

Chapter 2

LITERATURE SURVEY

There is no subject so old that something new cannot be said about it.

Dostoevsky, *“Diary of a Writer”* [1876]

Introduction

In the previous chapter the specific problem of a linguistically and culturally diverse student population was touched upon. Several related problems were highlighted, such as the problem of the underprepared student; the learning methods - verbatim studying; inability to use the language of the subject; and the dated lecturing method. In this chapter the literature that deals with these problems will be discussed.

Learning, more specifically learning in groups, cooperative learning, lifelong learning and experiential learning, is a topic that has interested many researchers. The literature on cooperative learning and team constitution will be explored in more depth and the literature on related topics such as methods of assessment, learning styles and methods of knowledge representation will also be discussed.

Cooperative learning

Hilke defines cooperative learning as an organisational structure where students can pursue academic goals through collaborative efforts creating opportunities to develop communication skills and higher-level thinking abilities [Hilke, 1990].

Some researchers differentiate between the terms “collaboration” and “cooperation” whilst others use them interchangeably. Argyle [1991] is one of the researchers who use the concepts interchangeably. In the Oxford dictionary “cooperation” is described as “*work or act together; help, assist*” whereas “collaborate” is defined as “*work jointly, especially in a literary or artistic production*”.

The differences that some of the researchers draw between the concepts of collaboration and cooperation are as follows:

- Hoyt [1978] sees collaboration as a term that implies sharing of responsibility whereas cooperation is the working together of separate autonomous parties to make their separate programmes more successful;
- Hold [1986] is of the opinion that the concepts differ in terms of time (more time is needed to collaborate than to cooperate);
- Freer and Enoch [1994] find the difference in the interplay between instructor and learners. According to them the teacher in the cooperative learning environment assumes the traditional role of the transmitter of knowledge, whereas the teacher is a facilitator and co-learner in a collaborative learning environment.

In this study the term cooperative learning is used but collaborative learning could just as well have been used. Furthermore the lecturer in the cooperative environment will be seen as a facilitator and co-learner. Why co-learner?

As the editor of the *British Medical Journal*, Richard Smith, says in the editor's comment of the August 1999 edition:

In the Old World you were expected to know what you should know, learning was complete at the end of training, and uncertainty was discouraged and ignorance avoided. In the New World the most important thing to know is what you don't know. And you should feel good about not knowing.

And this holds true even for the lecturer.

Researchers who have written several books on cooperative learning are David and Roger Johnson. In their books they advocate that the use of cooperative learning will accomplish several goals: raise the achievement of all the group's participants; create a learning community in which diversity is valued; and allow students to develop socially, psychologically and cognitively [Johnson, Johnson & Holubec, 1994]. For the successful implementation of cooperative learning they suggest the implementation of the following five elements:

1. **Positive interdependence** – if positive interdependence is lacking no cooperation can take place;
2. **Individual and group accountability** – the group must be accountable for achieving its goals;
3. **Promotive face-to-face interaction** – to promote each other's learning face-to-face;
4. **Interpersonal and small group skills** – students must know how to provide effective leadership, decision-making and trust-building, and how to communicate and manage conflict;
5. **Group processing** – groups need to be able to describe which actions are helpful and which are unhelpful.

They furthermore suggest that groups should extend cooperation to include other groups too. According to their model, base groups are groups that last from one to several years, formal groups can be maintained for any length of time that suits the lecturer, and informal groups last for only a few minutes or at most one class period.

Johnson *et al.* suggest that the lecturer should monitor group work closely and intervene if necessary. They suggest that there are certain aspects of intervention that must be heeded:

- intervene only when absolutely necessary (don't jump in frequently to solve problems);
- intervene at eye level (don't look down onto group);
- label actions, not students (don't embarrass or insult a student by labelling the student);
- have whole group focus on you, the lecturer (don't have a *tête-à-tête* with one student);
- allow students to solve the problem, etc.

If groups experience problems Johnson *et al.* suggest that they should **not** be changed. That is, members of a problem group should not be transferred to another group, as this – according to Johnson *et al.* - would be counterproductive. Johnson *et al.* are of the opinion that students need to acquire the skills to resolve problems in collaboration with each other.

