.3 Interactional theories of cognitive development**

#### ***2.3.3.1 Bruner's theory of cognitive development***

Bruner proposed three systems of processing information by which people understand their life worlds. He suggests that humans respond to their environment through action or patterned motor acts, through conventionalised imagery and perception, and through language and reason. These capabilities form the basis of the modes of representation he calls:

- (1) enactive representation;
- (2) iconic representation; and
- (3) symbolic representation (Driscoll 1994:209).

A brief explanation of these three modes of representation now follows:

#### ***(1) Enactive representation***

Enactive representation refers to "a mode of representing past events through appropriate motor responses" (Driscoll 1994:209). A young learner, for example, may not be able to tell you directions to the store from her house, but she can take you there by way of a route previously travelled. Bruner concluded that some type of understanding, then, appears to be represented solely within our muscles.

(2) *Iconic representation*

Iconic representation enables the perceiver to "summarise events by the selective organisation or percepts and of images, the spatial, temporal, and qualitative structures of the perceptual field and their transformed image" (Bruner in Driscoll 1994:209).

A learner, for example, who can draw a map showing the route from her house to the shop, now represents her experience and understanding of that route in an iconic mode.

(3) *Symbolic representation*

Symbolic representation comes about with the acquisition of "a symbol which represents things by design features that include remoteness and arbitrariness" (Bruner in Driscoll 1994:209).

'Language' is an example of the primary system by which humans can encode and represent experience. Map language is generally dominated by conventional signs and symbols that, at a glance, succinctly convey more information than images or acts or words.

Bruner believes that the usual course of intellectual development moves from enactive through iconic to symbolic representation of the world.

### **2.3.3.2 Vygotsky's theory.. the social formation of the mind**

Like Bruner, Vygotsky attempts to understand the formation of the intellect by focusing on the process of its development. He too believes that individual development cannot be understood without reference to the social and cultural context within which such development is embedded (Driscoll 1994:225; Spada & Reimann 1996:193).

Two concepts are used to explain the manner in which the individual gains knowledge. They are (1) mediation and (2) internalisation.

Conway and Ashman (1997:96) define these concepts as follows:

(1) *Mediation*

"Mediation refers to the need for someone other than the learner to translate knowledge about the society and culture so that it can be internalised by the learner.

(2) *Internalisation*

"Internalisation refers to the individual's 'ownership' of concepts or meaning that have been provided through instruction."

Vygotsky also developed the concept of the zone of proximal development (ZPD) to express the potential of the individual to learn.

### **Zone of proximal development**

Vygotsky refers to this zone as "the distance between the actual developmental level as determined by independent problem-solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers" (Bjork & Druckman 1994:92; Conway & Ashman 1997:97; Foley 1991:19; Schinke-Llano 1993:123). As such this is important for co-operative learning.

According to Vygotsky, the zone of proximal development is the area in which learning takes place. Learning occurs as the result of mediation in which an adult or more skilled peer acts as the 'go-between' between the learner and the task, or problem at hand (Marjoribanks 1991:101-103; Schinke-Llano 1993:123-124).

In the teaching and learning of mapwork, mediators can:

- supply information needed for relationships;
- ask questions rather than give answers; and
- arrange events so that student learning is guided.

In order, for example, for students to read and interpret types of slopes as they appear on contour maps (topographical maps), the students must first master the concepts of contour lines, contour intervals and contour patterns.

"In collaboration with an adult or a more capable peer, the child is able to solve more complex tasks, since, through the use of practical intellectual activities such as speech and action, the adult can guide the child's progress towards a solution" (Foley 1991:19).

Learners, for example, when measuring distance on a map (using rulers) generally make the mistake of starting a measurement from one unit, instead of starting a measurement from the nil unit. Thus they need a teacher's guidance in this respect.

### **Scaffolding**

The term 'scaffolding' is linked to Vygotsky's idea and notion of the zone of proximal development (ZPD).

According to Greenfield (Driscoll 1994:235) the scaffold, as it is known in building construction, has five characteristics:

- It provides support;
- It functions as a tool;
- It extends the range of the worker;
- It allows the worker to accomplish a task not otherwise possible; and
- It is used selectively to aid the worker where needed. A scaffold would not be used, for example, when a carpenter is working five feet from the ground (Driscoll 1994:235-236).

The characteristics of a scaffold define the characteristics of an ideal instructor. An instructor should provide the guidance required for learners to bridge the gap between their current level of skill and the desired level of skill. As learners become more proficient, and are able to complete tasks on their own without assistance, the guidance can be withdrawn (Smith 1991:13).

Another requirement of the social interaction between learning partners is that their relationship be one of intersubjectivity. Vygotsky meant that partners must come to some degree of joint understanding about the task at hand. It is not enough for the partners to simply work together or for one partner to dominate and demonstrate the solution to the other. They must co-construct the solution to a problem or share in joint decision-making about the activities to be coordinated in solving the problem.

Intersubjectivity implies shared power and shared authority, and where inequality between partners resides only in their respective levels of understanding. Students can be paired, for example, to read and interpret one topographical map sheet. It is the duty of the Geography teacher to see to it that one student does not dominate the other.

### **2.3.4 Gagné's theory of instruction**

According to Driscoll (1994:331) Regolith (1983) defines "instructional theory as identifying methods that will best provide the conditions under which learning goals will most likely be attained."

For instructional theory to be effective, it must either build on, or be compatible with, existing learning theory. Instructional theory involves the realisation of intentional learning goals.

According to Driscoll (1994:332), *instruction* refers to "deliberate arrangement of learning conditions to promote the attainment of some intended goal". The purpose of instructional theory is to be prescriptive, and to provide principles by which teachers and instructional designers can assure learning (Marjoribanks 1991:217-220).

Suppose the teacher is interested in students learning how to convert a ratio scale (1:50000) into a statement scale (centimetres to kilometres). Before students can acquire this skill, they must have some confidence in their ability to learn it, and they must see some value in learning it.

Information processing theory suggests additional conditions required for learning. Students must already know how to multiply and divide, and the fact that 1 00 000 cm =

1 km, because these skills are components of the rule for converting scales. "Gagné (1977) believes that having the prerequisite subskills is the key to learning new intellectual skills" (Grippin & Peters 1984:16).

On the basis of instructional theory these learning conditions can be implemented in the following way.

Effective methods may include the teacher demonstrating the rule to all the students. For example:

$$\begin{aligned}
 100\ 000\ \text{cm} &= 1\ \text{km} \\
 50\ 000\ \text{cm} &= x \\
 x &= \frac{50\ 000}{100\ 000} \\
 &= 0,5\ \text{km} \\
 \therefore &= 0,5\ \text{km}
 \end{aligned}$$

Statement scale = One centimetre > 0,5 kilometre.

A demonstration should be followed by the opportunity of practice solving meaningful examples.

Gagné's theory incorporates three major components. They are:

- (1) a taxonomy of learning outcomes;
- (2) specific learning conditions required for the attainment of each outcome, and
- (3) the nine events of instruction (Driscoll 1994:333-337).

A brief explanation of these components now follows:

- (1) *A taxonomy of learning outcomes*

Benjamin Bloom, a contemporary of Gagné's, was among the first to accept the notion that learned capabilities in the human being can be classified into three major domains:



cognitive, affective and psychomotor. He proposed a taxonomy of levels within the cognitive domain (Bruning 1993:30).

According to Ormrod (1990:76) and Driscoll (1994:335), Bloom identified information within the cognitive domain that is useful in developing objectives. Bloom presented these six levels as a hierarchy: knowledge, comprehension, application, analysis, synthesis and evaluation.

The taxonomy "provides a useful reminder that behavioural objectives should be written to encompass higher level cognitive skills as well as the knowledge of simple, discrete facts" (Ormrod 1990:76).

The advantage of behavioural objectives to Geography students, especially in the learning of mapwork, is that students who are told what behaviours they should be able to demonstrate at the conclusion of an instructional unit have tangible goals towards which to strive and are in a better position to judge correctly their own realisation of those behaviours. Within OBE, the knowledge/understanding, skills and values are specified as learning outcomes.

(2) *Specific learning conditions required for the attainment of each outcome*

Once instructional goals have been categorised into types of learning outcomes, then the planning for instruction can proceed systematically. A teacher can determine just what unique conditions are needed for learners to acquire each desired skill, knowledge or attitude.

The motor skills (learning outcome) involved in drawing a cross-section of a contour map can be acquired by arranging repeated practice (critical learning condition).

(3) *The nine events of instruction*

Gagné proposed the following nine events of instruction:

- gaining attention,

- informing the learner of the objective (outcome), stimulating recall of prior learning,
- presenting stimulus,
- providing learner guidance,
- eliciting performance,
- providing feedback, and
- assessing performance and enhancing retention and transfer (Driscoll 1994:351).

These nine events of instruction should never be ignored by the teacher of mapwork.

Gagné's theory of instruction serves the requirements of OBE well. According to Driscoll (1990:333), Gagné "dealt particularly with problems of determining just what skills and knowledge are required for someone to be an effective performer at a given job. Once job requirements were identified, the task then become one of determining how those requirements might best be learned by a person in training for the job" (Smelkinson, De Falco & Heinemann 1992:18).

### **2.3.5 Constructivism: a constructing theory**

"Constructivist theory rests on the assumption that knowledge is constructed by learners as they attempt to make sense of their experiences. Learners, therefore, are not empty vessels waiting to be filled, but rather active organisms seeking meaning" (Driscoll 1994:360).

According to Digby and Pedersen (1995:158) "the constructivist hypothesis states that knowledge is constructed by the learners, not passively received, and that one comes to know by an adaptive process of organising one's experiences rather than by perceiving some external reality (Smith 1991:11).

Many constructivist theorists adhere to Vygotsky's notions about the social negotiation of meaning. That is, learners test their own understandings against those of others, notably those of teachers or more advanced peers.

## **Constructivist conditions for learning**

The goals for constructivist instruction include problem-solving, reasoning, critical thinking, and the active use of knowledge. According to Driscoll (1994:365-372), learning conditions that are likely to bring these goals about include the following:

(1) *Provide complex learning environments that incorporate authentic activity*

For effective learning to take place, a complex learning environment must be created that will challenge the learner's thinking. Simulation games in Geography that require students to observe various phenomena and manipulate concepts can help in this regard.

The concept of authenticity in the learning environment should be emphasised. In the teaching of mapwork the project method, discussed in the previous unit, can accomplish this. This is because the students have an investment in the project, making their own decisions and evaluating their own progress – especially in groups.

(2) *Provide social negotiation as a integral part of learning*

Constructivists emphasise collaboration in co-operative learning as a critical feature in the learning environment. It enables insights and solutions to arise synergistically (Bjork & Druckman 1994:83; Papert & Harel 1993:85-87; Smith 1991:12).

(3) *Juxtapose instructional content and access to multiple modes of representation*

One of the ways that can be used to avoid partial understanding is to examine the same material from multiple perspectives or multiple metaphors.

Using multiple modes of representation can also serve as a means of juxtaposition. That is, for example, viewing the same mapwork content through different sensory modes (such as visual, auditory or tactile) enables different aspects of it to be seen as in co-operative learning.

(4) *Emphasise student-centred instruction*

"What distinguishes the constructivist perspective on student-centred instruction is the placement of the student as the principal arbiter in making judgements as to *what, when,* and *how* learning will occur" (Hannafin in Driscoll 1994:371; Best 1991:275; Department of Education 1997:7).

Geography students should not be passive recipients of instruction that has been designed for them. Instead they are actively involved in determining what their own learning needs are and how these needs can best be satisfied.

Learning for most is aided by clear and focused guidance, particularly if learners are helped to "think about their thinking" (Tilbury & Williams 1997:177).

In conclusion, Geographers regard maps as tools that enable them to communicate knowledge and understanding of place, space and environment. To develop their familiarity with maps, students need the opportunity to use, make, read and interpret maps in a variety of contexts.

## **2.4 SUMMARY**

In this chapter diverse methods of teaching Geography and the theories of learning relevant to the teaching of mapwork and co-operative learning are explained. In the next chapter, the co-operative learning method is explained in detail.

# *Chapter Three*

## *Co-operative learning*

### **3.1 INTRODUCTION**

The previous chapter identified and explained the diverse methods used to teach mapwork, namely the fieldwork method, the lecture method, the textbook method, the project method, role playing and simulation games. The advantages and disadvantages of each method were also explained.

Chapter Two included an examination of the following theories related to the learning, and teaching, of mapwork:

- (1) Piaget's developmental theory;
- (2) information processing theory;
- (3) interactional theories of cognitive development;
- (4) Gagné's theory of instruction; and
- (5) constructivism.

This chapter will concentrate on the co-operative learning method in-depth.

### **3.2 DEFINITIONS AND EXPLANATIONS OF THE CONCEPT 'COOPERATIVE LEARNING'**

Proponents of co-operative learning define the method in various ways. These definitions were given in Chapter One (section 1.4.4).

The main idea conveyed in these definitions is that co-operative learning structures student interaction by placing the students in small, mixed ability groups, which encourages mutual interdependence and yet provides for individual accountability. This

atmosphere of mutual helpfulness allows students to solve issues through face-to-face discussion.

According to Johnson and Johnson (1994:5) "co-operative efforts result in participants' recognising that all group members share a common fate (we all sink or swim together), striving for mutual benefits so that all group members benefit from each other's efforts (your efforts benefit me and my efforts benefit you), recognising that one's performance is mutually caused by oneself and one's colleagues (united we stand, divided we fall), empowering each other (together we can achieve anything), and feeling proud and jointly celebrating when a group member is recognised for achievement. (You got an A! That's terrific!)."

According to the researcher's point of view, the spirit of co-operative learning is well expressed by the Chinese proverb of Wang Yang-Ming which states: "to know and not to do, is not to know". It is essential that in order for students to know, read and interpret maps, they must be involved in doing the activities that will let them learn.

The researcher, to conclude, supports the idea of Kennet, Stedwill, Berrill and Young (1996:177) when they state: "Through talking, students can discover what they know and what they do not understand, and 'make sense' of what they are learning". This description makes co-operative learning a favourable instructional strategy that can be used in outcome-based education. This valuable idea is supported by Schwarz (1995:88) when he states, "Worthwhile ideas advocated by OBE proponents include co-operative learning ..." Van der Horst and McDonald (1997:127) and Spandy (1993:28) also recommend co-operative learning as a teaching strategy in OBE.

### **3.3 THE HISTORY OF CO-OPERATIVE LEARNING**

"Two are better than one, because they have a good reward for toil. For if they fall, one will lift up his fellow; but woe to him who is alone when he falls and has not another to lift him up ... and though a man might prevail against one who is alone, two will withstand him. A threefold cord is not quickly broken - Ecclesiastes 4:9-12" (Digby & Pedersen 1995:3).

The above-mentioned Biblical scripture indicates that co-operative learning springs from an age-old wisdom. The capacity to work co-operatively has been a major contributor to the survival of our species.

As early as the first century, Quintilian argued that students could benefit from teaching one another. According to Franklin, Griffin and Perry (1994/95:14), peer tutoring can be traced back to the first century AD, when the Greeks used it to help those children who later became the country's leaders and philosophers.

John Amos Comenius (1592-1670) believed that students would benefit by teaching and being taught, by other students. The late 1700's witnessed Joseph Lancaster and Andrew Bell use co-operative learning groups extensively in England, and their idea was brought to the United States when a Lancastrian school was opened in New York City in 1806 (Johnson *et al.* 1991:4).

In the last three decades of the 19th Century, Colonel Frances Parker of the United States of America (USA), brought to his advocacy of co-operative learning, enthusiasm, idealism, practicality, and an intense devotion to freedom, democracy, and individuality in the public schools.

John Dewey followed in Parker's footsteps, and promoted the use of the co-operative method in instruction (Dewey 1916).

In the 1970's, Davis De Vries and Keith Edwards began working on co-operative learning at the John Hopkins University's Centre for Social Organisation Schools. De Vries and Edwards developed Teams-Games-Tournaments (TGT), and Shlomo and Yael Sharan, in Israel, developed the Group Investigation procedure for co-operative learning groups (Watson & Marshall 1995:292).

In the mid 1960's the authors began to train teachers how to employ co-operative learning. David W. Johnson and Roger T. Johnson contributed much to co-operative learning. They synthesised the existing knowledge of co-operative, competitive, and individual efforts, to formulate theoretical models concerned with the nature of cooperation and its essential components. They also conducted a systematic programme

of research to test their theories, and translated their validated theory into a set of concrete strategies and procedures for using cooperation in classrooms.

They further built, and maintained, a network of schools and colleges which implemented co-operative learning strategies throughout North America and many other countries (Johnson & Johnson 1994:47).

According to Johnson and Johnson (1994:47), in the late 1970's, Robert Slavin extended the work of De Vries and Edwards at John Hopkins University, by modifying TGT into Student Teams-Achievement Division (STAD). He further modified computer-assisted instruction into Team-Assisted Instruction (TAI).

Donald Dansereau and other individuals developed a number of co-operative scripts and co-operative procedures in the 1980's.

Schwalb and Schwalb (1995:293-295) note the following research findings in different countries of the world:

- In Germany, Huber presented several examples of how team or group learning proved to be effective with German learners. In his research Huber concludes that co-operative learning must be implemented in a way which does not alienate individuals who have grown up accustomed to non-co-operative teaching methods.
- In England, Cowie, citing two decades of experimental research, demonstrated that co-operative learning has a positive effect on learners' personal growth, cognitive abilities and general social outcomes.
- Taylor noted how little formal research has been conducted on co-operative learning in Sub-Saharan Africa. However, investigations have begun in a few countries, including South Africa and Nigeria. Positive achievement findings have been reported in both these two countries.



- In Latin America, Brown and Brown have indicated that research into co-operative learning is almost non-existent. They reported a few case studies in which co-operative learning had been used.
- In Israel, Hertz-Lazarowitz and Zelniker, and Shachar and Sharan, concur that co-operative learning techniques can be quite valuable for Israeli learners, under certain conditions.

To summarise, the research report given above suggests that co-operative learning has been successfully applied in various parts of the world, and that it has yielded a wide variety of positive effects on students from many different countries.

### **3.4 CLASSROOM RESEARCH ON THE ACHIEVEMENT EFFECTS OF CO-OPERATIVE LEARNING**

The co-operative learning method has been extensively used and researched in elementary and secondary education, and is increasingly adopted in the college classroom (Hagen & Moffat 1992:531; Slavin 1995:19).

This section will deal with the previous research reports on the achievement effects of co-operative learning.

- Over 375 studies, with over 1700 findings on productivity and achievement, have been conducted over the past 95 years (Digby & Pedersen 1995:21; Johnson *et al.* 1991:38).

The number of studies conducted in the last 30 years has increased. Ninety percent of the studies have been conducted since 1960 and two-thirds have been conducted since 1970, which indicates the significantly high level of interest in this method.

When all of the studies were included in the analysis, the average student cooperating in the experiments performed at about two-thirds a standard deviation above the average learning within a competitive (effect size = 0,67) or individualistic situation (effect size = 0,64).

An *effect size* is the proportion of a standard deviation by which an experimental group exceeds a control group. Effect sizes provide a convenient measure of programme impact. In this section, effect sizes will be used to describe the impact of co-operative learning on the experimental group in comparison with the control group (Slavin 1995:20-21).

When only high-quality studies are included in the analysis, the effect sizes are 0,88 and 0,61 respectively. When only the college and adult studies are included in the analysis, the results are similar.

Co-operative learning promotes higher achievement than competitive or individualistic learning (effects = 0,59 and 0,62 respectively) (Johnson *et al.* 1991:38).

- “Pure” and “mixed” co-operative learning. The term “pure” means, co-operative learning that is not mixed with competitive or individualistic learning. The term “mixed” means, co-operative learning that is mixed with competitive or individualistic learning.

An interesting research discovery is that “... when the results of ‘pure’ and ‘mixed’ operationalisation of co-operative learning are compared, the ‘pure’ operationalisations produce higher achievement (co-operative versus competitive, pure = 0,71 and mixed = 0,40, co-operative versus individualistic, pure = 0,65 and mixed = 0,42)” (Digby & Pedersen 1995:23).

- According to Slavin (1990:13), forty studies, of at least four weeks duration, have evaluated co-operative learning methods. In all the studies, which took place in regular classrooms without aides or special resources, one of the co-operative learning methods was compared to traditionally taught classes, while studying the same material.

In 33 of the 40 studies, the students in the co-operative learning classes learned significantly more than those in the traditionally taught classes, although, in seven studies there were no significant differences.