Discussion groups allow students to explore their understanding of the work and can bridge the gap in language proficiency as Lotan and Benton experienced with Spanish-speaking Americans [Lotan & Benton, 1990].

Jaques [1991] notes:

Many of the issues (concerning learning in groups) may seem far-fetched to academic tutors, especially those in the physical sciences and engineering whose central concern is not with personal feelings ... but with imparting a body of knowledge.

Contemporary life, in particular in the industrial section, demands of people to get on with each other and to be able to handle interpersonal problems. Small group work creates the opportunities to practise these qualities [Jaques, 1991].

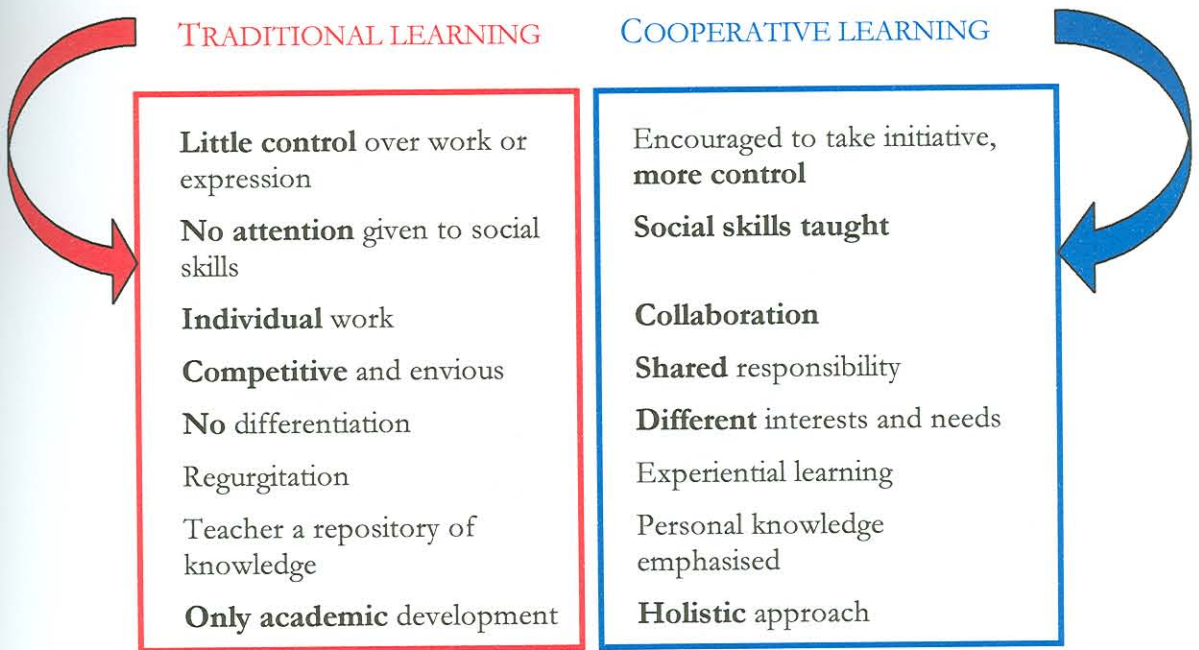


FIGURE 4: Comparison between traditional and cooperative learning [Source: De Villiers, 1996b: 4]

Cooperation is the key to learning in groups, according to him. Competition within a group may be an inspiration for some to work harder and reason with more persuasion, but for others it may only result in the dulling of their appetite for discussion. Cooperation does not happen by itself – it is only learnt through experience. It is therefore necessary to have

a clear strategy for learning about working together and to improve skills in cooperation. For cooperation to be successful each member of the group must participate and share the responsibility for the group's success or failure. Cooperative learning is more than just learning IN groups - it is also learning ABOUT groups.

For effective group interaction Jaques suggests the theme-centred interaction (TCI) method. TCI has three constituent factors (each of equal importance), namely, the "I", the "we" and the "it" as seen in *Figure 5*.

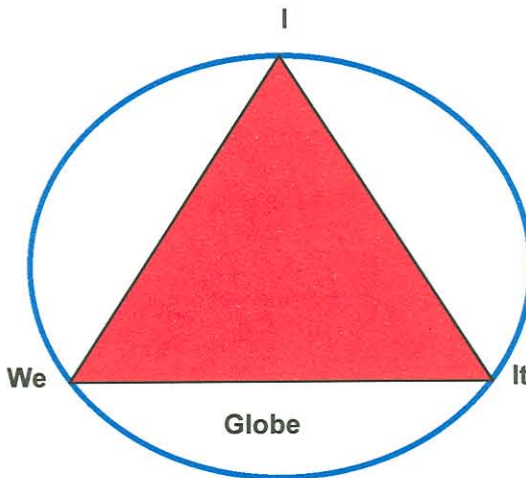


FIGURE 5: The theme-centred interaction triangle and globe
[Source: Jaques, 1991: 26]

The "globe" that contains the three elements comprises the physical, social and temporal setting of the group. It includes the shape of the room, arrangement of furniture and the emotional milieu of the group.

Two of the principles that guide TCI are:

- thought and feeling should not be separated; and
- that each person speaks for himself or herself.

The latter means that no one can speak for the group without first checking with the rest of the group. And it encourages group members to speak in the first person rather than generalising by using “you”. A further principle of TCI is the fundamental rule that if a group member is unable to focus on the group task because of some reason, they should say so. The emotional background is thus revealed. According to Jaques, TCI is strongly influenced by both existentialism and psychoanalysis:

... it provides a framework for each individual to internalise and understand his or her own place and function in a group.

According to Kolb [1984], learning is a continuous process grounded in experience. Knowledge gained through personal experience has more significance when it was gained through own insight or discovery and when participation with others is valued. Thus –

...the sense of belonging which a student can gain from a well-run group (team) should not be underestimated [Jaques, 1995: 10].

Cohen suggests that the effectiveness of teamwork and cooperative learning can be measured using the following criteria: academic achievement, conceptual learning and higher-order thinking, equity or equal status interaction within the group, positive intergroup relations and desirable prosocial behaviours [Cohen, 1994].

According to Craig, dialogue and discussion among peers seem to be neglected in the case of unprepared students [Craig, 1989]. Cooperative learning, where students are expected to converse with peers, is thus

probably a more desirable teaching method for our students, who typically come from varied academic and socioeconomic backgrounds.

Yael and Shlomo Sharan have written extensively on the topic of cooperative learning. They are of the opinion that group investigation, where each group member carries out his or her part of a cooperative investigation, harnesses each student's individual interest and thus gives them more control over their learning [Sharan & Sharan, 1990].

According to Ivancevich and Matteson [1996] groups learn just as individuals do and the performance therefore of the group depends as much on individual learning as on how well the members learn to work with one another.

A model of group development suggests that groups develop in five stages [Tuckman & Jensen, 1977]:

1. In the **forming** stage, groups are uncertain about the group's purpose, structure and leadership. According to Tuckman and Jensen this stage is more pronounced in multicultural groups. At the end of this stage group members feel part of the group.
2. The **storming** stage is when group development hits a rough patch and conflict and confrontation is experienced. While some members may accept the group, they may still resist the control the group imposes on them. During storming the group's tasks and goals can be redefined and the individual group members are likely to decide their commitment to the group. Storming needs to be managed rather than suppressed as suppression creates negative effects that can seriously hinder group functioning at a later stage.
3. During the **norming** stage group cohesion develops and this stage is characterised by cooperation and collaboration. Members accept

differences of opinion and actively try to achieve their mutually agreed-upon objectives.

4. **Performing** is the functional stage of the group. The group structure has been determined and each member's role is understood and acknowledged. The accomplishment of the set task is now the focus of the group. This process of learning and development within the group will be ongoing if the group accomplishes their task well or can become stagnant if the group does not perform. The way the group will go depends on the earlier stages of group development.
5. The **adjourning** stage involves the termination of group activities. This stage can be a positive experience for all the group members, especially if the task the group set out to complete was accomplished successfully. However, there may also be a feeling of loss and disappointment when the group's task has been completed and the group disbands.