- Newman and Thompson (in Digby & Pedersen 1987:880) reviewed 27 selected research studies used in grade 7-12. The 27 research reports involved 37 comparisons of co-operative versus control methods. Twenty-five (or 68 percent) of these comparisons favoured a co-operative learning method at the 0,05 level of significance.
- Johnson, Johnson and Smith also conducted a meta-analysis of over 75 studies on secondary school students (Grades 7-12). "Cooperation results in higher achievement than do competitive (effective size = 0,72) or individualistic (effective size = 0,56) efforts. When only the high quality studies are included cooperators outperform competitors (effect size = 0,93) and students working individualistically (effect size = 0,59)" (Digby & Pedersen 1995:25).
- Sixty-three (63%) of the ninety-nine experimental-control comparisons conducted by Slavin (1995:21) significantly favoured co-operative learning. Only five percent significantly favoured control groups.
- Research studies conducted by Franklin, Griffin and Perry (1994/5:13-25) in Florida support the positive effect of co-operative learning. Experimental versus control student performance was compared in a series of multiple choice examinations. Results indicate enhanced performance for the peer tutoring subjects.
- Research report on an application of peer tutoring at the Navy's Electrician Mate's School in Great Lakes, Illinois reveals the following. The experimental students (co-operative group) benefited from peer tutoring experience and achieve a 95,7 grade average compared to 88,40 for the control group (Franklin *et al.* 1995:16).
- The study in Statistics conducted by Keeler and Steinhorst (1994:81-84) at the University of Idaho, USA, confirmed the effectiveness of co-operative learning on achievement. There were two co-operative classes and one traditional class. The results of the experiment were as follows:

The traditional lecture class had a mean final course average of 72,3%. The two co-operative classes had mean final course averages of 78,3% and 80,5%.

A comparison of the grade distributions reveals that a much higher percentage of students received A's, B's, and C's in the two co-operative classes (84% and 78%) than in the traditional class (38%).

- McMillon (1994:71) at Lehman College, City University of New York, conducted a pedagogical study designed and implemented to evaluate the effects of small group instruction on the academic performance of underprepared minority college students. To determine this, 32 first semester, skills block programme minority students were randomly placed in two sections of the skills blocked Freshmen Orientation course in an experimental/control group design.

The interval data analysis (t-test) revealed a significant difference ( $P < .05$ ) in the academic performance of the experimental group relative to the control group.

The interval results of the post-test in the two groups were as follows:

The mean score for the experimental group was 5,87; the control group was 3,18 ( $t=3,08$ ,  $p < .04$ ). The data analysis for measures on the post-test level revealed a significant difference between the two groups. The mean score for the experimental groups was 24,3; the control group was 15,1 ( $t=2,63$ ;  $p < .01$ ). Twelve students in the experimental group passed or increased their scores, a total of 50%; nine students in the control group passed or increased their scores, a total of 44%. Increased performance was in favour of the experimental group relative to the control group.

In conclusion, the researcher supports the statement by Watson and Marshall (1995:293) when they note, "... there has been a great deal of research completed in the area of co-operative learning over the last 100 years, and there is considerable evidence for effectiveness of these techniques in improving academic achievement" (Coleman & Freedman 1996:663-634; Jacobson 1990:247; Purdom & Kromrey 1995a:345-346; Slavin & Stevens 1995:251-253).

### 3.5 CO-OPERATIVE LEARNING AND OUTCOMES OTHER THAN ACHIEVEMENT

Co-operative learning is not only an instructional technique for increasing student achievement, it is also "a way of creating a happy, pro-social environment in the classroom, one that has important benefits for a wide array of affective and interpersonal outcomes" (Slavin 1995:50).

In this section the researcher names and discusses the outcomes of co-operative learning other than achievement.

Proponents of co-operative learning (Brandt 1991:96-97; Digby & Pedersen 1995:107-136; Slavin 1995:50-68) agree that there are outcomes other than achievement that are related to co-operative learning.

These outcomes include the improvement of the following:

- (1) intergroup relations;
- (2) self-esteem;
- (3) social support;
- (4) social skills;
- (5) pro-academic peer norms, and
- (6) "psychological health".

An explanation of these outcomes now follows:

(1) *Intergroup relations*

Co-operative learning is an ideal solution to the problem of providing students of different ethnic groups with opportunities for non-superficial, co-operative interactions. Co-operation between students is emphasised by the classroom rewards and tasks, and by the teacher, who tries to communicate an "all for one, one for all" attitude (Slavin 1995:51).

Co-operative learning methods satisfy the conditions outlined in the Social Science Statement and by Allport (1954) for the positive effects of desegregation on race relations – interracial cooperation; equal status roles for students of different races; contact across racial lines that permits students to learn about one another as individuals; and the communication of unequivocal teacher support for interracial contact.

The evidence linking Student Team-Achievement Division (STAD) to gains in cross-racial friendship is strong. Two studies by Slavin (1987, 1979) found that students who had experienced STAD gained more in cross-racial friendships than did control students.

In Slavin's (1979) study, students were asked to list their friends. Students in the control group listed an average of less than one friend of another race, or 9,8 percent of all of their friendship choices; those in the experimental group named an average 2,4 friends outside their own race, or 37, 9 percent of their friendship choices.

## (2) *Self-esteem*

"Self-esteem is a judgement about one's self-worth, value and competence based on a process of conceptualising and gathering information about oneself and one's experiences" (Digby & Pedersen 1995:119-120). Self-esteem has two components: the level of worth a person places on himself or herself, and the processes through which individuals derive conclusions about their self-worth.

Over 80 studies comparing the relative impact of co-operative, competitive and individualistic experiences on self-esteem have been conducted since 1950. Co-operative efforts promoted higher self-esteem than did competitive (effect size = 0,58) or individualistic (effect size = 0,44) efforts. These findings were consistent across high, medium and low quality studies.

The pure operationalisations of cooperation had a significantly stronger impact on self-esteem than did mixed operationalisations (competitive: mixed = 0,33 and pure = 0,74; co-operative vs individualistic: mixed = 0,22 and pure = 0,51).

In co-operative learning, students (a) realise that they are accurately known, accepted, and liked by their peers (basic self-acceptance – which means the perceived intrinsic

acceptability of oneself); (b) know that they contribute to own, others and group success (reflected self-esteem - which means the seeing of themselves as others see them); and (c) perceive themselves and others in a differentiated and realistic way that allows for multidimensional comparisons based on complementarity of own and others' abilities (comparative self-evaluation - which means the estimate of how positively their attributes compare with those of their peers ) (Digby & Pedersen 1995:120-121).

The use of co-operative learning to teach Geography mapwork is likely, therefore, to improve students' self-esteem.

### (3) *Social support*

Social support can be defined as "the existence and availability of people on whom one can rely for emotional, instrumental, informational, and appraisal aid" (Digby & Pedersen 1995:108).

Social support involves:

- Emotional concern, such as attachment, reassurance, and a sense of being able to rely on and confide in a person, all of which contribute to the belief that one is loved and cared for.
- Instrumental aid such as direct aid, goods or services.
- Information, such as facts or advice that may help to solve a problem; and
- Appraisal, such as feedback about the degree to which certain behavioural standards are met (information relevant for self-evaluation).

Social support systems consist of significant others who collaboratively share people's tasks and goals, who provide individuals with resources (such as money, materials, tools, skills, information, and advice) that enhance their well-being and/or help people mobilise their resources in order to deal with the particular stressful situation they face.

Since the 1940's 106 studies have been conducted to compare the relative impact of co-operative, competitive, and individualistic efforts on social support. Co-operative learning promotes greater social support than competitive (effect size = 0.62) or individualistic (effect size = 0,70) efforts. The higher quality studies reflected that the effect sizes for cooperation compared with competition and individualistic efforts were even stronger (effect size = 0,83 and 0,71 respectively).

The pure co-operative operationalisations promoted significantly higher levels of social support than did mixed operationalisations (competitive : mixed = 0,45 and pure = 0,73; individualistic: mixed = 0,02 and pure = 0,77).

David Johnson and Roger Johnson note the relationship between social support and stress. Social support is related to stress, in that the greater the social support individuals have, the less stress they experience and the better able they are to manage the stresses involved in their lives.

Thus, to learn Geography mapwork by means of co-operative learning may improve social support and inhibit stress, and further enable the learning process.

#### (4) *Social skills*

Social competence is an essential aspect of "psychological health". People do not instinctively know how to interact effectively with others. Many people lack basic interpersonal skills, for example, the ability to correctly identify the emotions of others and appropriately resolve a conflict, and often their social ineptitude persists into maturity. Individuals who lack social skills find themselves isolated, alienated, and at a disadvantage in vocational and career settings.

Social skills are required for exchanging information within co-operative groups and for providing members with assistance and encouragement. However, the relationship so essential for living productive and happy lives is lost when the basic interpersonal skills are not learned (Archer-Kath, Johnson & Johnson 1994:682).



Co-operative learning increases students' social skills. Therefore, to achieve mutual goals students must,

- get to know and trust each other,
- communicate accurately and unambiguously,
- accept and support each other, and
- resolve conflicts constructively.

A number of studies have examined the impact of co-operative learning experiences on the mastery and use of social skills. Lew, Mech, Johnson and Johnson (1986) found that socially isolated and withdrawn students learn more social skills and engage in them more frequently within co-operative, than within individualistic, situations.

Hence to employ co-operative learning for mapwork may improve students' social skills.

(5) *Pro-academic peer norms*

Co-operative goals create peer norms that support high achievement. This argument is based on the fact that co-operative incentives motivate students to encourage each other to do academic work, and thereby, students feel that their classmates want them to do their best.

Deutsch (1949) found that college students who discuss human relations problems under co-operative conditions feel more pressure to achieve from their group mates, feel more of an obligation to their groupmates, and have a stronger desire to win their groupmates' respect than students who work under competitive instructions.

The field experimental research also supports the findings of effects of co-operative learning on peer norms supporting individual achievement. Slavin (1978b) found positive effects of STAD on a questionnaire scale consisting of such items as, "Students in this class want me to come to school everyday", and "Other students want me to work hard in this class". One study of the Johnsons' methods found significantly greater gains on measures of "peer academic support" in co-operative than in individualistic treatment (Slavin 1995:62-63).

This has important implications for learning about Geography mapwork by means of the co-operative learning method.

(6) *“Psychological health”*

Johnson and Johnson define “psychological health” as, “the ability (cognitive capacities, motivational orientations, and social skills) to build, maintain and appropriately modify interdependent relationships with others to succeed in achieving goals” (Digby & Pedersen 1995:10). People who are unable to do so, often become depressed, anxious, frustrated, and lonely. They tend to feel afraid, inadequate, helpless, hopeless, and isolated.

Students who work together in co-operative learning groups to learn, for example, Geography mapwork, improve their “psychological health”. They can build and maintain productive, interdependent relationships, tend to cope effectively with stressful situations, are resilient in the face of adversity, feel self-reliant and autonomous, have a coherent and integrated self-identity, like themselves, and are happy.

Research studies conducted by Johnson and Norem-Hebeisen (1977) found that “the more co-operative the person, the lower his or her psychopathology and the greater his or her emotional maturity, social adjustment, self-acceptance and integration,…” (Digby & Pedersen 1995:112).

It is important to acknowledge the significant correlation found between co-operative learning and increased “psychological health”, in contrast to the mixed results noted between competitive methods and “psychological health”, and the distinct relationship found between an individualistic orientation and psychological pathology.

### **3.6 THE ATTITUDE OF STUDENTS TOWARDS CO-OPERATIVE LEARNING**

According to Johnson and Johnson, “... positive student attitudes can be developed, clarified, reinforced, and changed through structured discussions within a co-operative context” (Stahl 1994:60).

This section will examine a number of research findings on students' attitudes towards co-operative learning.

- (1) At the University of Wisconsin, Oshkosh, Hagen and Moffatt (1992:531-535) conducted a study to investigate students' reactions to a course that used co-operative learning. Two co-operative classes were formed. Students in class 1 were seniors or graduate students. Students in class 2 were freshman or juniors. All students were enrolled in a 14 week course that met 13 times for three hours each.

The questionnaire was developed by the authors and a pilot study was conducted on university students in the same field of study as the test subjects. It addressed three aspects:

- (i) basic demographic information;
- (ii) reported satisfaction with co-operative learning; and
- (iii) perception of achievement.

The results were as follows:

Good agreement was found between the questions, with 90,2% of all students responding "yes" to "enjoyed being involved" and 89,8% reporting "no" to "wasting ... time".

Level of satisfaction was also addressed by asking whether the students "like the opportunity to socialise" during co-operative learning; (98,4%) of all students responded "yes". Nearly as many (93%) of all students reported that they "would like to be involved" with co-operative learning again.

In this study, the majority of students were positive about their experiences with co-operative learning, both in their satisfaction and their perception of their achievement.

- (2) A survey of Geography classes at Flinders University (second year Social Geography course) and Western Washington University (second year Economic Geography course), was conducted during 1993. The survey aimed to assess what students think about writing groups in Geography.

Anonymous responses from 58 students, who had participated fully in the exercise, were received; of these, 36 were from students in Australia and 22 were from students in the North American class.

The results of the exercise were as follows:

The US students were more convinced than the Australian about the constructive role of the exercise. "Some 65% of Flinders' students surveyed thought that the writing groups exercise helped them with the essay associated with this exercise whilst the comparable figure for Western Washington students was 80% (overall, 71% thought the exercise helped them to produce a better essay" (Hay & Delaney 1994:327). The student responses to this exercise provide a useful indicator of the merits of writing groups for Geography courses.

- (3) A similar case study conducted by Jackson (1994:166-177) at Massey University, New Zealand, investigated students' attitudes towards co-operative learning.

The results of the questionnaire were very favourable and, in particular, there were only one or two exceptions to the very positive attitude towards co-operative learning initiatives.

The higher percentage of students found "... the co-operative learning environment effective (88 percent) and enjoyable (79 percent). Their enthusiasm was also noticeable in the reply to the question 'What single thing do you like most about the course?' Some 34 percent commented that they liked the co-operative learning environment above anything else and some 26 percent thought the lecturer-student relationship was the most important" (Jackson 1994:175).

- (4) Purdom and Kromrey (1995:341-348), at the University of South Florida, conducted a study in order to compare the lecture, co-operative learning and Programmed Instruction methods at college level. At the conclusion of the study, a post-test was administered, along with a questionnaire, that assessed attitudes and perceptions about the learning experience.

The results of the research were as follows:

A larger number of students in the lecture treatment (37%) perceived their learning 'at a high level of mastery' than did those students in the programmed instruction (7%) and co-operative learning treatment (6%). More students in the co-operative learning group rated the learning 'satisfactory' (84%) than either the lecture (60%) or programmed instruction group (62%). Only 3 percent of students in the lecture group and 10 percent of students in the co-operative learning group rated their achievement as 'less than satisfactory level of mastery'.

- (5) Swafford (1995:626) introduced co-operative learning to pre-service teachers in an undergraduate content area reading course at Texas College of Education. At the end of the semester, students' reactions were noted. Students' comments clustered around these central ideas: 'enhancing learning', 'facilitating per interaction' and 'fostering individual accountability'.

Students commented that the co-operative learning method improved their learning (Swafford 1995:630).

Responses related to facilitating 'peer interaction' were also positive and so were comments related to fostering individual accountability (Swafford 1995:630).

- (6) Purdom and Kromrey (1995:57-62) conducted three studies on co-operative learning at college level. These studies were designed both to measure the effects of co-operative learning on academic achievement, and to determine college students' perceptions and attitudes to co-operative learning. The research found:

- (i) A total of 90% of the students believed co-operative learning helped them master the material studied.
- (ii) Over three-fourths of the students indicated either a strong or moderate liking for the method.
- (iii) Above all else, students liked the opportunity to interact with peers and to work with them on common purposes.
- (iv) However, students disliked the absence of continual teacher reassurance as they learned. The use of group rewards was viewed by some students as unnecessary.
- (v) The majority of students in these studies believed that their groups worked well together; between 83% and 97% said their groups worked either very well or at a satisfactory level.
- (vi) College students believe they need some instructor assistance as part of their co-operative learning experience.

In general, student attitude towards co-operative learning in this study was very positive.

- (7) In an experiment conducted by Duch (1996:326-329), a teaching consultant in the centre for teaching effectiveness, University of Delaware, New York, students' responses after using co-operative learning methods in science were positive:

"Group work helped me see there's more than one way to approach a problem."

"The groups definitely help - not only if you don't know the answer, but if you have to explain it to others - you really have to understand it" (Hartman 1996:107-109, Hertzog & Lieble 1996:277; Kempa & Orion 1996:39-40).

### **3.7 TYPES OF CO-OPERATIVE LEARNING (CO-OPERATIVE GROUPS)**

Co-operative learning may be used in various ways. Three types of co-operative learning procedures have been noted. They are:

- (1) formal co-operative learning,
- (2) informal co-operative learning,
- (3) co-operative base groups.

(Digby & Pedersen 1995:40; Johnson & Johnson 1994:24; Kutnick & Rogers 1994:67; MacDonald & Korinek 1995:342-344; Sharan 1994:51; Stahl 1994:51).

Explanation of the three types of co-operative learning procedures will now follow.

#### **3.7.1 Formal co-operative learning**

“Formal co-operative learning is students working together, from one class period to several weeks, to achieve shared learning goals by ensuring that they and their group mates have successfully completed the learning task assigned” (Johnson & Johnson 1994:24).

In formal co-operative learning groups, teachers/lecturers:

- (i) specify the objective or learning outcomes for the lesson. In every mapwork lesson, for example, there should be an academic objective that specifies the mapwork concepts and strategies to be learned, and a social skill objective specifies the interpersonal or small group skill to be used and mastered during the lesson.

This point fits well with one of the characteristics of outcomes-based education which states, “goals are clearly defined”, and that “learning is carefully facilitated toward the achievement of the established outcomes” (Boschee & Baron 1994:50).

- (ii) make a number of pre-instructional decisions. A teacher/lecturer decides on the size of groups, the method of assigning students to those groups, the roles students have to play, the material needed to conduct the lesson, and the way the classroom will be arranged.
- (iii) explain the task and the positive interdependence. A teacher/lecturer defines the assignment, teaches the essential concepts and strategies, specifies the positive interdependence and individual accountability, gives the criteria for success, and explains the expected social skills to be engaged.
- (iv) monitor students' learning, and intervene within the groups to provide task assistance or to increase students' interpersonal and group skills. An instructor observes and collects data on each group as it works. He/she also assists students to complete the task accurately and to work together effectively.
- (v) evaluate students' learning, and help students process how well their groups functioned. Students' learning is carefully assessed and their academic performances are evaluated. Team mates then assess how effectively they have been working together.

### **3.7.2 Informal co-operative learning**

"Informal co-operative learning consists of having students work together to achieve a joint learning goal in temporary, *ad hoc* groups that last from a few minutes to one class period" (Sharan 1994:54).

During a lecture, demonstrations or films can be used to focus students' attention on the material to be learned, set a mood conducive to learning, help set expectations as to what will be covered in that session, ensure that students cognitively process the material and provide closure to an instructional session.

The teacher/lecturer ensures that students do the intellectual work of organising the material, explaining it, summarizing it, and integrating it into existing conceptual frameworks.



Informal co-operative learning groups are often organised so that students engage in a three-to-five minute focussed discussion before and after a lecture, and two-to-three minute turn-to-your-partner discussions interspersed throughout a lecture.

### **3.7.3 Co-operative base groups**

“Co-operative base groups are long term, heterogeneous co-operative learning groups with stable membership whose purpose is for members to give each other the support, help, encouragement, and assistance each needs to make good academic progress” (Johnson & Johnson 1994:25).

Base groups provide students with permanent, long-term, committed relationships that last for at least a year, and perhaps until all members graduate.

Base groups meet daily in elementary school, and twice a week in secondary schools. They meet formally, to discuss the academic progress of each member, provide help and assistance to each other, and verify that each member completes assignments and progresses satisfactorily through the academic programme. Informally, members interact every day within and between classes, to discuss assignments and help each other with homework.

Base groups tend to improve attendance, personalise both the work required and the school experience, and improve the quality and quantity of learning. “The larger the class or school and the more complex and difficult the subject matter, the more important it is to have base groups” (Digby & Pedersen 1995:44).

It is the researcher’s point of view that all three types of co-operative learning can be integrated into the teaching, and learning, of mapwork because they are useful.

### 3.8 CO-OPERATIVE LEARNING METHODS THAT ARE RELATED TO THE TEACHING AND LEARNING OF MAPWORK

Co-operative learning methods/techniques were developed and researched at John Hopkins University (Slavin 1990:3). All these methods share the idea that students work together to learn, and are as responsible for their team mates' learning as for their own.

The methods emphasise the use of team goals and team success, which can be achieved only if all members of the team learn the objectives being set.

There are three concepts which are central to all student team learning methods. They are:

- (1) team rewards,
- (2) individual accountability, and
- (3) equal opportunity for success (Killen 1993:37; Slavin 1990:3; Slavin 1995:5).

These will be discussed briefly:

#### (1) *Team rewards*

Teams may earn certificates, or other team rewards, if they achieve above the designated criterion. Teams do not compete to earn scarce rewards; all (or none) of the teams may achieve the criterion in a given week.

#### (2) *Individual accountability*

According to Van der Horst and McDonald (1997:129) individual accountability refers "to the feeling on the part of each group member that he/she is responsible for completing the task individually and cannot simply rest on the laurels of the group or allow other group members to do the work for him/her".

This means that the team's success depends on the individual learning efforts of each team member. Accountability focuses the activity of the team members upon helping one

another learn, and making sure that everyone on the team is ready for a quiz or any other assessment that students undergo without teammate help.

(3) *Equal opportunity for success*

This means that students contribute to their teams by improving upon their own past performance. This ensures that high, average and low achievers are equally challenged to do their best, and that the contributions of all team members are valued. Rewarding students who improve upon their past performance, instead of rewarding them for performance relative to that of other students, seems to strongly motivate students involved in co-operative learning.