In his discussion on the new interpretation of higher education, Denning mentions the necessity to learn how to work in teams. He is of the opinion that the lifelong skills that employers, parents, and business executives are now looking for in our graduates are:

- Being a power user of computing systems and a competent builder of applications
- Balance between practical and theoretical knowledge
- Awareness of need to function in an international, networked world
- Ability to work with clients and produce satisfaction
- Skills in communication written and oral
- Ability to communicate a vision and a mission
- Ability to work productively in teams

- Ability to understand and follow instructions
- Eagerness to learn (continuing education)
- Ability to bounce back from adversity
- Flexibility and adaptability in job and career

We cannot create an environment in which students learn these skills by the tradition of presentation-oriented lectures [Denning 1993: 102].

Although all these skills (that a student needs to “*be competent at living and working in the world as it is now and will be in the years ahead*”) are equally important, I would like to focus on the necessity to learn how to work in teams, and more particularly the effect that the team can have on an individual’s learning experience.

It would seem as if the construction of the team could have an impact on the effectiveness of the group or team. It is thus necessary to investigate what the literature says about the mechanics of group/team construction.

Team construction

Different cooperative learning models such as Jigsaw, Jigsaw II, Teams-Games-Tournament, Student-Teams-Achievement Division, etc. have been thoroughly researched and documented [De Villiers, 1996b]. A short description of each of the above learning models will highlight their application, similarities and differences:

Jigsaw. Each member of a team is instructed on a topic together with counterparts from other teams. They discuss their understanding of the topic with these students before returning to their own teams. On their return to their own group they teach their team members what they have learnt.

Jigsaw II. An adaption of Jigsaw where teams compete for group rewards, and each student's achievement contributes towards the group's points.

Teams-Games-Tournament. Teams compete face-to-face in tournaments. Tests and quizzes determine students' individual scores.

Students-Teams-Achievement Division. Learners tutor each other in preparation for a competition. Teams are constituted to have similar abilities. Learners can earn points for their team by improving their individual performance. The team's achievement is acknowledged publicly on bulletin boards or in newsletters.

In most of these above-mentioned models, teams range from three to seven members and are heterogeneous with regard to ability level, race, sex and personality factors.

As far as group constitution is concerned Johnson *et al.* [1994] feel that there is no ideal group membership. They are of the opinion that a group's productivity "*is not who its members are, but rather members' teamwork skills*". And these skills can be acquired through training. They do, however, give consideration to the group's diversity and feel that there are advantages to heterogeneous groups as well as homogeneous groups depending on what needs to be achieved. It has been found that when students group themselves, they usually form homogeneous groups – whereas if the lecturer forms the groups, it may be either.

Jaques highlights the influence that the size of the group has on the group function. He is of the opinion that as the size of a group increases, its characteristics change. He summarises this as depicted in *Table 1*.

M o r e C o h e s i o n ↑	NUMBER OF MEMBERS	CHANGING CHARACTERISTICS	M o r e T e n s i o n ↓
	2-6	Little structure or organization required. Leadership fluid.	
	7-12	Structure and differentiation of roles begin. Face-to-face interaction less frequent.	
	12-25	Structure and role differentiation vital. Subgroups emerge. Face-to-face interaction difficult.	
	25- ?	Positive leadership vital to success. Subgroups form; greater anonymity. Stereotyping, projections and flight/fight occur.	

TABLE 1: Changing characteristics of groups with increase in membership [Jaques, 1991]

In his observations of groups and their group function Belbin also indicates that the size of the team does have an influence on its function. Belbin observed that the difference between a six-member and a four-member team revolved around the chairmanship. Four-member teams often became leaderless while five-member teams seemed to be well regulated. In a five-member team –

...the group is large enough to benefit from an organization, while the (chairman's) casting vote becomes decisive should uncertainty or disagreement threaten [Belbin, 1981].

Our preference for the Belbin approach stems from the fact that team roles are assumed according to the team members' **intrinsic personality traits** rather than being allocated to the member. Although each member could be allocated any of the tasks, some tasks are simply done with less effort by a person who is inclined to assume that role naturally.

Belbin's validated and standardised questionnaires (a self-assessment as well as the minimum of four observers' assessment questionnaires) and the software Interplace IV were used in this study to determine each student's psychometric profile. These profiles (without any reference to either gender or cultural background) were then used to constitute academically diverse but "balanced" teams. Belbin, who developed the team-role concept, identified nine team roles, each with its associated strengths and weaknesses [Belbin, 1993].