Proponents of co-operative learning (Bruce & Chan 1991:50; Digby & Pedersen 1995:233-2240; Fawns & Sadler 1994:28-29; Grobler & Devilliers 1995:127; Killen 1993:37-41; Nevin, Villa & Thousand 1994:17; Sharan 1994:3-115; Sharan & Sharan 1992:38; Slabbert 1992:440; Stahl 1994:108-353), have identified a number of co-operative learning methods. Those that are related to the teaching and learning of mapwork include the following:

- (1) Student Team-Achievement Division (STAD),
- (2) Teams-Games-Tournament (TGT),
- (3) The Jigsaw Method (Jigsaw I & II),
- (4) The Jigsaw III,
- (5) Group Investigation,
- (6) Co-op Co-op Strategy.

An outline of each of the above-mentioned methods is given below.

### **3.8.1 Student Team-Achievement Division (STAD) (R. Slavin)**

Student Team-Achievement Division (STAD) consists of five major components: (1) class presentation, (2) teams, (3) quizzes, (4) individual improvement scores, and (5) team recognition. A brief explanation of these components now follows.

(1) *Class presentation*

Material in STAD is initially introduced in a class presentation. This may be a direct instruction or a lecture conducted by the teacher/lecturer. Students must pay careful attention during the class presentation, because doing so will help them do well on the quizzes, and their quiz scores determine their team scores.

(2) *Teams*

Teams are composed of four or five students who represent a cross-section of the class in terms of academic performance, sex, and race or ethnicity.

The major function of the team is to make sure that all team members are learning, and to prepare its members to do well on the quizzes. After the teacher/lecturer presents the material, the team meets to study worksheets or other material, for example, maps.

The study expects students to discuss problems together, compare answers, and correct any misconceptions if teammates make mistakes.

(3) *Quizzes*

After one to two periods of teacher presentation, and one to two periods of team practice, the students take individual quizzes. Students are not allowed to help one another during the quizzes. Thus, every student is individually responsible for knowing the material.

(4) *Individual improvement score*

The idea behind the individual improvement scores is to give each student a performance goal to be attained if he or she works harder and performs better than in the past. Any student can contribute maximum points to his or her team in this scoring system, by doing his/her best work.

Each student is given a "base" score, derived from the student's average past performance on similar quizzes. Students then earn points for their teams based on the degree to which their quiz scores exceed their base scores.

(5) *Team recognition*

Teams may earn certificates or other rewards if their average score exceeds a certain criterion. Students' team scores may also count for up to 20 percent of their grades.

"STAD is most appropriate for teaching well-defined objectives, such as mathematical computations and applications, language usage and mechanics, Geography and map skills, and science concepts" (Sharan 1994:4). This is indicative of the importance of STAD to this research, with its focus on map skills.

The main idea behind STAD is to motivate students to encourage and help their team mates to learn the material, to encourage their team-mates to do their best, and to express the norms that learning is important, valuable and fun (Van der Horst & McDonald 1997:131).

### **3.8.2 Teams-Games-Tournament (TGT) (D. Devries & R. Slavin)**

Teams-Games-Tournament (TGT) (Slavin 1995:84, Killen 1993:38) is the same as STAD in every respect, except that instead of the quizzes and the individual improvement score system, TGT uses academic tournaments, in which students compete as representatives of their teams with members of other teams who match them in previous academic performance in the subject.

A description of the components of TGT now follows:

(1) *Class presentation*

The material in TGT is initially introduced in a class presentation by the teacher or lecturer (same as for STAD).

(2) *Teams*

Team formation and team study is the same as for STAD. Students work on worksheets in their teams to master the material.

**(3) Games**

The games are composed of content-relevant questions designed to test the knowledge students have gained from the class presentation and team practice. Games are played at tables of three students, each of whom represent a different team.

**(4) Tournaments**

The tournament is the structure in which the games take place. Students play academic games in ability - homogeneous, three-member tables. Thus, a high performing student from group A competes with a high performer from group B and a high performer from group C. Another table may have average performing students from groups D, E and F, etcetera.

After the first tournament, students change tables depending on their own performance in the most recent tournament.

**(5) Team recognition**

Team scores are based on team members' tournament scores, and teams are recognised if they exceed pre-set criteria.

The use of academic games instead of quizzes makes TGT even more exciting and motivating than STAD.

**3.8.3 The Jigsaw Method (E. Aronson)**

The jigsaw approach was originally designed by Elliot Aronson and his colleagues at the University of Texas, and then at the University of Santa Cruz.

According to McMillon (1994:71), the Jigsaw Method focuses "on students as the principal source of information and reinforcement among each other. It is a student-centred, group task-process which lends itself to experience based learning (learning by doing) and demonstration of learned skills and information". In the researcher's evaluation the

Jigsaw Method is one of the instructional strategies best designed to fulfil the needs of outcome-based education as described by Dlugosh, Walter, Anderson and Simmons (1995:180-181).

### **Jigsaw I**

In the Jigsaw I method, students are assigned to five or six member heterogeneous study teams.

Academic materials which have clearly defined sections or topics are presented to the students, usually in text form; for example, a topographical map may be divided into title, scale, marginal information, absolute location and contour patterns.

First, each team member reads his or her unique section. Then, members of different teams who have studied the same sections meet in "expert" groups to discuss their sections, master them and plan how to teach them. Then they return to their teams and take turns to teach team-mates about their sections.

### **Jigsaw II (R. Slavin)**

This is the modification of Jigsaw I (Killen 1993:39; Purdom & Kromrey 1995:343, Sharan 1994:37, Van der Horst & McDonald 1997:131-132) and it was developed by Robert Slavin and his colleagues at John Hopkins University. In Jigsaw II, students work in four to five member teams as in TGT and STAD.

Instead of each member having a unique section, all students read a common topic of mapwork. Each student receives a section on which to become an expert. Students with the same topics meet in an 'expert' group to discuss them, and return to their teams to teach their team-mates what they have learned. The students take individual quizzes, which are formed into team scores using the improvement score system of STAD, and a class newsletter recognises the highest scoring teams and individuals.

### **3.8.4 Jigsaw III**

Jigsaw III (Stahl 1994:133) is an expansion of the standard Jigsaw II strategy with the difference that it adds a co-operative test review team phase that is essentially a third responsibility for the home team.

The four levels of Jigsaw III are now outlined.

#### **Level one: Home teams**

Students meet as home teams, consider co-operative roles, and are instructed as to what they are about to learn.

#### **Level two: Expert teams**

Students form into expert groups to co-operatively study and learn from one another so that each student becomes an expert in the area they each will study.

#### **Level three: Home team reconvene**

Students return to their original home teams, with each student required to teach all members his or her area of expertise and to monitor their success.

#### **Level four: Co-operative test review**

Co-operative test review involves reconvening co-operative learning home teams, and providing them with review tasks that focus on the specific concepts and skills to be evaluated in a unit test.

According to Stahl (1994:136), co-operative test review groups are formed by having students reconvene into their heterogeneous home teams in order, among other things, to:

- (a) locate and review responses to questions in the textbook;



- (b) review the content of the expert sheets;
- (c) clarify concepts and skills through discussion; and
- (d) coach each home-team member to answer specific items.

“Test review teams focus on increased individual mastery and ‘remastery’ of targeted content and skills, and increased individual test achievement after the formal instructional sessions have ended and one or two days prior to a major test for the unit” (Stahl 1994:136).

Final Individual Student Test for the unit/lesson. To conclude Jigsaw III, students must, at the end, take individual tests, for individual accountability, and the scores are used to compute team scores, team bonus points, and team rewards.

### **3.8.5 Group investigation (S. Sharan & Hertz-Lazarowitz)**

“In the group investigation, a complex topic is divided into multiple subtopics to be studied by different research groups” (Nevin, Villa & Thousand 1994:17).

A group investigation project begins when the teacher/lecturer presents a challenging, multifaceted problem and the issues it suggests. Working together, the students sort their questions into subtopics and form small groups on the basis of common interest in a subtopic. Group members cooperate to plan their inquiry and to carry out their plans.

In Group Investigation, learners progress through six stages (Slavin 1995:113, Sharan 1994:101, Killen 1993:40, Van der Horst & McDonald 1997:132-136). These stages and their components are now outlined.

#### **Stage one: Identifying the topic and organizing learners into groups**

- The teacher/lecturer presents the class with a broad, multifaceted problem that has no single right answer. Each learner raises questions about the aspects of the problem he or she would like to investigate.

- Students meet in buzz groups where each person expresses his or her ideas about what to investigate. A recorder in each buzz group writes down all ideas and then reports them to the whole class. A short class discussion results in a shared list of suggestions for subtopics to be investigated.
- Students join the group studying the topic of their choice. For example, in mapwork, students may study topics such as the interpretation of the physical landscape, rural land use, and urban land use zones (Blackbeard 1992:33-45). Group composition is academically and ethnically heterogeneous. The teacher/lecturer assists in information gathering and facilitates organisation.

### **Stage two: Planning the learning tasks**

At this stage, groups plan their investigation. Students join their respective research groups and focus their attention on the co-operative planning of the questions to be answered. Group members have the following main functions:

- (1) to choose the questions they want to answer;
- (2) to determine the resources they need; and
- (3) to divide the work and assign roles.

While discussing their plans together, students listen to one another, exchange ideas, information and points of view; elaborate and expand on one another's ideas; and get feedback on their understanding of the material.

### **Stage three: Carrying out the investigation**

During this stage students, singly or in pairs, gather, analyse, and evaluate information, reach conclusions, and apply their share of new knowledge to the resolution of the group's research problem.

As the investigation draws to a close, the recorders note their group's conclusions. New findings are integrated into a summary statement. The instructor follows the progress of each group and offers help when needed.

**Stage four: Preparing a final report**

This stage is a transition from the data-gathering and clarifying stage to the stage where the groups report the results of their activities to the class. Group members determine the main idea of the investigation. They plan how to present their findings. Classmates should be involved as much as possible in the presentation. Group representatives meet as a steering committee to coordinate plans for a final presentation to the class.

**Stage five: Presenting the final report**

The teacher/lecturer posts the schedule of presentations so that each group knows when its turn will come. Before the presentations begin, the teacher and students collaborate in preparing an evaluation sheet, which the class fills out as the presentations take place. Groups convene and reconstitute the class as a whole.

Group members present their findings to the class in a variety of forms: skills, quizzes, role play, posters, and so forth. The audience evaluate the clarity and appeal of each presentation.

**Stage six: Evaluating achievement**

Students share feedback about their investigations and about their affective experiences. Teachers/lecturers and students collaborate in the evaluation of individual, group and class wide learning. One possible suggestion is peer evaluation. Evaluation includes assessment of higher-level thinking processes.

**3.8.6 Co-op Co-op Strategy (S. Kagan)**

The name 'Co-op Co-op' (Stahl 1994:278) emerges from the fact that students cooperate within and as small groups to produce something of benefit to share with the entire class.

Co-op Co-op (Slavin 1995:119-122; Stahl 1994:282-289) allows students to work together in small groups, first to advance their understanding of themselves and the world, and then to provide them with the opportunity to share that new understanding with their peers.

There are nine essential steps that should be followed in order to increase the probability of success with this method. An explanation of these steps now follows.

### **Step one: Student-centred whole-class discussion**

This method urges that, at the beginning, students should be encouraged to discover and to express their own interests in the subject to be covered. This is followed by a student-centred class discussion. The discussion is not directed at leading students to particular subtopics for study, but to stimulate their interest, curiosity, and motivation in the topic selected.

The teacher/lecturer should highlight on the board or newsprint the ideas generated during this discussion, as a helpful record of the brainstorming session.

### **Step two: Selection of student learning teams and team building**

Students are assigned to four-to-five member heterogeneous teams as in STAD. Initial team building experiences are needed so that students develop a genuine sense of being a "we". Students need to have developed trust and good group working skills before beginning Co-op Co-op.

### **Step three: Team topic selection**

Students should be allowed to select topics for their teams. Topics should be selected from the brainstorming list. In order to avoid duplication of another team's selection, the teacher circulates among the teams and facilitates the selection process.

### **Step four: Mini topics selection**

Each student now selects a mini topic that covers one aspect of the team topic. Each member of the group is responsible for gathering sufficient information and resources on his or her mini topic and then shares it with the whole team.

Students are also expected to evaluate the contributions of their team-mates, assign tasks to individual team members, and monitor each member's contribution.

**Step five: Mini topic preparation**

The team members individually study their mini topics by a variety of means. The preparation may involve reading available resources, gathering data, completing library research, completing computer searches, conducting interviews, reflecting upon what they have found, or planning individual projects. Students may be given two to three days in order to collect, analyse and organise data relevant to their mini topics.

**Step six: Mini topic presentations**

In this step, each team member is given a specific time, and stands up to present his or her mini topic. During the mini topic presentations, a division of labour within the teams is encouraged. One team-mate may take notes, another may play critic, another may be a supporter and another may check for points of convergence and divergence in the information presented.

After the presentation, team-mates discuss the team topic like a panel of experts. Mini-topics are put together in a coherent whole for a successful team presentation to the class.

**Step seven: Preparation for team presentations**

Students integrate all mini topic material in the team presentation. There must be an active synthesis of the mini topics. Non-lecture formats such as displays, demonstrations, and team-led class discussion are encouraged. The use of blackboard, overhead, audio-visual media, and handouts are also encouraged.

**Step eight: Team presentation**

Each team is responsible for how time, space, and resources are managed during their presentation. The teacher/lecturer must appoint a class timekeeper who is not a member of the presenting team.

After the presentation, the instructor may lead a feedback session so that other teams can learn something of what was involved in the development of the presentation.

**Step nine: Evaluation and reflections**

Evaluation takes place on three levels:

- (1) Team presentations are evaluated by the class.
- (2) Individual contributions to the team effort are evaluated by team-mates.
- (3) A presentation of the mini topic by each student is evaluated by the teacher/lecturer.

Following each presentation, the instructor may guide a class discussion of the strongest and weakest elements in the content and format of the presentation.

**3.9 BASIC ELEMENTS OF CO-OPERATIVE LEARNING**

Simply to place students in groups and tell them to work together does not, in and of, itself result in co-operative effort. There are many ways in which group efforts may go wrong. To successfully set up effective co-operative learning groups, a number of essential requirements must be met (Grobler & De Villiers 1996:126-127; Housego & Burns 1996:65; Johnson & Johnson 1994:22; Kennedy & Ewing 1995:51; Norwood 1995:233; Sharan 1994:57-59; Siner 1993:170-171; Smith & Hintz 1990:235; Stahl 1994:10, Van der Horst & McDonald 1997:128-129).

There are two reasons why teachers/lecturers need to master the essential or basic elements of co-operative learning. They are:

- (1) Teachers/lecturers need to tailor co-operative learning to their unique instructional needs, circumstances, curricula, subject areas and students; for example, teachers may need to tailor co-operative learning towards Geography mapwork.
- (2) They need to diagnose the problems some students may have in working together and intervene to increase the effectiveness of the student learning groups.

The exact number, name and order of these basic requirements vary from author to author. Johnson and Johnson (1994:22), Lyman and Foyle (1991:225) and Sharan (1994:58-59), for example, note five essential elements of co-operative learning, while Slabbert (1992:439) notes six elements; Stahl (1994:10-15) on the other hand lists ten essential elements of co-operative learning. However, almost all the authors agree that the five basic elements listed below are essential for effective co-operative learning (Candler & Robertson 1995:7-8; Kems 1996:435).

### **3.9.1 Positive interdependence**

Sharan (1994:58) defines positive interdependence as "... the perception that you are linked with others in such a way that you cannot succeed unless they do (and vice versa), that is, their work benefits you and your work benefits them."

It promotes a situation in which students work together in small groups to maximise the learning of all members, sharing their resources, providing mutual support, and celebrating their joint success. "Students must believe that they sink or swim together" (Johnson & Johnson 1994:22).

To achieve this, the mapwork teacher/lecturer structures the group and group tasks so that every student learns the assigned content and skills and makes sure that all of his or her team-mates also master the same content and skills regarding mapwork.

Teachers and lecturers can structure for positive interdependence by

- (1) making it clear to all students that all members of their group are to master the targeted content and abilities;
- (2) informing students that part of their personal effort is to help every member of their group learn the content and skills targeted;
- (3) providing group rewards (e.g. if all members of a team score 85 or higher on the test, all members of the group earn 10 bonus points). Nevin *et al.* (1994:64) refer to this as "incentive interdependence". It "results when the same reward, grade or advantage is given to group members for the successful performance of all team-mates";
- (4) assigning specific complementary roles to each group member (e.g. reader, checker, recorder, encourager and elaborator). It is also referred to as "role interdependence". Role interdependence requires that each group member assumes a specified responsibility that is interconnected to the functioning of other group members;
- (5) dividing the resources equally among all members. This may be called "resource interdependence". It can be engineered by arranging one set of shared materials or distributing information among group members so that single elements must be interfaced for the completion of the product.

Positive interdependence is at the heart of co-operative learning, and its emphasis is on the quality of learning (Morton 1990:203).

### **3.9.2 Face-to-face promotive interaction**

Students, with the help of the instructor, arrange themselves so that from the beginning to the end of their group work they are positioned and postured so that they face one another for direct eye-to-eye contact and face-to-face academic conversation.

The instructor needs to maximise the opportunity for students to promote each other's success by helping, supporting, encouraging, and praising each other's efforts to learn.



Accountability to peers, ability to influence each other's reasoning and conclusions, social modelling, social support, and interpersonal rewards all increase as the face-to-face interaction among group members increases. The verbal and non-verbal responses of other group members provide important information concerning a student's performance.

When students promote each other's success, it results in both higher achievement and in getting to know each other on a personal as well as a professional level.

### **3.9.3 Individual accountability**

"Individual accountability means that the team's success depends on the individual learning of all team members. Accountability focuses the activity of the team members on helping one another learn and making sure that every one on the team is ready for a quiz or any other assessment that students take without team-mate help" (Slavin 1995:5).

Individual accountability exists when the performance of each individual student is assessed and the results are given back to the group and to the individual. It is important that group members are advised not to "hitchhike" on the work of others.

Here students are reminded that the purpose of co-operative learning groups is to make each member a stronger individual in his or her own right. Students learn together so that they can subsequently perform more efficiently as individuals.

Ways to structure individual accountability include the following:

- (a) giving an individual test to each student;
- (b) randomly selecting one student's product to represent the entire group;
- (c) having each student explain what he or she has learned to a classmate;
- (d) keeping the size of co-operative learning groups small;
- (e) observing and recording the frequency with which each member contributes to the group's work;
- (f) assigning one student in each group the role of checker, who asks other group members to explain the reason and rationale underlying group answers (Cohen 1994:65-66; Johnson, Johnson & Holubec 1994:31).

### 3.9.4 Co-operative skills

Proponents of co-operative learning have given this component/element different titles. Slabbert (1992:439), for example, uses the title "co-operative skills"; Johnson, Johnson and Holubec (1994:23) use the title "interpersonal and small-group skills"; Sharan (1994:59) uses "social skills" and Stahl (1995:14) uses the title "positive social interaction behaviour and attitudes". The researcher prefers the title "co-operative skills", because it embraces all these other titles. However, all the authors seem to agree on the following explanation:

In co-operative learning groups, students are required to learn the subject content and also to learn the interpersonal and small-group skills required to function as part of a team. A warm, caring and supportive environment is required (Archer-Kath, Johnson & Johnson 1994:68; Candler & Robertson 1995:12).

In order to coordinate efforts to achieve mutual goals, students must

- (a) get to know and trust each other,
- (b) communicate accurately and unambiguously,
- (c) accept and support each other, and
- (d) resolve conflicts constructively.

The whole field of group dynamics is based on the premise that social skills are the key to group productivity. The more socially skilful students are, and the more attention instructors pay to teaching and rewarding the use of social skills, the higher the achievement that can be expected within the co-operative learning groups.

### 3.9.5 Group processing

Johnson *et al.* (1994:33) define group processing as "reflecting on group sessions to (1) describe what member actions were helpful and unhelpful and (2) make decisions about what actions to continue or change".

The purpose of group processing is to clarify and improve members' effectiveness in contributing to collaborative efforts to achieve the group's goals.

Two levels of group processing are:

- (1) small group processing, and
- (2) whole class processing.

In order to ensure that small group processing takes place, facilitators must allocate some time at the end of each class for co-operative groups to process how effectively members worked together.

Such processing

- (1) enables learning groups to focus on maintaining good working relationships among members,
- (2) facilitates the learning of co-operative skills,
- (3) ensures that members receive feedback on their participation,
- (4) ensures that students think about their metacognitive as well as their cognitive work, and
- (5) provides a way to celebrate the success of the group and reinforce group members' positive behaviours.

Keys to successful small-group processing include:

- allowing sufficient time for it to take place;
- providing a structure for processing (such as "List three things your group is doing well today and one thing you could improve");
- emphasising positive feedback, making the processing specific rather than general;
- maintaining student involvement in processing;
- reminding students to use their co-operative skills during processing; and
- communicating clear expectations about the purpose of processing.

The facilitator can conduct the whole class processing session at the end of the class period. He/she can do that by sharing the results of observation with the class. Results of peer observers may be included to get the overall class data (Wilcox & Strachan 1996:346-349).

### **3.10 THE TEACHER OR LECTURER'S ROLE IN CO-OPERATIVE LEARNING**

Traditional goal structures tend to be teacher-centred. Teachers and lecturers control learning by imparting knowledge, maintaining control, and validating thinking. When co-operative groups are utilised, the teacher or lecturer's role shifts from that of information giver to facilitator and manager of learning. The teacher/lecturer's responsibility is to ensure the success of groups, and must engage in a number of critical instructional decisions (Department of Education 1996:19).

The researcher's evaluation of the teacher/lecturer's roles has led him to divide them into two: (1) team building and (2) facilitation.

An outline of the above-mentioned divisions now follows:

#### **3.10.1 Team building**

Proponents of co-operative learning (Chivers 1995:1; Hall 1996:189-191; Merenbloom 1991:36; Slavin 1995:137-140) support training students in how to work in groups. They feel that students need to be prepared to work co-operatively before beginning co-operative learning activities. This is because they have discovered that to work effectively in co-operative activities does not emerge automatically.

According to Chivers (1995:1) "team building is about ensuring that you get the most out of working with an effective group of people and that everyone in your team gets opportunities for development plus the reward of being part of a successful team."

There are five aims of team building:

- getting acquainted;

- building team identity;
- experiencing mutual support;
- valuing individual differences; and
- increasing energy, called synergy.

Team building activities included in Kagan (1992) include the following:

- (1) Name learning,
- (2) Interviewing,
- (3) Deciding on a team name, banner, logo and/or mural,
- (4) Group brainstorming.

A brief explanation of these team building activities is as follows:

(1) *Name learning*

At school, this activity is conducted at the beginning of a new year. In this case, the teacher or lecturer must give each learning group a set amount of time to learn the names of their team-mates. Thereafter, students take a test and the average percentage of correct names per group is announced. More information, such as favourite hobby or most unusual experience, can be included for variation. Following 100 percent mastery by all groups, student teams may pair and repeat the exercise.

(2) *Interviewing*

This activity is also conducted at the beginning of a new year. Interviews introduce team-mates to each other in some depth, and classmates to each other superficially. Students are given some basis for relating to others with common interests or experiences. It gives them the opportunity to feel welcome in the group, and it helps overcome the initial resistance that some students have to participating in groups.

An interview may consist of the following steps:

**Step one:** The teacher/lecturer has students gather in teams.

- Step two:** Team-mates count of one, two, three, four or more, one number for each team-mate.
- Step three:** The teacher informs the students that it is number one's job to interview number two, number three's job to interview number four, and so on, for five minutes. The aim of the interview is to gather information that will be used to introduce each person to his or her team-mates. Interview topics may be suggested, such as hobbies, unusual experiences, favourite movies, and life goals.
- Step four:** Introductions are carried out within groups. Each interviewer has one minute to present to the group the person he or she has interviewed.
- Step five:** Step three and four are repeated with students switching roles: two interviews and presents one, four interviews and presents three, and so on.
- Step six** The team attempts to discover through discussion the “positive essence” of each team-mate so that he or she can be described in an adjective or very brief phrase, such as “adventuresome”, “caring” or “natural girl”. Students are instructed to look for themes in the interview responses that will help them capture the positive essence of the person.
- Step seven:** Team members introduce their team-mates to the class by taking turns to state the adjective or phrase that best captures the positive essence of the team member and provide a sentence or two of explanation.

*(3) Deciding on a team name, banner, logo and/or mural*

When teams are first formed they are asked to name themselves. This process can be used as a team building exercise. Three simple rules for the group process are stated:

- Each team member must have a say.
  - No decision can be reached unless everyone consents.
  - No member consents to the group decision if he or she has a serious objection.
- These rules set the tone for future group processes, which must include participation, consensus, and respect for individual rights.

In addition to choosing a name, teams may be requested to create a team mural, banner or logo. In this case, the same simple rules for the group process apply. Each group member must contribute, and the group cannot proceed without consensus.

(4) *Group brainstorming*

Any task that has many possible solutions may be set up for group brainstorming. The instructions are simply that the group members put their heads together and come up with as many correct or interesting solutions as they can.

After groups have had time to brainstorm, they may get points for the number of correct solutions; they may rate the creativeness of each group's best solution; or they may simply share their most creative products (Slavin 1995:137-140).

### **3.10.2 Facilitation of learning**

For effective learning to take place, teachers need to accept the role of a resource person and a facilitator. Proponents of co-operative learning (Brogan 1995:15-16; Bruning 1993:34; Candler & Robertson 1995:9-10; Caplow & Kardash 1995:218-220; Department of Education 1996:22; Desmond 1996:73; Gibbs 1995:8; Hay & Delaney 1994:324; Harmin 1994:99-100; Harris, Guthrie, Hobart & Lundberg 1995:152-153; Jackson 1994:169; Johnson & Johnson 1994:103; Johnson *et al.* 1994:37; Margolis, McCabe & Schwartz 1990: 113-114; Matthews, Cooper, Davidson & Hawkes 1995:36; Nevin *et al.* 1994:62-66; Kutnick & Rogers 1994:167; Slabbert 1992:439; Vermette & Erickson 1996:209; Van der Horst & McDonald 1997:231; Wheeler & Andrews 1993:34) note the following roles for the teacher/lecturer:

(1) Specifying the academic and social objectives for the lesson.

The teacher/lecturer must specify two types of objectives before each lesson: academic and social.

Academic objectives relate to curricular content, for example, Geography mapwork. They should be set at the appropriate level for the students, and matched to the right level of instruction according to a conceptual or task analysis.

When planning for co-operative groups, learning outcomes can be group-oriented or limited to individual performance.

The social objectives require that “the skills necessary to work together effectively in groups” be taught (Lyman & Foyle 1991:225). The social skills objective must detail the interpersonal and small-group skills that will be emphasised during the lesson. Potential social skills for consideration include the following:

- contributing ideas;
  - asking questions;
  - encouraging members to participate;
  - disagreeing without criticising;
  - expressing worth and empathy towards group members;
  - active listening; and
  - resolving conflicts (Hustler & McIntyre 1996:20; Nevin *et al.* 1994:63).
- (2) Making pre-instructional decisions about learning groups, room arrangements, instructional material, and student roles within the group.
- (i) *Determining the size of the group*

Co-operative learning groups typically range in size from two to six members, but group size will vary to accommodate the specific objectives and circumstances of a lesson.

When instructors select the size of a co-operative learning group, they must remember that the shorter the amount of time available, the smaller the group should be. Larger groups mean more resources for the group’s work, and require group members to have more skills to work productively.



“The larger the group, the more problems students will have cooperating and coordinating their efforts, the easier it is for students to 'hide', and the harder it can be to distinguish the contribution of individuals” (Gibbs 1995:8).

■ Assigning students to groups

The instructor can assign students to groups in numerous ways. The following techniques can be used by the Geography teacher:

(a) Heterogeneous teams

As a general rule, the membership of groups should be heterogeneous across ability level, ethnicity, gender, and socio-economic level. According to Desmond (1996:109) “students should be assigned to groups by demonstrated performance”.

The instructor can use a rank list (from high to low or from low to high) of each learner's IQ. If, for example, there are ten learners in the class, they may be ranked from highest to lowest IQ score. Numbers one, five and 10 form the first group. In other words, one from each of the high, middle and low IQ group's is chosen. The next group would consist of numbers two, six and nine, and so on. Instead of IQ scores, instructors could also use average achievements of the learners in, for example, Geography.

(b) Random teams

**Puzzled people**

- Have learners tear pictures into four parts. (If you have 40 learners and want them in groups of four, you will need ten pictures.)
- Have them mill around the room and trade pictures - each one with a different person (learners keep their hands raised until they have made a trade).
- Let the learners complete the puzzles by grouping with others who hold pieces of the same picture.

## Counting

- Using colours: The learners, as they stand (or sit) in a row, count off colours. The number of colours corresponds to the number of teams you want to form. If, for example, you have a class of 35, and thus want to form seven teams of five each, the learners count seven colours such as red, white, blue, brown, orange and pink. All those of the same colour form a team.
- The same procedure of counting can be followed using sounds or days of the week.

## Stratified random assignment

Here, for example, a Geography pre-test is given. The class is divided into high, medium and low scores. One student from each category is randomly assigned to a triad. Alternatively, students' learning styles can be diagnosed and one student from each category can be assigned to each learning group (Candler & Robertson 1995:9-10; Harmin 1994:99-100).

### *(ii) Arranging the room or the learning environment*

Co-operative learning can only occur when interaction takes place in a properly structured and organised environment which is an engaging learning environment. In an environment like this students are active learners, who can discover through progressive experiences how to seek, organise and apply knowledge and skills. Learners who are being prepared for the challenges of their future need continuous opportunities to grow, intellectually and emotionally, through interactive learning; investigation of important facts, values, and concepts; creative hands-on problem solving; and collaboration with fellow students and teachers. Van der Horst and McDonald (1997:93) recommend that "teachers should create an atmosphere in the class that is supportive, comfortable, friendly and relaxed ..." (Department of Education 1996:22; Desmond 1996:105; Hustler & McIntyre 1996:21; Van der Horst & McDonald 1997:93-94).

Instructors must ensure, therefore, that members of a learning group sit eye-to-eye, knee-to-knee, in other words, close enough to share materials, to maintain eye contact with

each other, to talk quietly without disturbing other groups, and to exchange ideas in a comfortable atmosphere. The instructor needs easy physical access to every group, but this may be problematic in the typically overcrowded South African classroom. According to the OBE approach, "in order to teach competently and effectively we must be capable of building learning environments that integrate knowledge, skills and values" (Lubisi, Wedekind & Parker 1997:153).

*(iii) Choosing instructional materials*

The choice of materials is determined by the type of task the students must complete. Mapwork, for example, requires contour maps to show the types of slopes, a magnetic compass to demonstrate direction, graph paper to draw cross-section, rulers to measure distance and area and so on. The instructor's role is to decide what is appropriate. The material is distributed in such a way that all group members participate and achieve.

*(iv) Assigning roles to ensure interdependence*

Roles that the teacher/lecturer might, for example, assign to individual students include those of summariser, checker (of understanding), recorder, encourager of participation, or observer.

Instructors cannot always monitor the understanding of every student in the class, so they can delegate this by allowing the students to work in co-operative groups and assign the role of checker to one member. (This aspect is discussed further in section 3.1 under the topic "Group roles in co-operative learning".)

**(3) Explaining the task and goal structure to the students.**

It is the role of the instructor to explain the academic task so that students clearly understand the assignment and the objectives of the lesson.

The instructor must first explain what the assignment is, and the procedures students must follow to complete. Secondly, the instructor explains the objectives of the lesson

and places the concepts and information to be studied in the context of the students' past experiences and learning, to ensure maximum transfer and retention.

Satisfied that the procedures and objectives are clear, the instructor may begin direct teaching of concepts, principles, and strategies. Important concepts can be defined, for example, topographical map, map code, scale, area, gradient, bearing, grid reference, etcetera and the instructor can answer any questions students have about the concepts they are to learn or apply during the lesson.

Explaining the criteria for success and desired behaviour helps the students to grasp what level of performance is expected of them. The instructor may say, for example, "Everyone who earns 95 points or more in map interpretation will get an A, scores between 90 and 94 points will be given a B and scores between 85 and 89 points will be given a C. The group is not finished until all members score above 85."

The instructor needs to specify the behaviours that are appropriate and desirable within learning groups, and it begin with such instructions as:

"Use quiet voices",

"Take turns" and

"Use each other's names".

#### (4) Setting the co-operative lesson in motion.

During formal co-operative learning, learners' actions may be loosely or highly prescribed. Instructors may provide different degrees of structures. On the one hand, co-operative lessons can be structured to specify only positive goal interdependence and individual accountability, to emphasise a few social skills, and provide some group processing at the end.

On the other hand, there are highly structured, direct approaches to co-operative learning that must be used in a prescribed, lockstep manner. They include co-operative scripts, structures, and curriculum packages that specify, step-by-step, what each student is to do throughout the lesson.

“Co-operative learning scripts are standard, content-free co-operative procedures for either conducting generic, repetitive lessons (such as writing reports, giving presentations) or managing classroom routines (such as checking homework and reviewing tests” (Johnson *et al.* 1994:43).

Donald Dansereau and his colleagues (1985) have developed a number of co-operative scripts that structure students' interaction. They developed a simple text-processing script called MURDER (Mobilise, Understand, Recall, Detect, Elaborate, Review). When using this script, students proceed through the material, and alternate roles until they have completed the assignment. Then, they co-operatively review and organise the entire body of information, once again alternating active and monitoring roles.

Spencer Kagan (1988) has identified a number of co-operative learning structures. His learning structures include a three-step interview, in which students are assigned to pairs; student A interviews student B, student B interviews student A, and the two share the results with another pair.

No matter which co-operative procedure is used, the teacher/lecturer has to monitor the student at work and intervene when necessary. It is his/her role to “assist students in expressing and clarifying ideas” (Bruning 1993:34).

- (5) Monitoring the effectiveness of co-operative learning groups and intervening when necessary.

The teacher's role in most structured lessons is to monitor students' interaction in the learning groups, and intervene to help students learn and interact more skilfully.

- Monitoring student behaviour and providing task assistance

When co-operative learning groups start working, the instructor observes the interaction among group members to assess their academic progress and appropriate use of interpersonal and small-group skills. Observation can be formal, with an observation schedule on which frequencies are tallied. During this time “teachers can offer

suggestions, mandate rules or lead a group discussion to generate operating principles” (Vermette & Erickson 1996:209).

According to Jackson (1994:170), “students should be shown how to monitor their own performance and take corrective action where appropriate.” He also supports Vygotsky (1978) when he states that the teacher should release control as the students gain independence.

- Intervention to teach social skills

When monitoring co-operative learning groups, the instructor may find students lack the necessary social skills. It is his/her role to intervene and suggest to the group more effective procedures for working together and specific social skills to use.

(6) Evaluating learning and processing interaction.

According to Rogers and Kutnick (1994:167), “the process of evaluation can best be considered as a systematic approach to the gathering of information.” Moreover they distinguish between summative and formative evaluation.

Summative evaluation is primarily concerned with establishing a view about the outcome of a particular activity once the activity has reached a natural breakpoint. Formative evaluation on the other hand is generally carried out parallel to the activity itself and is concerned with its ongoing development. In OBE, formative evaluation is highly valued and may be usefully applied to teach Geography mapwork. Students should demonstrate map skills mastered during the lesson presentation.

- Evaluating the quality and quantity of student learning

Authors of co-operative learning recommend that for successful co-operative learning, group members’ learning must be evaluated by a criterion-referenced system. They further indicate that co-operative learning provides an arena where performance-based assessment (students are required to demonstrate what they can do with what they know by performing a procedure or demonstrating a skill), authentic assessment (students are

required to demonstrate the desired procedure or skill in a real life context) and total quality learning (continuous improvement can take place of the process or students helping team-mates) (Burz & Marshall 1997:5; McGormic 1997:354-355; McLean & Lockwood 1996:19-31; Oosterhof 1996:148-155).

The aspects mentioned above suggest that co-operative learning can greatly enhance outcome-based education, because as Baron and Boschee (1996:574) remark, outcome-based education "proposes directing all of school programmes and instructional efforts towards the achievement of clearly defined outcomes that all learners must demonstrate by the time they leave school." Hence, all Geography students should master the skill of mapwork.

- Processing how well the group functioned

When students have completed the given task, it is the role of the teacher/lecturer to ask them to engage in small-group or whole-class processing.

The instructor must also see to it that students receive feedback, reflect on how their actions may be more effective, and plan how to be even more skilful during the next group session.

Slabbert (1992:439) regard quotes Johnson and Johnson (1990:103-106) and Sharan and Sharan (1987:22), to stress the importance of feedback: "periodic and regular evaluation of how the group functions should be done by describing which member actions are helpful and which are not and which behaviour should continue and which should not."

### **3.11 GROUP AND INDIVIDUAL ROLES IN CO-OPERATIVE LEARNING**

Proponents of co-operative learning (Cohen 1994:93; Gupta & Ervin 1996:132; Hall 1996:192; Jackson 1994:171; Johnson *et al.* 1991:63; Kennedy & Ewing 1995:53) recommend that group members be aware of the different tasks and roles that are performed during discussion, and of the considerable value of individual members being

assigned responsibility to monitor certain tasks and behaviours. This is particularly necessary in the beginning when members work together for the first time.

### **3.11.1 Group roles**

Group roles generally include the following:

- Monitoring the participation and behaviour of members and, where appropriate, providing the necessary encouragement and support.
- Keeping to the agreed time frame, and reminding the group when the time allocated is about to expire.
- Recording summary details, progress and performance.
- Avoiding non-functional behaviours (e.g. aggressing, blocking, self-confessing, competing, seeking sympathy, special interest pleading, status seeking, withdrawal and dominating).

### **3.11.2 Individual roles in a co-operative learning group**

An effective group member can and should perform many, if not all, the group roles well and with finesse. These roles include:

- initiating new ideas and making comments;
- giving and seeking information;
- giving and seeking reactions;
- restating and giving examples;
- confronting and reality testing;
- clarifying, synthesising and summarising;
- timekeeping, focussing and expediting;
- evaluating;
- sponsoring and encouraging;
- relieving group tension.



It is recommended that each team member be responsible to help team members work together effectively. The responsibilities important to teach and learn mapwork include:

- (1) A researcher-runner, who fetches materials for the group (topographical maps, aerial photographs, orthophoto maps, rulers, magnetic compass, protractors, graph papers, etc.) and communicates with other groups and the instructor.
- (2) A recorder, who writes down the group's decisions and edits the group's report.
- (3) A checker, who ensures that all group members are able to explain how an answer or conclusion was arrived at, and that everyone has finished the worksheet and answered all the questions.
- (4) An encourager, who ensures that all members contribute, and encourages team members.
- (5) A timekeeper, who prompts group members with such statements as "We have 15 minutes left, let us look at Sue's cross-section", in order to complete the activity on time.
- (6) A facilitator, who keeps the group focused on the objectives; sees to it that everyone gets the help he or she needs to do the task; is responsible for seeking answers to questions within the group.

### **3.12 ADVANTAGES OF THE CO-OPERATIVE LEARNING METHOD**

Numerous studies of co-operative learning have shown significant gains on measures of academic achievement, measures of social relationship, self-esteem, and cross-cultural relationships.

The advantages of co-operative learning for students and teachers/lecturers are explained in this section.

### 3.12.1 Advantages of co-operative learning for students

Proponents of co-operative learning (Battistini 1995:3; Clark & Starr 1996:218-219; Cohen 1994:17-18; Courtney, Courtney & Nicholson 1994:472; Vermeulen 1997:14,39; Cowie & Lewis 1993:77; Digby & Pedersen 1995:24-241; Duch 1996:327; Fawns & Sadler (1994:28; Gamson 1994:46; Gibbs 1995:4-6; Hamm *et al.* 1990:9; Henschen & Sidlow 1990:31; Hill 1996:11-21; Jongmsa 1990:346; Manner 1995:333; Monteith, Shelton & Hughes 1996:240); Moses 1995:45; Phelan 1995:244; Raynold 1994:24; Ross & Raphael 1990:149; Shipman & McIntosh 1996:364; Sigh 1995:10; Slabbert 1992:440; Spady 1993:18; Sparrow & Boam 1992:13; Swafford 1995:631; Teasley 1995:218; Vermette & Erickson 1996:205; Warriner 1996:331-338; Wheeler & Andrews 1993:34; Wilcox & Strachan 1996:349-350; Winter, Neal & Waner 1995:79) note the following advantages, which are also applicable to the learning of Geography mapwork:

- Because students in co-operative settings assist each other with the learning process and form support groups, retention rates and academic achievement scores are higher for these students than for students in other settings. This is so because learners are given the opportunity “to learn through the expression and exploration of diverse ideas and experiences in co-operative company” (Cowie & Lewis 1993:77). Regarding the retention rate in a Learning Pyramid: teaching others by means of co-operative learning in OBE has 90% retention rate (Rowe 1994:19).
- Co-operative learning promotes improved relations among ethnic groups and between students with special needs and other students. The benefits of social interaction reduce the high competitiveness and isolation of learners. Social interaction develops cognition, learning and knowledge as students explore concepts and solve problems together.
- Students working in small co-operative groups can master material more quickly than students working individually, while simultaneously improving their self-esteem and personal motivation. Diverse resources available to the group deepen understanding, sharpen judgement, extend knowledge, and stimulate learning.

- “Groups can often handle challenging situations that are well beyond the capabilities of individuals at that developmental stage” (Slabbert 1992:440). Teams can be set tasks which are larger, more complex and sophisticated, which involve more variables or more data analysis, and which are more interesting than tasks that individuals can reasonably tackle.
- There is relatively little chance of team failure, and much less so than of individual student failure. This is because co-operative learning can “offer the emotional support one needs when swimming in uncharted pedagogical waters” (Shipman & McIntosh 1996:364). Co-operative learning offers opportunities of success to all learners, which makes it one instructional strategy that might meet the demands of Curriculum 2005 or OBE. It improves “imaginative thinking and critical reasoning” (Parkyn: 1994:35)

Success for all students is possible because outcomes-based education uses “clearly defined outcomes for all students”, organises instruction based upon the “performance capabilities and learning needs of students, and modifies instruction to enable all students to reach outcome goals (Desmond 1996:12).

- Co-operative learning can involve a wide range of transferable skills, and team projects are an ideal vehicle to build the use of skills into learning tasks. Team projects can involve leadership, interpersonal skills, negotiation, oral and written communication, time and task management, research and information skills, chairing meetings and almost any other skill a teacher or lecturer wants to develop. These skills prepare learners to function optimally in the workplace.
- Students have more time than tutors, and team members are more likely than tutors to be accessible and available when individuals need them. Students are therefore better able to control the pace of learning.
- Co-operative learning increases security, which decreases fears. This allows learning and nurtures the willingness to debate and refine personal argument.

- Each student is accountable for his/her own work and for the final product of the group. The group is able to capitalise on the strengths of each of the individuals - hence, the students learn to consider and value individual differences.
- "Those who learn in groups develop greater abilities to work individually than those taught in the traditional classroom model" (Jones 1995b:281; Healy, Matthews, Livingstone & Foster 1996:169-170; Longmore, Dun & Jarboe 1996:84-85; Phelan 1995:243).

### **3.12.2 Advantages of the co-operative learning method for teachers and lecturers**

Proponents of co-operative learning (Vermette & Erickson 1996:205; Gibbs 1995:5; Hamm *et al* 1990:25; Harmin 1994:95; Lyman & Foyle 1991:223; Wheeler & Andrews 1993:35) note the following advantages of the co-operative learning method for teachers and lecturers:

- Co-operative learning helps teachers spend less time being 'policemen', as students discover they are capable of validating their own values and ideals. It may, for example take twice as long to supervise a team of six as it does an individual, but not six times as long. Time saved in this way can be partly reinvested in developing team skills, so that students become more independent and need even less supervision in the future. Teachers are therefore freer to move about, work with small groups and interact in a more personal manner with students. In this way instructors have time to continue to be learners themselves, opening channels they may never have imagined.
- Marking the products of teamwork has the potential to save a great deal of time - again it involves fewer hours than marking the products of all the individuals involved.
- Learning is made visible. Teamwork frees teachers for reflective observation, and an opportunity for the instructor to hear and see the learning in process.

- Teachers are better able to assess the developing knowledge and perspectives of individual learners and are in a better position to make intervention with probing questions, reteaching or explanation than they would be otherwise (Erickson & Vermette 1996:205).
- The use of co-operative learning, a proven technique for increasing academic achievement and promoting positive student attitudes, may help teachers concerned with improving the geographic literacy of students.
- Teams can share resources which individuals might otherwise use: books, articles, equipments, materials, etcetera. For example, a group of five students may use one topographical map. This is a great saving of resources and is a very important advantage in the financially constrained South African context.
- Co-operative learning is relatively easy to implement and is not expensive (Lyman & Foyle 1991:223).

### **3.13 DISADVANTAGES OF CO-OPERATIVE LEARNING METHODS AND POSSIBLE SOLUTIONS**

While both the motivational and the cognitive theories support the achievement benefits of co-operative learning, there are disadvantages that have been noted as well (Cowie & Lewis 1993:81; Gibbs 1995:6; Shea 1995:306; Slavin 1995:19; Swafford 1995:627-628.). These disadvantages include the following:

- The “free rider” effect. If improperly constructed, co-operative learning classes can allow for the “free rider” effect, in which some group members do all or most of the work (and learning) while others go along for the ride. The “free rider” effect is most likely to occur when the group has a single task, as when they are asked to hand in a single report, complete a single worksheet or produce one project.

This problem may also be referred to as “diffusion of responsibility”. It can be detrimental to the achievement effects of co-operative learning. Two principal techniques can be

used to eliminate "diffusion of responsibility". One is to make each group member responsible for a unique part of the group's task, as in Jigsaw, Group Investigation, and related methods. The second would be to make students individually accountable for their learning. For example, in Student Team Learning methods, rewards are based on the sum of the group members' individual quiz scores or other individual performances (Slavin 1995:19).

- There is the possibility that high achievers would be held back by poor or lazy students. Students heading for a first might feel threatened by working with others heading for 2:2s, and such students may find themselves doing a tremendous amount of work to compensate for weaker colleagues.

It is possible to avoid this problem through various assessment devices such as the following:

(1) *Identifying skills*

Teamwork should involve a number of skills, such as chairing team meeting, time and task management, interpersonal influence, negotiation, group facilitation, etcetera. Each of these skills can be examined and broken down into their components.

(2) *Direct observation of team behaviour*

The instructor can sample the way teams operate, visiting teams for short periods and using checklists to focus his/her observation. He/she may visit teams several times at several stages to get a fair and revealing impression of their skills.

(3) *Peer review*

Teams can be in a good position to review their own behaviour: they are there all the time and experience the consequences of poor teamwork skills. Groups can assess their own performance using the checklists.

(4) *Global assessment*

Assessing or giving feedback on individual component skills can be useful as a learning process, as it identifies specific behaviours rather than general descriptions.

- There may be a loss of individual choice. Students may be tackling a topic the tutor has set for the group, or which the majority in the team have chosen, rather than what the individual might have preferred. It is also seen as a threat to individual identity since it requires learners to do everything collectively.
- Students who assume roles of non-participants, underparticipants, and overparticipants during group work.

This problem can be resolved by using case discussion. This means dividing the class into groups, and each group is given one case. The group members read their case and discuss the problem and possible solutions.

Then each group dramatises its case and one solution for the class. When the students dramatise the cases, the room is arranged so that the class sits in a circle with one group sitting in the middle.

After each dramatisation the class discusses the problem and how the group solved the problem. They also talk about other possible solutions.

- Commuter students often have difficulty finding mutually acceptable times for group meetings.
- The students have to work with people who have different personalities, aims and working styles.
- Arranging meetings of the group can be difficult and reaching decisions can be slow (Basu & Middendorf 1995:320; Healy, Matthews, Livingstone & Foster 1996:167-170).

### 3.14 CONCLUSION

In this chapter, the following topics have been discussed:

The history of co-operative learning; classroom research and achievement effects; outcomes other than achievement; student attitudes toward co-operative learning; types of co-operative learning; co-operative learning strategies/methods; basic elements of co-operative learning; the teacher's role; the group and individual roles; advantages and disadvantages of the co-operative learning method.

In conclusion, theory and research suggest that many of the highly valued cognitive and metacognitive components can be enhanced by using an appropriate learning environment. Co-operative learning promotes effective working relationships, interpersonal skills (social development and intellectual growth), more natural and convivial interactions, increased self-esteem and conveys to students a sense of caring and an understanding that the best way to learn is through helping and supporting one another.

In the next chapter, the research design will be outlined.



# *Chapter Four*

## *Research design*

### **4.1 INTRODUCTION**

In the previous chapter, the researcher explained co-operative learning in depth. The following aspects of co-operative learning were discussed:

- Definitions and explanations of co-operative learning
- Classroom research on the achievement effects of co-operative learning
- Co-operative learning and outcomes other than achievement
- Student attitude towards co-operative learning
- Co-operative learning methods relevant to the teaching and learning of mapwork
- Basic elements of co-operative learning
- The teacher or lecturer's role in co-operative learning
- Group and individual roles in co-operative learning
- Advantages and disadvantages of co-operative learning

In this chapter the researcher concentrates on the research design. The research design has two parts:

- an experimental design (with randomly selected experimental and control groups) and
- a questionnaire (with the experimental groups).

The problem statement/s, hypotheses and the research design to test the hypotheses are explained as well as the validity, reliability and analysis of the data.

## 4.2 GENERAL PROBLEM STATEMENT

According to the informal assessment of the researcher, poor methods of teaching are a major cause of, among others, low achievement in mapwork by students. Many teachers/lecturers still use outdated, traditional methods of teaching. If students are to be helped to achieve better results in mapwork, they must be involved in activities that motivate them. For example, co-operative learning methods may be used in Outcomes Based Education whereby students can be actively involved and the teachers/lecturers act as facilitators (Bassey 1995:56; Gay 1992:34).

“A well-written statement of problem generally indicates the variables of interest to the researcher and the specific relationship between those variables which is to be investigated, and, ideally, the type of subjects involved” (Gay 1992:36). It also defines all relevant variables, either directly or operationally.

From the preceding it follows that the general research problem can be stated thus:

*Does co-operative learning improve (among other things) first and second year Geography students' performance in the learning of mapwork?*

## 4.3 SPECIFIC PROBLEM STATEMENTS

From the general problem statement and the literature study, the following nine specific problem statements may be formulated:

### ***Problem 1:***

Is there a significant difference between the average performance of a group of *first* year students who learnt mapwork by means of co-operative learning and a second group who learnt mapwork by means of the traditional method?

**Problem 2:**

Is there a significant difference between the average performance of a group of *second* year students who learnt mapwork by means of co-operative learning, and a second group who learnt mapwork by means of the traditional method?

**Problem 3:**

Is there a significant correlation between *attitude* towards co-operative learning and *intergroup relations* for first year and second year students and for both genders?

**Problem 4:**

Is there a significant correlation between *attitude* towards co-operative learning and *self-esteem* for first year and second year students and for both genders?

**Problem 5:**

Is there a significant correlation between *attitude* towards co-operative learning and *social support* for first year and second year students and for both genders?

**Problem 6:**

Is there a significant correlation between *attitude* towards co-operative learning and *social skills* for first year and second year students and for both genders?

**Problem 7:**

Is there a significant correlation between *attitude* towards co-operative learning and *academic norms* for first year and second year students and for both genders?

**Problem 8:**

Is there a significant correlation between *attitude* towards co-operative learning and "*psychological health*" for first year and second year students and for both genders?

**Problem 9:**

Is there a significant difference between the *attitudes* of first year and second year students towards co-operative learning?

(*Gender* was used as moderator variable for all the aforementioned problem statements.)

#### 4.4 HYPOTHESES

According to Smith (1995:12), a hypothesis can be defined as "... a tentative answer to the problem as formulated". A hypothesis in a research study is a speculation – an educated guess – about how two or more variables are related to each other, or which of two or more programmes or methods is most effective. Hypotheses usually are formulated on the basis of theory and previous research findings and the prediction they make must be justifiable in terms of the theory (Bassey 1995:56; Bonerjee 1993:54-55; Borg, Gall & Gall 1993:93; Boumo & Atkinson 1995:37; Dyer 1995:37; Morgan & Morgan 1984:473-474; Sprinthal, Schmutte & Sirois 1991:129-130; Steenbruger & Manchester 1996:196-197).

The null hypothesis states that no significant relationship exists between the variables studied, or no significant difference will be found between groups who were treated differently. It also states that any difference or relationship found for the samples is the result of sampling error. In accumulating evidence that the null hypothesis is false, the researcher indirectly demonstrates that the variables are related or that the statistics are different. The null hypothesis is the core idea in hypothesis testing (Bassey 1995:97; Borg & Gall 1989:66-67; Dyer 1995:341-344; Gall, Borg & Gall 1996:57-59; Vogt 1993:156).

The experimental hypothesis states the researcher's expectations about what the data will show. It is a statement which asserts a significant relationship between two or more concepts.

From the aforementioned specific problem statements the following hypotheses may be stated:

(1) Null hypothesis

There is no significant difference between the average performance of a group of *first* year students who learnt mapwork by means of co-operative learning and another group who learnt mapwork by means of the traditional method.

Experimental hypothesis:

There is a significant difference between the average performance of a group of *first* year students who learnt mapwork by means of co-operative learning and another group who learnt mapwork by means of the traditional method.

(2) Null hypothesis

There is no significant difference between the average performance of a group of *second* year students who learnt mapwork by means of co-operative learning and another group who learnt mapwork by means of the traditional method.

Experimental hypothesis:

There is a significant difference between the average performance of a group of *second* year students who learnt mapwork by means of co-operative learning and another group who learnt mapwork by means of the traditional method.

(3) Null hypothesis

There is no significant correlation between a positive *attitude* towards co-operative learning and positive *intergroup relations* for first year and second year students.

Experimental hypothesis:

There is a significant correlation between a positive *attitude* towards co-operative learning and positive *intergroup relations* for first year and second year students.

(4) Null hypothesis

There is no significant correlation between a positive *attitude* towards co-operative learning and positive *self-esteem* for first year and second year students.

Experimental hypothesis:

There is a significant correlation between a positive *attitude* towards co-operative learning and positive *self-esteem* for first year and second year students.

(5) Null hypothesis

There is no significant correlation between a positive *attitude* towards co-operative learning and positive *social support* for first year and second year students.

Experimental hypothesis:

There is a significant correlation between a positive *attitude* towards co-operative learning and positive *social support* for first year and second year students.

(6) Null hypothesis

There is no significant correlation between a positive *attitude* towards co-operative learning and positive *social skills* for first year and second year students.

Experimental hypothesis:

There is a significant correlation between a positive *attitude* towards co-operative learning and positive *social skills* for first year and second year students.

## (7) Null hypothesis

There is no significant correlation between a positive *attitude* towards co-operative learning and *proacademic norms* for first year and second year students.

Experimental hypothesis:

There is a significant correlation between a positive *attitude* towards co-operative learning and *proacademic norms* for first year and second year students.

## (8) Null hypothesis

There is no significant correlation between a positive *attitude* towards co-operative learning and "*psychological health*" for first year and second year students.

Experimental hypothesis:

There is a significant correlation between a positive *attitude* towards co-operative learning and "*psychological health*" for first year and second year students.

## (9) Null hypothesis

There is no significant difference between the *attitude* of first year and second year students towards co-operative learning.

Experimental hypothesis:

There is a significant difference between the *attitude* of first year and second year students towards co-operative learning.

*Gender* was also used as moderator variable to test the aforementioned hypotheses.

The statistical techniques used to test these hypotheses were the following:

For hypotheses 1, 2, and 9: a t-test

For hypotheses 3, 4, 5, 6, 7 and 8 correlation

## 4.5 IDENTIFICATION OF VARIABLES

“A variable is a concept that varies in amount or kind” (Bouma & Atkinson 1995:51). It is a concept of which it is possible to have more or less, or different kinds.

There are various kinds of variables. For example, the independent variable is the variable which has been identified, from theory or elsewhere, as a possible cause of the phenomenon being researched. In the experiment, the value of the independent variable is changed by the experimenter in order to observe whether any significant changes occur to the dependent variable.

The dependent variable is the variable which is thought to be causally linked to the independent variable, and which is therefore expected to change its value in response to any changes induced to the independent variable. During an experiment this variable has its value measured in order to detect any such changes in response to manipulations of the independent variable. It is these measurements which constitutes the data of the experiment.

The logic behind naming the variables in this way is that the independent variable, although it is controlled by the experimenter, is an independent force in the experiment, while the value of the dependent variable will, if the causal link exists, be dependent on the changes which are made to the independent variable.

In the first part of the research (the experimental design), the following variables were identified:

- Independent variables: Co-operative learning method and the lecture method.
  - Dependent variables: Average achievement in mapwork.
  - Control variables: First and second year Geography students; same lecturer; same lesson content.
  - Nuisance variable: Students' motivation.
- (Jones 1995a:128-129; Leary 1995:177-181; McBurney 1994:63-64; Schweigert 1994:175-176.)



In the second part of the research (using the questionnaire) the variables were as follows:

- Independent variable: Attitude towards co-operative learning
- Dependent variables: Intergroup relations; self-esteem; social support; social skills; proacademic norms; "psychological health".
- Moderator variable: Gender and year group

## **4.6 EXPERIMENTAL DESIGN**

### **4.6.1 Sampling and method**

In the first part of the research, the classical experimental design was used. The distinguishing feature of true experimental research is that the different groups (two in this instance) are formed by random assignment (Huysamen 1994:23). Random sampling is the most attractive sampling method (Huysamen 1994:39). In the simplest case each member of the population has the same chance of being included in the sample and each sample of being the sample chosen. In this research respondents were randomly assigned to two groups and therefore had the same chance of being in either the control or experimental groups. This was done by putting the names of all first year Geography students in a container, shuffling the container and extracting the names for the control and experimental groups alternatively. This was repeated for the second year Geography students. These first and second year students were studying for a three-year course, the Secondary Teacher's Diploma (STD). The college is situated at Makhado, a small town north-west of Thohoyandou in the Northern Province. The population is tricultural, being composed primarily of Venda, Shangaan and Northern Sotho (Pedi) students.

Thereafter the experimental and control groups were subjected to different treatments as follows:

The experimental groups were taught by the co-operative learning method. The control groups were taught by means of the traditional lecture method.

After six weeks of teaching, both the co-operative learning groups and the traditional learning groups wrote the same mapwork test. Items included in the test covered the following concepts in mapwork:

- topographical map title;
- grid references;
- direction;
- bearing;
- calculation of distances on a map in metres and kilometres;
- magnetic declination;
- scales;
- calculation of areas in metres and kilometres;
- slope gradient;
- drawing cross-section; and
- interpretation of topographical maps

A t-test technique was used to compare the averages between the control and experimental groups for both year groups. "...the t-test is a powerful parametric procedure which compares the means of two sets of scores in order to determine whether the difference between them is significant at the chosen level of probability" (Dyer 1995:389-390). If the result of the test indicates that the difference is significant, the null hypothesis may be rejected. It can then safely be assumed that any significant difference between the two groups, can be attributed to the treatment (independent variable) (Bell 1993:11-12; Black 1993:143-148; Borg, Gall & Gall 1993:305-307; Bouma 1995:126-134; Fraenkel & Warren 1993:247-250; Ferron & Onghena 1996:232-233; Gall *et al.* 1996:494-496; Gay 1992:368; Hittleman & Simon 1997:180; Maruyama & Deno 1992:37-38; Moore 1991:85-88; Mutchnick & Berg 1996:77-78; Szymanski 1993:179-180; Usher & Schott 1996:52-55).

## **4.6.2 Co-operative learning**

### ***4.6.2.1 Forming co-operative teams***

The researcher used the Student Team Achievement Division (STAD) technique in teaching the co-operative learning group. According to this technique, each team consists of four or five students who represent a cross-section of the class in terms of sex, race and past performance (Slavin 1991:23). The team includes one high performer, one low performer, and two average performers where possible.

In this case the researcher used a rank order list (from high to low) of the learner's average achievement in Geography.

Figure 4.1 shows how students are assigned to teams according to the rank order.

Figure 4.1

Assigning students to teams		
	Rank Order	Team Name
High-Performing Students	1	A
	2	B
	3	C
	4	D
	5	E
	6	F
	7	G
	8	H
Average-Performing Students	9	H
	10	G
	11	F
	12	E
	13	D
	14	C
	15	B
	16	A
	17	
	18	
	19	A
	20	B
	21	C
	22	D
	23	E
	24	F
	25	G
	26	H
Low-Performing Students	27	H
	28	G
	29	F
	30	E
	31	D
	32	C
	33	B
	34	A

Source: Slavin (1986).

In this case, the following teams were formed:

#### YEAR ONE

*Experimental group*

Number of students = 25

Number of teams formed = 5

Number of students in each team = 5

Student distribution in each team -

A = 1, 10, 11, 20, 21

B = 2, 9, 12, 19, 22

C = 3, 8, 13, 18, 23

D = 4, 7, 14, 17, 24

E = 5, 6, 15, 16, 25

*Control group*

Number of students = 23

## YEAR TWO

*Experimental group*

Number of students = 27

Number of teams = 5

Number of students in each team = 5

Teams A and B had 6 students.

Student distribution in each team -

A = 1, 10, 11, 20, 21, 26

B = 2, 9, 12, 19, 22, 27

C = 3, 8, 13, 18, 23

D = 4, 7, 14, 17, 24

E = 5, 6, 15, 16, 25

*Control group*

Number of students = 26

(Digby & Pedersen 1995:433-444; Hike 1990:19-20; Sharan 1994:6-17)

### **4.6.2.2 Student roles**

Each team member was assigned responsibility to help team members work together effectively (Johnson, Johnson & Smith 1991:63). The responsibilities of the members were as follows:

- (1) A researcher-runner, who gets needed materials for the group and communicates with other groups and the instructor.
- (2) A recorder, who writes down the group's decisions and edits the group's report.
- (3) A checker, who ensures that all group members are able to explain how to arrive at an answer or conclusion.
- (4) An encourager, who ensures that all members contribute.
- (5) Quiet Captain, who ensures that the team does not talk loudly enough to be overheard by other teams.

#### **4.6.2.3 Carrying out the research**

##### **Experimental groups**

For experimental groups, each lesson began with a team building exercise. Team members interviewed one another to get acquainted. They filled out a questionnaire to describe themselves. See "My favourites" handout: Appendix 1.

Team building activities included team naming, designing team banners, logos, cheers and handshakes. These activities helped to build team identity (Cannif 1991:157; Kagan 1992:8-12).

##### **Teaching social skills**

As part of co-operative learning, all experimental groups (year one and year two) learnt communication and social skills. These included:

- active listening;
- asking questions;
- sharing ideas;
- criticising ideas not people;
- problem solving;
- reaching consensus;
- taking turns; and
- differentiating ideas and praising

(Stahl 1994:25; Davidson & Worsham 1992:104; Kagan 1992:6; Warden, Tolmie, Anderson, Howe & Foot 1994:283-284).

### **Group brainstorming exercise**

As part of co-operative learning, teams were given a group brainstorming exercise. This exercise was given to see whether students had mastered the communication and social skills. In this case groups were given the topic: The important uses of maps. Each group member was requested to write two important uses of maps. Thereafter each team member read his/her statements while others were listening. Discussions started. Mistakes were corrected, related statements or facts were integrated. Each team member assumed his/her role as research runner, recorder, checker, encourager or quiet captain. The researcher moved from group to group to facilitate learning (Andersen 1995:3; Kagan 1992:10; Cohen 1994:95-96; COTEP 1997:88; Radcliffe-Vasile, Kipperman, Charness & Rabow 1994:33-35; Hamm & Adams 1990:26-27).

### **Teaching mapwork**

For the experimental group, each lesson began with a short class presentation. The objectives of the lesson were explained. After this short lecture, team-mates moved to their team tables. Topographical maps, worksheets and answer sheets were handed out.

Each team received two topographical maps of the same area and two worksheets. From the topographical map students were expected to work together to answer a given problem or explain a given concept.

The following topics were studied from the given topographical map:

- (a) Map title
- (b) Grid references
- (c) Direction, bearing and azimuth
- (d) Calculation of distances on a map in metres and kilometres
- (e) Calculation of magnetic declination
- (f) Use of scales and scale conversion
- (g) Calculation of area
- (h) Working out the slope gradient
- (i) Drawing a cross-section
- (j) Read and interpret the topographical maps

(Campbell 1993:58-62; Dent 1996:74-76; Gillet 1990:6-10; Jewson, Bridge & Scoffham 1991:3; Keates 1989:147-148; Marson 1992:6, 48; Monmonier 1993:21-30; Monmonier 1991:5-8; Selwyn 1987:28-40; Tyner 1992:209-213; Warn 1991:3-12).

### Individual quizzes

After the experimental groups had completed their study of a number of concepts, they took individual quizzes. The quizzes were based on the course content - relevant questions that students had to answer. They were designed to test the knowledge gained by the students from class presentations and during team practice.

Team members were not permitted to help one another during the quizzes. At the end of the period, the instructor collected the papers, marked and returned them to the students in their next class period.

### Individual improvement scores

Students received an improvement score each week indicating how well they were performing compared to their usual level of performance (base score). Figures 4.2 and 4.3 show examples of quiz score sheet and team summary sheet respectively.

Figure 4.2

**QUIZ SCORE SHEET (STAD AND JIGSAW II)**

Student	Date: May 23			Date:			Date:		
	Base	Quiz	Improvement	Base	Quiz	Improvement	Base	Quiz	Improvement
	Score	Score	Points	Score	Score	Points	Score	Score	Points
A	90	100	30						
B	90	100	30						
C	90	100	30						
D	85	74	0						
E	85	98	30						
F	85	82	10						
G	80	67	0						
H	80	91	30						
I	75	79	20						
J	75	76	20						

Source: Digby & Pedersen (1995)



**Figure 4.3: Team Summary Sheet**TEAM NAME: Fantastic Four

TEAM MEMBERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Sara A.	30													
Eddie E.	30													
Edgar I.	20													
Carol N.	20													
TOTAL TEAM SCORE	100													
TEAM AVERAGE	25													
TEAM AWARD														

Source: Digby &amp; Pedersen (1995).

**Team recognition**

Each week teams received recognition for the sum of the improvement scores of the team members. Certificates or newsletters were the primary means of rewarding teams for their performance. Appendixes 2, 3 and 4 show example of certificates that could be received (Kagan 1992:16.1-16.6; Digby & Pedersen 1995:433-445).

**Control groups**

For the control group, each lesson would likewise, begin with an introduction to explain the objectives of the lesson. Thereafter the researcher proceeded to explain mapwork in the traditional way, namely, by means of a lecture.

This was continued for six weeks in which the same topographical map was worked with by both groups. All other circumstances were the same.

After six weeks (ten lessons) both the co-operative learning groups and the traditional learning groups wrote the same test at the same time and under the same conditions.

The averages of the experimental groups and control groups were compared by means of a t-test for unrelated groups to determine if they differed significantly.

## **4.7 QUESTIONNAIRE**

### **4.7.1 Compiling the questionnaire**

In the second part of the research a questionnaire was drawn up. (See Appendix 5.) Appendix 6 gives a summary of the questions indicating which statements were formulated positively or negatively.

All experimental groups (first and second year students) were requested to reply to the statements on the questionnaire by indicating their responses on answer sheets which could be read by an optical reader.

The aim of the questionnaire was to survey the students' attitudes towards co-operative learning and to indicate how well statements described them in terms of the other variables as listed below.

Students were requested not to write their names on the answer sheets. Biographical data were asked (namely their gender and year group) and thereafter they were requested to respond to statements. The statements focussed on the following variables:

- intergroup relations;
- self-esteem;
- social support;
- social skills;
- proacademic norms;
- "psychological health"; and
- attitude towards co-operative learning method.

A total of 103 statements were formulated; of these, 51 were positive and 52 were negative.

Students were asked to indicate their answers by means of a dash (–) in the appropriate number in the square on the answer sheet provided. The numbers have the following meanings:

3 = Agree

2 = Undecided

1 = Disagree

The statements were formulated by means of the variables as described in the literature study as follows:

Variable: *Intergroup relations* - Questions: 3, 9, 18 (See Section 3.5 [1])

Variable: *Self-esteem* - Questions: 4, 10, 19, 26, 32, 37, 39 (See Section 3.5 [2] )

Variable: *Social support* - Questions: 5, 11, 20, 27, 33 (See Section 3.5 [3])

Variable: *Social skills* - Questions: 6, 12, 21, 28, 34 (See section 3.5 [4])

Variable: *Proacademic norms* - Questions: 7, 13, 22, 29 (See section 3.5 [5])

Variable: *"psychological health"* - Questions: 8, 14, 15, 16, 17, 23, 24, 25, 30, 31, 35, 36, 38, 40, 41 (See section 3.5 [6])

Variable: *Attitude towards co-operative learning* - Questions: 42 to 105 (See section 3.6 [7]).

#### 4.7.2 Pilot study

A pilot study to test the questionnaire was carried out on a small number of people from the same population as the one which the researcher wished to survey. The aim was to reveal any unanticipated problems with the questionnaire before it was administered.

In this case ten course one students responded to the questionnaire. The pilot study revealed whether most subjects understood the instructions, whether the research situation was plausible, and how long it took to answer the questionnaire. Difficult concepts were noted and improved in the final questionnaire (Boniface 1995:88; Cozby 1979:147-148; Gall, Borg & Gall 1996:298-299; Gay 1992:112; Hall & Hall 1996:126-127; Hittleman & Simon 1997:171; Maruyama & Deno 1992:25).

### 4.8 VALIDITY

Validity can be defined as the degree to which a test measures what it is supposed to measure. A test is not valid *per se*; it is valid for a particular purpose and for a particular group.

#### 4.8.1 Content validity

Content validity is the degree to which a test measures an intended content area. It requires both item validity and sampling validity. Item validity is concerned with whether the test items represent measurement in the intended area. Item validity helps the researcher to make inferences about performance in the entire content area based on

performance in the items included in the test. It is possible to make such inferences if the test items adequately sample the domain of possible items.

In the *experimental* research, items included in the test covered the following concepts in mapwork:

- topographical map title;
- grid references;
- direction;
- bearing and azimuth;
- calculation of distances on a map in metres and kilometres;
- magnetic declination;
- scales, calculation of areas in metres and kilometres;
- slope gradient;
- drawing cross-section; and
- interpretation of topographical maps.

In the *questionnaire* the statements also covered the total area as explained in the literature study. Hence the variables which may be related to co-operative learning were identified and accordingly statements formulated for the questionnaire. Thus the questionnaire has content validity.

#### **4.8.2 Face validity**

Basically face validity refers to the degree to which a test appears to measure what it purports to measure. It is used as an initial screening procedure in test selection.

In this experiment, the concepts in section 4.6.2.3 are included within the mapwork test (Adams & Schvaneveldt 1991:78-95; Black 1993:67-72; Bouma & Atkinson 1995:60; Gall, Borg & Gall 1996:571-578; Gay 1992:155-157; Hall & Hall 1996:43; Maruyama & Deno 1992:69; Miles, Alt, Goshing, Lewis & Trout 1988:163-164, Mutchnick & Berg 1996:80-81; Szymanski 1993:178).

The questionnaire also appeared to have face validity as confirmed by an expert in this field.

## 4.9 RELIABILITY

“Test reliability refers to the consistency, stability, and precision of test scores” (Gall, Borg & Gall 1996:197). A score with a large amount of measurement error is unreliable, and conversely, a score with a small amount of measurement error is described as reliable.

The more reliable a test is, the more confidence we have that the scores obtained from the administration of the test are essentially the same scores that would be obtained if the tests are readministered.

The reliability of a score can be described statistically either by a reliability coefficient or by standard error of measurement (Black 1993:72, Bouma & Atkinson 1995:104; Gay 1992:161; Hall & Hall 1996:44; Maruyama & Deno 1992:69).

In the computer analysis of this research use was made of the Cronbach alpha coefficient correlation which is a split-half method to calculate reliability.

## 4.10 ANALYSIS OF DATA

Data analysis involves the application of one or more statistical techniques. Data are analysed in a way that permits the researcher to test the research hypotheses or answer the research problem/s.

Analysis of data permits the researcher to develop explanations of events so that theories and generalisations about the courses, reasons and processes of any piece of social behaviour can be developed.

After the experimental groups and control groups were taught mapwork, all groups wrote the same test. The average of the experimental group was compared with the average of the control group. In the analysis the t-test for independent groups was applied.

For the other hypotheses a Pearson Product Moment Correlation was calculated as explained in 4.4.

### **A test of statistical significance**

A test of statistical significance is applied to determine whether the null hypotheses could be rejected.

### **The probability value**

The level of significance actually obtained after the data have been collected and analysed is called probability value, and is indicated by the symbol  $p$ . Educational researchers choose to reject the null hypothesis if the  $t$  value reaches a significant level of  $p < .05$ . In this case, statistical manipulation of data was done by the Department of Computer Science at Unisa (Bloom 1995:547-550; Boniface 1995:21-23; Cozby, Worden & Kee 1989:160-161; Cramer 1994:47-52; Edgington 1987:439; Fraenkel & Warren 1993:195; Gall *et al.* 1996:182-186; Hitchcock & Hughes 1995:96-97; Hittleman & Simon 1997:225-227; Moore 1991:400-404; Siegel 1990:773-774).

### **4.11 SUMMARY**

In this chapter, the general and specific problems were stated. The experimental as well as the null hypotheses were also stated. The research design indicated the respondents, instruments, and procedures and how the pilot study was undertaken. Validity and reliability of tests, as well as the analysis of data were fully explained. In the next chapter the results are presented and discussed.

## *Chapter Five*

### *Results and discussion of results*

#### **5.1 INTRODUCTION**

As explained in Chapter I, this study is motivated by an interest in the potential benefits offered by co-operative learning to the learning of mapwork in Geography.

Apart from these potential benefits for the learning of mapwork, it was suspected that co-operative learning may also develop positive attitudes in pupils with regard to a number of other aspects such as self-esteem, social support, social skills, academic norms and "psychological health". As moderator variables, *year group* and *gender* were considered. Hence, the following 9 specific problems were stated:

##### ***Problem 1:***

Is there a significant difference between the average performance of a group of *first year* students who learnt mapwork by means of co-operative learning, and a second group who learnt mapwork by means of the traditional method?

##### ***Problem 2:***

Is there a significant difference between the average performance of a group of *second year* students who learnt mapwork by means of co-operative learning, and a second group who learnt mapwork by means of the traditional method?

##### ***Problem 3:***

Is there a significant correlation between *attitude* towards co-operative learning and *intergroup relations* for first year and second year students and for both genders?

**Problem 4:**

Is there a significant correlation between *attitude* towards co-operative learning and *self-esteem* for first year and second year students and for both genders?

**Problem 5:**

Is there a significant correlation between *attitude* towards co-operative learning and *social support* for first year and second year students and for both genders?

**Problem 6:**

Is there a significant correlation between *attitude* towards co-operative learning and *social skills* for first year and second year students and for both genders?

**Problem 7:**

Is there a significant correlation between *attitude* towards co-operative learning and *academic norms* for first year and second year students and for both genders?

**Problem 8:**

Is there a significant correlation between *attitude* towards co-operative learning and "*psychological health*" for first year and second year students and for both genders?

**Problem 9:**

Is there a significant difference between the *attitudes* of first year and second year students towards co-operative learning?

The research design of the empirical investigation (as described in Chapter 4) focussed on these aforementioned problems, and the hypotheses, which were stated accordingly. The statistical techniques used to test these hypotheses are the following:



For hypotheses 1, 2 and 9: the t-test;

For hypotheses 3, 4, 5, 6, 7 and 8: correlation.

The remainder of this chapter is a description of the biographical data of the respondents and the results which were obtained after analysis of the questionnaires. These are given in 27 tables.

## 5.2 BIOGRAPHICAL INFORMATION

The whole student population at a teacher's training college was used.

This population consisted of four groups:

First year: Co-operative learning group = 25 students  
Lecture group = 23 students

Second year: Co-operative learning group = 27 students  
Lecture group = 26 students

Gender division of the co-operative learning group for both year groups:

Males in co-operative learning group = 25

Females in co-operative learning group = 23

## 5.3 RESULTS

### 5.3.1 Problem 1

Is there a significant difference between the average performance of a group of *first* year students who learnt mapwork by means of co-operative learning, and a second group who learnt mapwork by means of the traditional method?

H<sub>0</sub>: There is no significant difference between the average performance of a group of *first* year students who learnt mapwork by means of co-operative learning, and a second group who learnt mapwork by means of the traditional method.

$H_1$ : There is a significant difference between the average performance of a group of *first* year students who learnt mapwork by means of co-operative learning, and a second group who learnt mapwork by means of the traditional method.

To test this hypothesis a t-test was calculated. The results are as follows:

**Table 1** t-value and probability of first year students who study mapwork by means of co-operative learning or by means of lectures

Group	N	Mean	t-value	df	probability
Co-operative	25	53,0417	2,64	45	p<0,05
Lecture	23	40,9130			

According to Table 1, the first year students who studied mapwork by means of co-operative learning did significantly better (on the 5%-level of significance since  $p < 0,05$ ) than the lecture group in a test on mapwork.

### 5.3.2 Problem 2

Is there a significant difference between the average performance of a group of *second* year students who learnt mapwork by means of co-operative learning, and a second group who learnt mapwork by means of the traditional method?

$H_0$ : There is no significant difference between the average performance of a group of *second* year students who learnt mapwork by means of co-operative learning and a second group who learnt mapwork by means of the traditional method.

$H_2$ : There is a significant difference between the average performance of a group of *second* year students who learnt mapwork by means of co-operative learning, and a second group who learnt mapwork by means of the traditional method.

To test this hypothesis a t-test was calculated. The results are as follows:

**Table 2** t-value and probability of second year students who study mapwork by means of co-operative learning or by means of lectures

Group	N	Mean	t-value	df	probability
Co-operative	27	57,8889			
Lecture	26	46,5769	2,24	51	p<0,05

According to Table 2, the second year students who studied mapwork by means of co-operative learning did significantly better (on the 5%-level of significance since  $p < 0,05$ ) than the lecture group in a test on mapwork.

### 5.3.3 Problem 3

Is there a significant correlation between *attitude* towards co-operative learning and *intergroup relations* for first year and second year students and for both genders?

$H_0$ : There is no significant correlation between *attitude* towards co-operative learning and *intergroup relations* for first year and second year students and for both genders.

$H_3$ : There is a significant correlation between *attitude* towards co-operative learning and *intergroup relations* for first year and second year students and for both genders.

**Table 3** Correlation and probability of *attitude* towards co-operative learning and *intergroup relations* for first year students who used co-operative learning

N	correlation	probability
25	0,44	p<0,05

**Table 4** Correlation and probability of *attitude* towards co-operative learning and *intergroup relations* for second year students who used co-operative learning

N	correlation	probability
27	0,11	$p > 0,05$

According to Tables 3 and 4, there is a significant correlation (on the 5%-level since  $p < 0,05$ ) between attitude towards co-operative learning and intergroup relations for first year students. The correlation between the two variables is moderate and positive which means that the more positive the experience of first year students of co-operative learning the more positive their intergroup relations. This relationship for the second year students is also positive, but too low to be significant. However, it needs to be kept in mind that the number of students involved is low, which means that significant correlations are not easily obtained.

**Table 5** Correlation and probability of *attitude* towards co-operative learning and *intergroup relations* for male students who used co-operative learning

N	correlation	probability
25	0,44	$p < 0,05$

**Table 6** Correlation and probability of *attitude* towards co-operative learning and *intergroup relations* for female students who used co-operative learning

N	correlation	probability
23	0,13	$p > 0,05$

Tables 5 and 6 show that for *male* students there is a significant (on the 5%-level) correlation between attitude towards co-operative learning and intergroup relations. The correlation between the two variables is moderate and positive which means that the

more positive the experience of male students of co-operative learning the more positive their intergroup relations. This relationship for the female students is also positive but too low to be significant. However, it needs to be kept in mind that the number of students involved is low.

#### 5.3.4 Problem 4

Is there a significant correlation between *attitude* towards co-operative learning and *self-esteem* for first year and second year students and for both genders?

H<sub>0</sub>: There is no significant correlation between *attitude* towards co-operative learning and *self-esteem* for first year and second year students and for both genders.

H<sub>4</sub>: There is a significant correlation between *attitude* towards co-operative learning and *self-esteem* for first year and second year students and for both genders.

**Table 7** Correlation and probability of *attitude* towards co-operative learning and *self-esteem* for first year students who used co-operative learning

N	correlation	probability
25	0,05	p>0,05

**Table 8** Correlation and probability of *attitude* towards co-operative learning and *self-esteem* for second year students who used co-operative learning

N	correlation	probability
27	0,24	p>0,05

Tables 7 and 8 indicate that there are very low, positive correlations between *attitude* towards co-operative learning and *self-esteem* for first and second year students who

used co-operative learning. These correlations were not significant. In this regard it needs to be kept in mind that the number of respondents is low.

**Table 9** Correlation and probability of *attitude* towards co-operative learning and *self-esteem* for male students who used co-operative learning

N	correlation	probability
25	0,05	$p > 0,05$

**Table 10** Correlation and probability of *attitude* towards co-operative learning and *self-esteem* for female students who used co-operative learning

N	correlation	probability
23	0,23	$p > 0,05$

Tables 9 and 10 show very low and low positive correlations between *attitude* towards co-operative learning and *self-esteem* for male and female students, respectively, who used co-operative learning. These correlations were not significant. In this regard it needs to be kept in mind that the number of respondents is low.

### 5.3.5 Problem 5

Is there a significant correlation between *attitude* towards co-operative learning and *social support* for first year and second year students and for both genders?

$H_0$ : There is no significant correlation between *attitude* towards co-operative learning and *social support* for first year and second year students and for both genders.

$H_5$ : There is a significant correlation between *attitude* towards co-operative learning and *social support* for first year and second year students and for both genders.

**Table 11** Correlation and probability of *attitude* towards co-operative learning and *social support* for first year students who used co-operative learning

N	correlation	probability
25	0,48	p<0,05

**Table 12** Correlation and probability of *attitude* towards co-operative learning and *social support* for second year students who used co-operative learning

N	correlation	probability
27	0,44	p<0,05

Tables 11 and 12 clearly indicate that there are moderate, positive, but significant correlations (on the 5%-level of significance) between attitude towards co-operative learning and social support for both first and second year students. These correlations are confirmed in the next two tables:

**Table 13** Correlation and probability of *attitude* towards co-operative learning and *social support* for male students who used co-operative learning

N	correlation	probability
25	0,48	p<0,05

**Table 14** Correlation and probability of *attitude* towards co-operative learning and *social support* for female students who used co-operative learning

N	correlation	probability
23	0,45	p<0,05

When studying Tables 13 and 14 it is clear that there are moderate, positive, but significant correlations (on the 5%-level of significance) between attitude towards co-operative learning and social support for both male and female students.

### 5.3.6 Problem 6

Is there a significant correlation between *attitude* towards co-operative learning and *social skills* for first year and second year students and for both genders?

H<sub>0</sub>: There is no significant correlation between *attitude* towards co-operative learning and *social skills* for first year and second year students and for both genders.

H<sub>6</sub>: There is a significant correlation between *attitude* towards co-operative learning and *social skills* for first year and second year students and for both genders.

**Table 15** Correlation and probability of *attitude* towards co-operative learning and *social skills* for first year students who used co-operative learning

N	correlation	probability
25	0,10	p>0,05

**Table 16** Correlation and probability of *attitude* towards co-operative learning and *social skills* for second year students who used co-operative learning

N	correlation	probability
27	0,13	p>0,05

Tables 15 and 16 show that there are very low positive correlations (which are not significant) between *attitude* towards co-operative learning and *social skills* for first and second year students who used co-operative learning. However, this result needs to be interpreted in the light of the low number of respondents.



**Table 17** Correlation and probability of *attitude* towards co-operative learning and *social skills* for male students who used co-operative learning

N	correlation	probability
25	0,14	$p > 0,05$

**Table 18** Correlation and probability of *attitude* towards co-operative learning and *social skills* for female students who used co-operative learning

N	correlation	probability
23	0,19	$p > 0,05$

The same trend as with the year groups are observed for the genders - there are low, positive, but not significant correlations between *attitude* towards co-operative learning and *social skills* for both genders who used co-operative learning.

### 5.3.7 Problem 7

Is there a significant correlation between *attitude* towards co-operative learning and *academic norms* for first year and second year students and for both genders?

$H_0$ : There is no significant correlation between *attitude* towards co-operative learning and *academic norms* for first year and second year students and for both genders.

$H_7$ : There is a significant correlation between *attitude* towards co-operative learning and *academic norms* for first year and second year students and for both genders.

**Table 19** Correlation and probability of *attitude* towards co-operative learning and *academic norms* for first year students who used co-operative learning

N	correlation	probability
25	0,09	p>0,05

**Table 20** Correlation and probability of *attitude* towards co-operative learning and *academic norms* for second year students who used co-operative learning

N	correlation	probability
27	0,16	p>0,05

For both year groups there are very low, positive, but not significant correlations between *attitude* towards co-operative learning and *academic norms* for first and second year students who used co-operative learning.

**Table 21** Correlation and probability of *attitude* towards co-operative learning and *academic norms* for male students who used co-operative learning

N	correlation	probability
25	0,09	p>0,05

**Table 22** Correlation and probability of *attitude* towards co-operative learning and *academic norms* for female students who used co-operative learning

N	correlation	probability
23	0,11	p>0,05

The same trend as with the year groups is observed in both genders - there are very low, positive, but not significant correlations between *attitude* towards co-operative learning and *academic norms* for both genders who used co-operative learning.

### 5.3.8 Problem 8

Is there a significant correlation between *attitude* towards co-operative learning and "*psychological health*" for first year and second year students and for both genders?

H<sub>0</sub>: There is no significant correlation between *attitude* towards co-operative learning and "*psychological health*" for first year and second year students and for both genders.

H<sub>8</sub>: There is a significant correlation between *attitude* towards co-operative learning and "*psychological health*" for first year and second year students and for both genders.

**Table 23** Correlation and probability of *attitude* towards co-operative learning and "*psychological health*" for first year students who used co-operative learning

N	correlation	probability
25	0,49	p<0,05

**Table 24** Correlation and probability of *attitude* towards co-operative learning and "*psychological health*" for second year students who used co-operative learning

N	correlation	probability
27	0,33	p>0,05

According to Tables 23 and 24 the correlations between *attitude* towards co-operative learning and "*psychological health*" for first and second year students who used co-operative learning are positive and moderate. For the first year group, this correlation is also significant on the 5%-level of significance since  $p < 0,05$ .

**Table 25** Correlation and probability of *attitude* towards co-operative learning and "*psychological health*" for male students who used co-operative learning

N	correlation	probability
25	0,49	$p < 0,05$

**Table 26** Correlation and probability of *attitude* towards co-operative learning and "*psychological health*" for female students who used co-operative learning

N	correlation	probability
23	0,31	$p > 0,05$

According to Tables 25 and 26, there are positive correlations between *attitude* towards co-operative learning and "*psychological health*" for both genders. In the case of the males, this correlation is moderate and significant on the 5%-level.

### 5.3.9 Problem 9

Is there a significant difference between the *attitude* of first year and second year students towards co-operative learning?

$H_0$ : There is no significant difference between the *attitude* of first year and second year students towards co-operative learning.

$H_1$ : There is a significant difference between the *attitude* of first year and second year students towards co-operative learning.

**Table 27** t-value and probability of attitude towards co-operative learning of first and second year students

Group	N	Mean	t-value	df	probability
1st year	25	115,4400			
2nd year	27	116,4583	0,44	47	p>0,05

According to Table 27 the attitudes of the first year students who studied mapwork by means of co-operative learning do not differ significantly from those of the second year students.

#### 5.4 SUMMARY

When all the tables are studied, it seems that:

- First and second year students achieve significantly better results in mapwork if they study by means of co-operative learning than if they study by means of the lecture method.
- There are significant correlations between *attitude towards co-operative learning* and:
  - » *intergroup relations* for first year students of both sexes, and male students;
  - » *social support* for first and second year students and both genders; and
  - » *“psychological health”* for first year students of both sexes, and male students at first and second year.

In the next chapter conclusions and recommendations will be made.

## *Chapter Six*

### *Conclusion and recommendations*

#### **6.1 INTRODUCTION**

From the preceding, the general research problem may be stated thus:

*Does co-operative learning improve the performance, among other things, of first and second year Geography students learning mapwork?*

The specific stated aims of this study were to enable the Geography students to do the following:

- identify and explain the title of a topographical map;
- locate geographical features using grid references;
- work out direction, bearing and azimuth;
- calculate distances on a map in metres and kilometres;
- calculate magnetic declination;
- know and use three types of scales;
- convert scales from one type to another;
- calculate area in metres and kilometres;
- work out the slope gradient;
- draw a cross-section;
- read and interpret topographical maps.

The general stated aims were to:

- better train Geography teachers to teach mapwork;
- improve the learners' attitude towards mapwork; and
- make students aware of the usefulness of maps to real life situations.

The following null hypotheses have been stated:

- (1) There is no significant difference between the average performance of a group of *first* year students who learnt mapwork by means of co-operative learning and a second group who learnt mapwork by means of the traditional method.
- (2) There is no significant difference between the average performance of a group of *second* year students who learnt mapwork by means of co-operative learning and a second group who learnt mapwork by means of the traditional method.
- (3) There is no significant correlation between *attitude* towards co-operative learning and *intergroup relations* for first year and second year students and for both genders.
- (4) There is no significant correlation between *attitude* towards co-operative learning and *self-esteem* for first year and second year students and for both genders.
- (5) There is no significant correlation between *attitude* towards co-operative learning and *social support* for first year and second year students and for both genders.
- (6) There is no significant correlation between *attitude* towards co-operative learning and *social skills* for first year and second year students and for both genders.
- (7) There is no significant correlation between *attitude* towards co-operative learning and *academic norms* for first year and second year students and for both genders.
- (8) There is no significant correlation between *attitude* towards co-operative learning and "*psychological health*" for first year and second year students and for both genders.
- (9) There is no significant difference between the *attitude* of first year and second year students towards co-operative learning.

## 6.2 CONCLUSIONS

### 6.2.1 Conclusions from literature study

- The literature study in this research shows that the co-operative learning method helps students to become actively involved in the learning process. Students are able to analyse, transfer and synthesise mapwork knowledge in a variety of ways. The co-operative learning method, as one of the strategies recommended by proponents of outcomes-based education provided students with "... imaginative thinking and critical reasoning" (see section 3.12.1).
- Co-operative learning gives students the opportunity to build skills as effective communicators, as group members, and as team players; skills increasingly needed in all areas of work, and skills students must have to function as professionals in the work place. The method provides a valuable opportunity to explore specific topics in greater detail – topics that are difficult for individuals to investigate on their own (see section 3.9.4).
- Positive interdependence, "... the perception that you are linked with others in such a way that you cannot succeed unless they do ..." (section 3.9.1), promotes a situation in which students work together in small groups to maximise the learning of all members, to share their resources, to provide mutual support, and to celebrate their joint success.
- As indicated in section 3.9.3 accountability to peers, ability to influence each other's reasoning and conclusions, social modelling, social support, and interpersonal rewards all increase as the face to face interaction among group members increases.
- Individual accountability, which means that the team's success depends on the individual learning of all team members, focuses the activities of the team members on helping one another learn and making sure that everyone on the team is ready for any assessment that students take individually, without their team's help (see section 3.8).



- In co-operative learning groups, students are required to learn the interpersonal and small group skills required to function as part of a team. A warm, caring and supportive environment is required (section 3.10.2). The more socially skilful students become and the more attention instructors pay to teaching and rewarding the use of social skills, the higher the achievement that can be expected within the co-operative learning groups.
- Group processing, is defined as “reflecting on groups’ sessions to (i) describe what member actions are helpful and unhelpful and (ii) make decisions about what actions to continue or change” (section 3.9.5). Group processing clarifies and improves members’ effectiveness in contributing to collaborative efforts to achieve the group’s goals.
- It is the teacher’s role to monitor students’ interaction in the learning groups, and to intervene to help students learn and interact more skilfully.

The research by Schwalb and Schwalb (in section 3.3) reports that co-operative learning has been successfully applied in various parts of the world, and that it has yielded a wide variety of positive effects on students from many different countries.

- Over 375 studies, with over 1700 findings on productivity and achievement, have been conducted over the past 95 years. When all of the studies are included in the analysis, the average student cooperating in the experiments performed at about two-thirds a standard deviation above the average learning within a competitive (effect size = 0,67) or individualistic situation (effect size = 0,64) (see section 3.4).
- Purdom and Kromrey (see section 3.6(4)) conducted three studies on co-operative learning at college level. These studies were designed both to measure the effects of co-operative learning on academic achievement, and to determine college students’ perceptions and attitudes towards co-operative learning. A total of 90% of the students believed that co-operative learning helped them to better master the material in comparison to earlier methods.

- Co-operative learning methods that are related to the teaching and learning of mapwork include the following:
  - (1) Student Team-Achievement Division (STAD)
  - (2) Teams-Games-Tournament (TGT)
  - (3) The Jigsaw Method (Jigsaw I & II)
  - (4) The Jigsaw III
  - (5) Group investigation
  - (6) Co-op Co-op Strategy

### 6.2.2 Conclusions from empirical investigation

#### (1) *Problem 1*

Is there a significant difference between the average performance of a group of first year students who learnt mapwork by means of co-operative learning and a second group who learnt mapwork by means of the traditional method?

The null hypothesis ( $H_0$ ) is stated thus:

There is no significant difference between the average performance of a group of first year students who learnt mapwork by means of co-operative learning and a second group who learnt mapwork by means of the traditional method.

To test this hypothesis a t-test was calculated. Table 1 (see section 5.3.1) shows the t-value and probability of first year students who study mapwork by means of co-operative learning or by means of lectures. According to this table, the first year students who studied mapwork by means of co-operative learning did significantly better (on the 5% level of significance since  $p < 0,05$ ) than the lecture group in a test on a mapwork.

The null hypothesis is rejected on the 5% level. The researcher can thus state with 95% confidence that there is a significant difference between the two averages. This means

that the co-operative learning method has helped the first year students to achieve higher marks in mapwork.

(2) *Problem 2*

Is there a significant difference between the average performance of a group of second year students who learnt mapwork by means of co-operative learning and a second group who learnt mapwork by means of the traditional method?

The null hypothesis ( $H_0$ ) is stated thus:

There is no significant difference between the average performance of a group of second year students who learnt mapwork by means of co-operative learning and a second group who learnt mapwork by means of the traditional method.

To test this hypothesis a t-test was calculated. Table 2 (in section 5.3.2) shows the t-value and probability of second year students who study mapwork by means of co-operative learning or by means of lectures.

According to Table 2, the second year students who studied mapwork by means of co-operative learning did significantly better (on the 5% level of significance since  $p < 0,05$ ) than the lecture group in the mapwork test. Hence the null hypothesis is rejected on the 5% level. The researcher can thus state with 95% confidence that there is a significant difference between the two averages. This means that the co-operative learning method has helped learners to achieve higher marks in mapwork.

(3) *Problem 3*

Is there a significant correlation between attitude towards co-operative learning and intergroup relations for first year and second year students and for both genders?

The null hypothesis ( $H_0$ ) is stated thus:

There is no significant correlation between attitude towards co-operative learning and intergroup relations for first year and second year students and for both genders.

To test this hypothesis, the correlation coefficient was calculated. Table 3 (in section 5.3.3) shows the correlation and probability of attitude towards co-operative learning and intergroup relations for first year students and for both genders. According to Table 3, there is a significant correlation (on the 5% level since  $p < 0,05$ ) between attitude towards co-operative learning and intergroup relations for first year students.

The null hypothesis is rejected on the 5% level. The researcher can thus state with 95% confidence that there is a significant correlation between attitude towards co-operative learning and intergroup relations for first year students. The correlation (0,44) between the two variables is moderate and positive, which means that the more positive the first year students experienced co-operative learning the more positive their intergroup relations.

Table 4 (in section 5.3.3) shows correlation and probability of attitude towards co-operative learning and intergroup relations for second year students who used co-operative learning. This relationship for second year students is positive (0,11) but too low to be significant since on the 5% level  $p > 0,05$ . In this case, it should be considered that the number of students involved in the experiment is low, which means that a significant correlation is not easily obtained.

Table 5 shows the correlation and probability of attitude towards co-operative learning and intergroup relations for male students who used co-operative learning. The correlation is 0,44 and the probability  $p < 0,05$ . Table 5, therefore, shows that for male students there is a significant correlation (on the 5% level) between attitude towards co-operative learning and intergroup relations. The correlation between the two variables is moderate and positive which means that the more positive the male students' experience of co-operative learning the more positive their intergroup relations (see section 5.3.3.).

Table 6 (in section 5.3.3) shows the correlation and probability of attitude towards co-operative learning and intergroup relations for female students who used co-operative

learning. This relationship (0,13) and probability ( $p>0,05$ ) for the female students is also positive but too low to be significant. However, it needs to be kept in mind that the number of students involved is low.

(4) *Problem 4*

Is there a significant correlation between attitude towards co-operative learning and self-esteem for first and second year students and for both genders?

The null hypothesis ( $H_0$ ) is stated thus:

There is no significant correlation between attitude towards co-operative learning and self-esteem for first year and second year students and for both genders.

Table 7 shows the correlation and probability of attitude towards co-operative learning and self-esteem for first year students who used co-operative learning. In this regard correlation is 0,05 and probability  $p>0,05$  (see section 5.3.4.).

Table 8 (in section 5.3.4) shows the correlation and probability of attitude towards co-operative learning and self-esteem for second year students who used co-operative learning. In this regard the correlation is 0,24 and probability  $p>0,05$ .

Tables 7 and 8 thus indicate that there is a very low, positive correlation between attitude towards co-operative learning and self-esteem for first and second year students who used co-operative learning. These correlations are not significant. The null hypothesis may not be rejected. The reason for non-significant finding may be the insufficient number of subjects. Further research on a larger population is necessary in this regard.

Table 9 (in section 5.3.4) shows the correlation and probability of attitude towards co-operative learning and self-esteem for male students who used co-operative learning. In this regard the correlation is 0,05 and probability ( $p>0,05$ ).

Table 10 shows the correlation and probability for attitude towards co-operative learning and self-esteem for female students who used co-operative learning. In this regard the correlation is 0,23 and probability ( $p > 0,05$ ) (see section 5.3.4.).

Tables 9 and 10 therefore show very low and low positive correlations between attitude towards co-operative learning and self-esteem respectively for male and female students who used co-operative learning. These correlations were not significant. The non-significance of the finding may mean that further research is necessary. Apart from this, it needs to be kept in mind that the number of respondents is low.

(5) *Problem 5*

Is there a significant correlation between attitude towards co-operative learning and social support for first year and second year students and for both genders?

The null hypothesis ( $H_0$ ) is stated thus:

There is no significant correlation between attitude towards co-operative learning and social support for first year and second year students and for both genders.

Table 11 shows the correlation and probability of attitude towards co-operative learning and social support for first year students who used co-operative learning. In this regard the correlation is 0,48 and probability ( $p < 0,05$ ) (see section 5.3.5).

Table 12 (in section 5.3.5) shows the correlation and probability of attitude towards co-operative learning and social support for second year students who used co-operative learning. In this regard the correlation is 0,44 and probability ( $p < 0,05$ ).

Tables 11 and 12 clearly indicate that there are moderate positive, but significant correlations (on the 5% level of significance) between attitude towards co-operative learning and social support for both first and second year students. The null hypotheses are rejected on the 5% level. The researcher can thus state with 95% confidence that there is a significant correlation between the two variables. This means that the more

positive the attitudes of the first and second year students towards co-operative learning, the more positive their social support. These correlations are confirmed in the next two tables:

Table 13 shows the correlation and probability of attitude towards co-operative learning and social support for male students who used co-operative learning. The correlation is 0,48 and probability ( $p < 0,05$ ) (see section 5.3.5).

Table 14 (in section 5.3.5) shows the correlation and probability of attitude towards co-operative learning and social support for female students who used co-operative learning. The correlation is 0,45 and probability ( $p < 0,05$ ).

When studying Tables 13 and 14 it is clear that there are moderate, positive but significant correlations (on the 5% level of significance) between attitude towards co-operative learning and social support for both male and female students. The researcher can thus state with 95% confidence that there is a significant correlation between the two variables. This means that the more positive the attitudes of the male and female students towards co-operative learning, the greater their social support.

(6) *Problem 6*

Is there a significant correlation between attitude towards co-operative learning and social skills for first year and second year students and for both genders.

The null hypothesis is stated thus:

There is no significant correlation between attitude towards co-operative learning and social skills for first year and second year students and for both genders.

Table 15 (in section 5.3.6) shows the correlation and probability of attitude towards co-operative learning and social skills for first year students who used co-operative learning. In this regard the correlation is 0,10 and probability ( $p > 0,05$ ).

Table 16 shows the correlation and probability of attitude towards co-operative learning and social skills for second year students who used co-operative learning. In this regard the correlation is 0,13 and probability ( $p>0,05$ ) (see section 5.3.6).

Tables 15 and 16 show that there are very low positive correlations (which are not significant) between attitude towards co-operative learning and social skills for first and second year students who used co-operative learning. The non-significance of the finding may mean that further research is necessary. However, this result needs to be interpreted against the fact that the number of respondents is low.

Table 17 (in section 5.3.6) shows the correlation and probability of attitude towards co-operative learning and social skills for male students who used co-operative learning. In this regard the correlation is 0,14 and probability ( $p>0,05$ ).

Table 18 (in section 5.3.6) shows the correlation and probability of attitude towards co-operative learning and social skills for female students who used co-operative learning. In this regard the correlation is 0,19 and probability ( $p>0,05$ ).

Tables 17 and 18 show low, positive non-significant correlations between attitude towards co-operative learning and social skills for both genders who used co-operative learning. The non-significant finding may mean further research is necessary in this regard. However, this result need to be interpreted against the fact that the number of respondents are quite low.

(7) *Problem 7*

Is there a significant correlation between attitude towards co-operative learning and academic norms for first and second year students and for both genders? The null hypothesis ( $H_0$ ) is stated thus:

There is no significant correlation between attitude towards co-operative learning and academic norms for first year and second year students and for both genders.



Table 19 (in section 5.3.7) shows the correlation and probability of attitude towards co-operative learning and academic norms for male students who used co-operative learning. The correlation is 0,09 while the probability is  $p>0,05$ .

Table 20 (in section 5.3.7) shows the correlation and probability of attitude towards co-operative learning and academic norms for second year students who used co-operative learning. In this regard the correlation is 0,16 and probability ( $p>0,05$ ).

For both first and second year groups there are very low, positive and non-significant correlations between attitude towards co-operative learning and academic norms for first and second year students who used co-operative learning. The non-significance finding may mean that further research is necessary. However, this result needs to be interpreted against the fact that the number of subjects used in the experiment is quite low.

Table 21 (in section 5.3.7) shows the correlation and probability of attitude towards co-operative learning and academic norms for male students who used co-operative learning. The correlation is 0,09 while the probability is  $p>0,05$ .

Table 22 shows the correlation and probability of attitude towards co-operative learning and academic norms for female students who used co-operative learning. The correlation is 0,11 and probability ( $p>0,05$ ) (see section 5.3.7).

A similar trend to that of the year groups was observed for both genders – there are very low, positive but not significant correlations between attitude towards co-operative learning and academic norms for both genders who used co-operative learning. The non-significance of the finding may mean that further research is necessary in this regard. The number of respondents is also low.

(8) *Problem 8*

Is there a significant correlation between attitude towards co-operative learning and “psychological health” for first year and second year students and for both genders.

The null hypothesis ( $H_0$ ) is stated thus:

There is no significant correlation between attitude towards co-operative learning and "psychological health" for first year and second year students and for both genders.

Table 23 (in section 5.3.8) shows the correlation and probability of attitude towards co-operative learning and "psychological health" for first year students who used co-operative learning. The correlation is 0,49 and probability ( $p < 0,05$ ).

Table 24 shows the correlation and probability of attitude towards co-operative learning and "psychological health" for second year students who used co-operative learning. The correlation is 0,33 and probability ( $p > 0,05$ ) (see section 5.3.8).

According to Tables 23 and 24 the correlations between attitude towards co-operative learning and "psychological health" for first and second year students who used co-operative learning are positive and moderate. For the first year group, this correlation is significant on the 5% level of significance since  $p < 0,05$ . The researcher can thus state with 95% confidence that there is a significant correlation between the two variables. This means that the more positive the attitudes of the first year students towards co-operative learning, the more positive their "psychological health".

Table 25 shows the correlation and probability of attitude towards co-operative learning and "psychological health" for male students who used co-operative learning. The correlation is 0,49 and probability ( $p < 0,05$ ) (see section 4.3.8).

Table 26 (in section 4.3.8) shows the correlation and probability of attitude towards co-operative learning and "psychological health" for female students who used co-operative learning. The correlation is 0,31 and probability ( $p > 0,05$ ).

According to Tables 25 and 26, there are positive correlations between attitude towards co-operative learning and "psychological health" for both genders. In the case of the males, the correlation is moderate and significant on the 5% level. The researcher can thus state with 95% confidence that there is a significant correlation between the two

variables. This means that the more positive the attitudes of the male students towards co-operative learning, the greater their "psychological health".

(9) *Problem 9*

Is there a significant difference between the attitude of first year and second year students towards co-operative learning?

The null hypothesis ( $H_0$ ) is stated thus:

There is no significant difference between the attitude of first year and second year students towards co-operative learning.

Table 27 (in section 4.3.9) shows the t-value and probability of attitude towards co-operative learning of first and second year students towards co-operative learning. In this regard the t-value is 0,44 and probability ( $p > 0,05$ ). According to Table 27 the attitudes of the first year students who studied mapwork by means of co-operative learning do not differ significantly from those of the second year students. In this case the null hypothesis cannot be rejected. This means that the first and second year students have similar positive attitudes towards co-operative learning.

### 6.2.3 Final conclusions

When all the tables are studied, the following final conclusions can be made:

- There are significant correlations between attitude towards co-operative learning and:
  - intergroup relations for first year and male students;
  - social support for first and second year students and both genders; and
  - "psychological health" for first year and male students. (This is interpreted with caution since no standardised tests for "psychological health" were used.)

- Co-operative learning offered a rare opportunity for Geography students to communicate with each other on an intellectual level in a non-threatening setting. While performing mapwork tasks, Geography students were able to experience trust building as they established closer relationships with their peers.
- Co-operative learning in mapwork improves learning quality and increases educational standards. This is because low achievers in this study improved their scores significantly when compared to the students who were taught by means of the lecture method. The average quality of work produced by co-operative learning effort is usually higher than the average work of individuals.
- By sharing resources, co-operative learning groups, in mapwork, require fewer resources than the same number of students undertaking identical tasks individually. In this study, five team mates, for example used two topographical maps.
- Co-operative learning experiences in mapwork decrease the amount of material to be memorised but increase analysis, synthesis and understanding of content.
- Students in the experimental group (using co-operative learning) were able to achieve organisational, social and motivational stimulation.
- Reading and interpretation of topographical maps by co-operative teams were less stressful, allowing for clever thinking as students teach each other, challenge each other and question each other.
- Short learning periods (a period less than 60 minutes) are too short to be used for co-operative learning in the teaching of mapwork. For example, an average teaching period in schools is 35 minutes. If the instructor uses 15 minutes to introduce a lesson, students will be left with only 20 minutes to work together. Twenty minutes is too short to work through such map skills as drawing, calculations and interpretations.

## 6.3 RECOMMENDATIONS

### 6.3.1 Recommendations from conclusions

The following recommendations are based on the conclusions derived from this study:

- Co-operative learning is a well-researched classroom methodology that can be used to teach mapwork in Geographic education. If principles of co-operative learning are properly used, students should retain a better knowledge of mapwork in Geography.
- Well designed mapwork tasks with clearly defined group goals, based on co-operative learning principles, require more time on the part of the lecturer, than more traditional formats, but the pay-off in terms of increased satisfaction, and increased achievement is a powerful motivator. Therefore, mapwork material must be organised to meet clearly defined outcomes.
- When teaching large enrolment Geography mapwork classes, co-operative learning strategies can be employed without having to sacrifice content. It can be a significant tool for the instructor if used judiciously and thoughtfully.
- Since co-operative learning can serve as an instrument to achieve practical teaching in mapwork, student teachers should be engaged in co-operative learning during their training. This is not only an effective way of learning how to use co-operative learning in classrooms, but it is a necessity, because lecturers/teachers must model and practice what they preach. Geography students should be taught mapwork by the very method which they are expected to use in the classroom.
- With the current emphasis on educational reform in colleges of education, Geography lecturers have a responsibility to explore innovative teaching methods that involve student cooperation and collaboration. More class time should be devoted to having students work together as this is one of the characteristics of outcome-based education (OBE).

- When teaching mapwork by means of the co-operative learning method, sequence is important. Presentation of the subject matter should adhere to the appropriate sequence to aid student comprehension. For example, knowledge to manipulate map scales should be introduced and mastered before calculation of distances and areas in metres or kilometres.
- Incorporating some group activities with class discussion and lectures when teaching Geography mapwork allows students to have the structure and support necessary in large classes, while at the same time challenges and motivates them to really understand and enjoy mapwork.
- The use of the co-operative learning method in Geography mapwork can be recommended for secondary and tertiary education, because:
  - (1) learning is enhanced when students use effective interpersonal skills during teamwork. When social skills are taught, social interaction promotes learning.
  - (2) When students have a positive group experience, they are likely to learn more than if their group experience is negative.
  - (3) Students who work in co-operative groups take their individual involvement seriously and evaluate their personal participation. When individual accountability and group processing are built into group work, students recognise the importance of personal contributions to teamwork.
- When using co-operative activities in mapwork, students should assume specific roles in their groups, such as recorder, reporter, facilitator, encourager, timekeeper or quiet captain. Rotating roles for successive assignments ensures that all students participate and learn the different group skills associated with each role.

For effective group functioning in co-operative learning, regular group processing is recommended. Students should discuss how well they are working together as a team to accomplish their goals. Having members talk about behaviours or tasks the group does well and identify specific behaviours to improve upon in future

sessions helps to ensure that groups become more effective. Group processing should be done in the last few minutes of the activity.

- Teaching mapwork using small groups encourages both lecturers and students to take non-traditional roles in the learning process. It is recommended that lecturers become facilitators of learning rather than instructors, while students become active rather than passive participants, and more responsible for their own learning. Lecturers as facilitators should learn when to intervene when students are working together. This fact is important for outcome-based education (OBE) as it is understood.

The researcher fully supports the statement made by Hephzibah Roskelly in Warriner (1996:337-338) concerning group work. He puts it this way:

“As teachers, we have to take on the risky business of looking at the academic house we live in, and the ways we invite students into it. We have to be willing to look at how we ourselves entered, how much we brought with us, how much we were forced to leave at the door. We have to make ourselves brave enough to risk the dissent that inevitably comes when democracy is in action. Once teachers do that, we’ll see the work of the small groups in our classes become the real work in the class, with students negotiating their own ideas against and around the ideas they’re offered. When students find a real voice, their own and not some mimicked institutional voice, both students and teachers acknowledge the possibility of the real change that might ensue.”

Rouche and Rouche in McMillon (1994:77) also state “educators need to look more closely at what happens in the classroom and what variables appear to have the most impact on teaching and learning experiences. It is the knowledge of what works in the classroom and the ability to implement that knowledge, that makes for effective teaching and the kind of positive learning experiences that promote academic success.”

- When forming co-operative teams, the tutor should consider previous mathematical performance of learners. This is because certain aspects of mapwork need mathematical knowledge and calculation skills.

- A learning period of at least 60 minutes (or more than 60 minutes) is recommended when using the co-operative learning method in the teaching of mapwork. This time allows time for learners to work conveniently within their teams. Teachers of mapwork are therefore advised to use double periods or arrange ample time with other teachers.
- When assigning students to groups, as a rule, the membership of groups should be heterogenous across ability level, ethnicity, gender, and socio-economic level. According to Desmond (1996:109) "students should be assigned to groups by demonstrated performance".
- Co-operative learning can only occur when interaction takes place in a properly structured and organised environment which is an engaging environment.

### **6.3.2 Recommendations for future investigation**

The following are recommendations for future investigations:

- Tables 4, 6, 7, 8, 9, 15, 16, 17, 18, 19, 20, 21, 22, 24 and 26 indicate that there are very low, positive correlations between different variables. These correlations are not significant. However, it needs to be kept in mind that the number of students involved is low which means that significant correlations are not easily obtained. It is therefore recommended that further investigation in the future be made with larger numbers of respondents.
- The experimental research was conducted at a college of education which is situated in a rural area. It is recommended that further investigation be extended to include colleges of education in urban areas.
- The investigation took place among three black population groups of South Africa. These are the Venda, Shangaan and Northern Sotho. It is recommended that the investigation be conducted in a learning institution with a more heterogeneous population group.



- Why the benefits of co-operative learning are less for female than for male students should also be investigated.
- Measures to determine “psychological health” should be improved.
- The investigation took place for a period of six weeks. It is therefore recommended that further investigation be conducted over a longer period of time, for example, eight to twelve weeks.

#### **6.4 LIMITATIONS OF THIS STUDY**

The following limitations have been found in this study:

- The number of students involved in this study is low.
- The study was conducted in a college of education (Makhado College) situated in a rural area. Many students involved in the study come from disadvantaged rural villages (communities). This lessens the heterogeneity of the population.
- The study involves subjects from black population groups only, that is the Venda, Northern Sotho and Shangaan.
- To determine “psychological health” by means of a questionnaire as was used in this study is not easy. Thus these conclusions should be treated with caution.

#### **6.5 SUMMARY**

The general research problem in this study has been stated thus:

Does co-operative learning improve the performance, among other things, of first and second year Geography student learning mapwork?

The general stated aims were to:

- better train Geography teachers to teach mapwork;
- improve the learners' attitude towards mapwork, and
- make students aware of the usefulness of maps to real life situations.

After studying all the tables, the researcher can conclude that for this group of students:

- there are significant correlations between attitude towards co-operative learning and:
  - intergroup relations for first year and male students at first and second year;
  - social support for first and second year students and both genders; and
  - "psychological health" for first year and male students at first and second year.
- first and second year students achieve significantly better in mapwork if they study by means of co-operative learning than if they study by means of the lecture method;
- students who participate in co-operative learning, experience the benefits of social interaction for the development of cognition, learning, and knowledge as they explore mapwork concepts and solve problems together.

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- 300.

Team building

# My favourites!



Sport to play: .....	School subject: .....
Sport to watch: .....	Colour to wear: .....
Hobby: .....	Type of clothing: .....
Holiday: .....	Colour: .....
Place to be: .....	Person to visit: .....
Time of the day: .....	Dream car: .....
Season: .....	Dream career: .....
Flower: .....	Dream vacation: .....
Tree: .....	Dream future: .....
Song: .....	Food: .....
Group: .....	Drink: .....
Book: .....	Sweets: .....
Movie: .....	Author: .....
TV programme: .....	Animal: .....

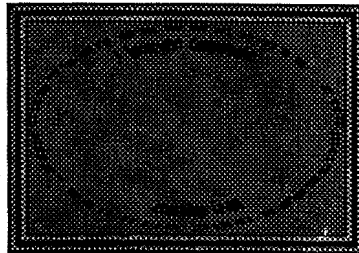
Source: Spencer Kagan (1992)

# *Congratulations to a SUPER TEAM:*

.....  
Team Member's Name

*In Recognition of a Successful Cooperative Effort  
In Geography Mapwork !*

Date: \_\_\_\_\_



SIGNED \_\_\_\_\_

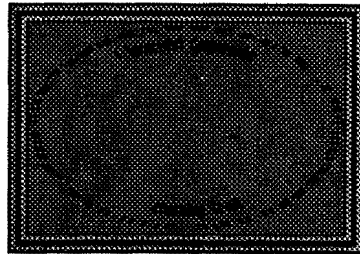
*AETshibato* [Instructor]

# *Congratulations to a GREAT TEAM:*

.....  
Team Member's Name

*In Recognition of a Successful Cooperative Effort  
In Geography Mapwork !*

Date: \_\_\_\_\_



SIGNED \_\_\_\_\_

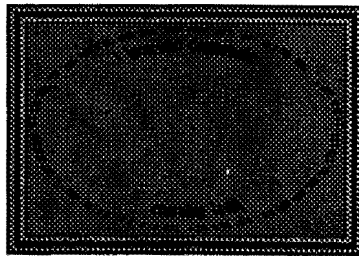
*AETshibata* [Instructor]

# *Congratulations to a GOOD TEAM:*

.....  
Team Member's Name

*In Recognition of a Successful Cooperative Effort  
In Geography Mapwork !*

Date: \_\_\_\_\_



SIGNED \_\_\_\_\_

*AETshibata* [Instructor]

## Questionnaire

*Hi, there! This is not a test but a questionnaire for which you have all the answers.*

- (a) Please do not write your name on this questionnaire. Write only on the response page provided.
- (b) Do not write above the red line - this is for office use only. Start below the red line next to number 1
- (c) For each item indicate your answer by means of a single stroke with an HB pencil on the appropriate number:  
e.g. [1]; [2]; or [3].
- (d) Please make sure that the number on the questionnaire is the same as the number on the answer sheet.
- (e) Sometimes only two alternatives are given from which to choose, sometimes more. Please ignore the ones you do not need.

- 1. Gender:        Male = [1]  
                      Female= [2]
- 2. Year group:  1st    = [1]  
                      2nd    = [2]  
                      3rd    = [3]

Directions for the rest of the questionnaire:

- (a) The rest of the questionnaire contains statements on how you feel about the cooperative learning method in Geography mapwork. There are no right or wrong answers. Only your opinion is important.
- (b) Think about how well each statement describes your feelings about cooperative learning in Geography mapwork. Indicate your answer by means of a dash (–) in the appropriate number in the square on the answer sheet provided.
- (c) The numbers have the following meanings:  
  - 3 = Agree
  - 2 = Undecided
  - 1 = Disagree
- (d) Provide your choice to each statement truthfully.
- (e) Do not write down your name on the answer sheet.
- (f) Thank you for your cooperation.



3 = Agree    2 = Undecided    1 = Disagree

3. Cooperative learning helped me improve relations with fellow students.
4. Cooperating with other students helped me derive conclusions about my self-worth.
5. Cooperative learning taught me I cannot rely on others for emotional, informational and appraisal support.
6. Cooperative learning made it difficult to identify emotions of members of my group.
7. My team mates wanted me to do the best within cooperative setting.
8. Cooperative learning did not help us build interdependent relationships with other students.
9. In the group of cooperative learners we had unequal status.
10. In cooperative learning, I realised that I am a valuable student.
11. Cooperative learning reassured me that I can confide in another person.
12. Cooperative learning taught me how to resolve conflicts constructively.
13. We had a strong desire to win our group mates' respect in cooperative learning.
14. Cooperative learners maintain interdependent relationships with their team mates.
15. I never felt lonely while working within the cooperative environment.
16. Students working within the cooperative structure tend to feel afraid.
17. Students are unhappy when they work together within the cooperative structure.
18. Cooperative learning made it difficult to make new friends.
19. I realised that I am accurately known within the cooperative learning environment.
20. I got the reassurance that I can get direct aid from my peers within cooperative efforts.
21. Cooperative efforts helped me to communicate accurately and unambiguously.
22. Students within my group (team mates) discouraged me to come to school everyday.

23. In the group of cooperative learners we appropriately modified interdependent relationships with other students.
24. Cooperative learning made me feel isolated.
25. Students working together in cooperative learning like themselves.
26. Cooperative learning helped me realise that I am rejected by other students.
27. Social support in cooperative learning prevented me from acquiring ways for solving problems.
28. Cooperative learning did not help me to know and trust other students.
29. Under cooperative conditions, we felt no pressure to work hard from our team mates.
30. Cooperative learning helped me to cope effectively with stressful situations.
31. I felt helpless while working with members of my group.
32. Cooperative efforts helped me to realise that I am liked by my peers.
33. The greater the social support I had in cooperative learning, the less the stress I experienced.
34. In the group of cooperative learners, we did not accept and support each other.
35. Working together in cooperative groups, helped me to feel resilient in the face of adversity.
36. Cooperative learning made students feel hopeless.
37. In cooperative learning I realised that I contribute nothing towards group success.
38. Cooperative efforts helped me to feel self-reliant.
39. Cooperative learning made it difficult to see how others perceive me.
40. I felt depressed while working with my team mates.
41. Cooperative learning frustrated me.
42. I enjoyed being involved in cooperative learning.
43. Cooperative learning was a waste of time.
44. I liked the opportunity to socialise in cooperative learning.
45. I would like to be involved in cooperative learning again.

46. Cooperative learning made it difficult to understand mapwork.
47. Cooperative learning environment is not effective in learning mapwork.
48. Cooperative learning is effective in learning mapwork
49. Cooperative learning environment is not enjoyable.
50. I liked the cooperative learning environment above anything else.
51. The lecturer-student relationship was the most important in cooperative learning.
52. Cooperative learning made it difficult to learn mapwork at a high level of mastery.
53. The learning experience within cooperative learning was satisfactory.
54. The learning experience within cooperative learning was less than satisfactory.
55. Cooperative learning enhanced learning in mapwork.
56. Cooperative learning prohibited learning on mapwork.
57. Cooperative learning facilitated student interaction.
58. Cooperative learning did not facilitate student interaction.
59. Cooperative learning fostered individual accountability in the learning of mapwork.
60. Students liked using cooperative learning method.
61. Students disliked using cooperative learning method.
62. I disliked to interact with other students in cooperative learning.
63. I didn't like the continual teacher absence during cooperative learning.
64. The use of group rewards during cooperative learning is unnecessary.
65. I liked the instructor intervention during cooperative learning.
66. I didn't like the instructor intervention during cooperative learning.
67. We didn't work well together in cooperative learning groups.
68. We needed some instructor help as part of the cooperative learning experience.
69. In cooperative learning, high, average and low achievers are not equally challenged to do their best.
70. Individual quizzes helped me to be responsible for knowing the mapwork material.

71. Individual quizzes are a waste of time in cooperative learning.
72. Teams' certificates motivate students to work hard in cooperative learning.
73. Cooperative learning helped me to share resources with other students.
74. Cooperative learning did not help me to share resources with other students.
75. Assigning specific complementary roles to each group member did not help us to be actively involved in learning.
76. Cooperative learning enhanced quality of learning in mapwork.
77. Cooperative learning resulted in the poor learning of mapwork.
78. Face-to-face interaction among group members made it difficult in getting to know each other on a personal basis.
79. Cooperative learning groups helped to make each member a stronger individual in his or her own right.
80. Cooperative learning did not help to make each member a stronger individual in his or her own right.
81. I disliked working in a small cooperative learning group.
82. Cooperative learning helped us accept and support each other.
83. Cooperative learning helped us resolve conflicts constructively.
84. Cooperative learning did not help us resolve conflicts constructively.
85. Team building activities in cooperative learning did not help students know each other better.
86. Team building activities in cooperative learning is a waste of time.
87. Team building activities before cooperative learning helped in building team identity.
88. Deciding on team name, banner or logo is an important team building exercise.
89. Group brainstorming exercise helped us reach interesting solutions.
90. Group brainstorming exercise was a waste of time in cooperative learning.
91. Cooperative learning helped me to disagree with my team mate without criticising.
92. Larger groups cause more problems in cooperative learning.

93. During cooperative learning the lecturer could not assist students in expressing and clarifying ideas.
94. Formative evaluation made it difficult for students to discover their strength and weaknesses during cooperative learning.
95. Cooperative learning helped students to avoid non-functional roles such as aggression and competition.
96. Cooperative learning did not help students in initiating new ideas and making comments.
97. Cooperative learning did not relieve group tension.
98. Cooperative learning did not give me the opportunity to learn through the expression and exploration of diverse ideas and experiences.
99. Cooperative learning increased my academic achievement scores.
100. Cooperative learning decreased my academic achievement scores.
101. Cooperative learners are better able to control the pace of learning.
102. Students who assume roles of non-participants and underparticipants hindered progress in cooperative learning.
103. Commuter students had difficulty in finding mutually acceptable times for group meetings.
104. Cooperative learning is seen as a threat to individual identity since it requires learners to do everything collectively.
105. Reaching decisions in cooperative groups could be slow.

*Summary of the questionnaire indicating each variable*

<i>Item number</i>	<i>Variable</i>	<i>Scoring direction</i>
3	Intergroup relations	+VE
9, 18	Intergroup relations	-VE
4, 10, 19, 32	Self-esteem	+VE
26, 37,39	Self-esteem	-VE
11, 20, 33	Social support	+VE
5, 27	Social support	-VE
12, 21	Social skills	+VE
6, 28, 34	Social skills	-VE
7, 13	Proacademic norms	+VE
22, 29	Proacademic norms	-VE
	Psychological health	
14, 15, 23, 25, 30, 35, 38		+VE
8, 16, 17, 24, 31,365, 40, 41		-VE
	ATTITUDE	
42, 44, 45, 48, 50, 51, 53, 55, 57, 59		
60, 63, 65, 68, 70, 72, 73, 76, 79, 82		
83, 87, 88, 89, 91, 92, 95, 99,101, 102, 103, 105		+VE
43, 46, 47, 49, 52, 54, 56, 58, 61, 62, 64		
66, 67, 69, 71, 74, 75, 77, 78, 80, 81, 84		
85, 86, 90, 93, 94, 96, 97, 98, 100, 104		-VE

<i>Item number</i>	<i>Variable</i>	<i>Negative</i>
Intergroup relation	1	2
Self-esteem	4	3
Social support	3	2
Social skills	2	3
Proacademic norms	2	2
Psychological health	7	8
Attitude	32	32
	TOTAL = 51	TOTAL = 52

POSITIVE STATEMENTS = 51

NEGATIVE STATEMENTS = 52