The nine team roles are:

Plant	Teamworker
Resource Investigator	Implementer
Coordinator	Completer Finisher
Shaper	Specialist
Monitor Evaluator	

Belbin defines a team role as –

...a pattern of behaviour characteristic of the way in which one team member interacts with another where his performance serves to facilitate the progress of the team as a whole.

He maintains that each team role has a distinctive contribution to make to successful team functioning. Each team role has a set of “allowable” weaknesses associated with it, and Belbin describes these allowable weaknesses as the *cost* of the positive contribution of the team role to the team.

Stoltz [Blignaut *et al.*, 1998] said (in the presentation “*Chalk-and-talk*” versus *Cooperative Learning: A Comparative Study*, presented at the IFIP’98 Conference) that Belbin’s team roles can be grouped, amongst others, into four categories:

Ideas Roles

The Plant and Resource Investigator bring ideas to the team. The Plant tends to contribute self-generated ideas, while the Resource Investigator is a good scout and collects ideas externally to the team, thus avoiding an internal focus. The associated allowable weakness of the Plant is forgetfulness and that of the Resource Investigator is a tendency to be easily bored and somewhat erratic.

Leadership Roles

The Shaper, who can be aggressive, creates a sense of urgency in the team and focuses the team’s activities on stated goals. The Coordinator is like the conductor of an orchestra and coordinates the activities of the team inconspicuously to achieve mutually formulated goals. The Coordinator can be manipulative and can be viewed as lazy.

Control Roles

The Monitor Evaluator is a very analytical individual and can evaluate alternative possible solutions without becoming emotionally involved. However, the cost of having this individual in the team could be a tendency to be overcritical. The Completer Finisher is conscious of detail but can get bogged down in unnecessary detail and become anxious, while the Implementer is a well-organised individual, able to prioritise tasks. The Implementer can become rigid.

Support Roles

The Teamworker is the individual who offers emotional support and alleviates conflict in the team, but can be indecisive, and the Specialist is the team member who provides “technical support” IF the team’s area of concern is within his/her area of personal interest. The Specialist can be territorial.

Another grouping of roles mentioned by Belbin are:

Social Roles

The Resource Investigator is the person who is outgoing, enthusiastic and, most importantly, develops contacts. The Teamworker is the perceptive and diplomatic team member who averts friction and calms the waters. The Coordinator delegates well, is confident and a good chairperson.

Thinking Roles

The Plant is the creative and unorthodox thinker. The Monitor Evaluator sees all the options and judges accurately, and the Specialist provides knowledge in rare supply.

Acting Roles

The Implementer is disciplined and turns ideas into practical actions. The Completer Finisher searches out omissions and, most importantly, delivers on time. Finally, the Shaper is dynamic, thrives on pressure and has the drive and courage to overcome obstacles.

To constitute an effective team, Belbin argues that team members should *collectively* display the personality traits associated with all the team roles. Each person's profile will be a combination of these roles; therefore a team need not consist of nine members to be balanced [Venter & Stoltz, 1995].

Barbara Senior [1997] found, in a study done on 11 management teams of between four and nine members, that there was a link between team performance and team-role balance.

Mind maps

The concept of cooperative learning within a team, combined with the concept of "mind mapping" [Buzan, 1995], was introduced to help students to get the "overall picture" and not to get bogged down by the technical detail of their study material. (A mind map is a clear and concise graphical representation of relevant, associated, categorized and hierarchically ordered information.)

Prof Roger Sperry of California found in the late 1960s that the two hemispheres of the cerebral cortex divided the major intellectual functions between them. Thus the two hemispheres of the brain use two different modes of knowing about the world, namely apprehension and comprehension. To come to this conclusion, Sperry and his colleagues studied the behaviour of split-brain patients, patients who had undergone an operation to surgically divide the *corpus callosum* (neural fibres that

connect the left and right neurocortex) to relieve the severity and frequency of epileptic seizures [Kolb, 1984: 46].

Left Hemisphere

- Analytical
- Logical
- Detail
- Structure
- Verbal
- Concrete
- Linear
- Based on facts
- Organised
- Planned

Right Hemisphere

- Intuitive
- Music
- Spatial
- Holistic
- Nonverbal
- Emotional
- Nonlinear
- Art

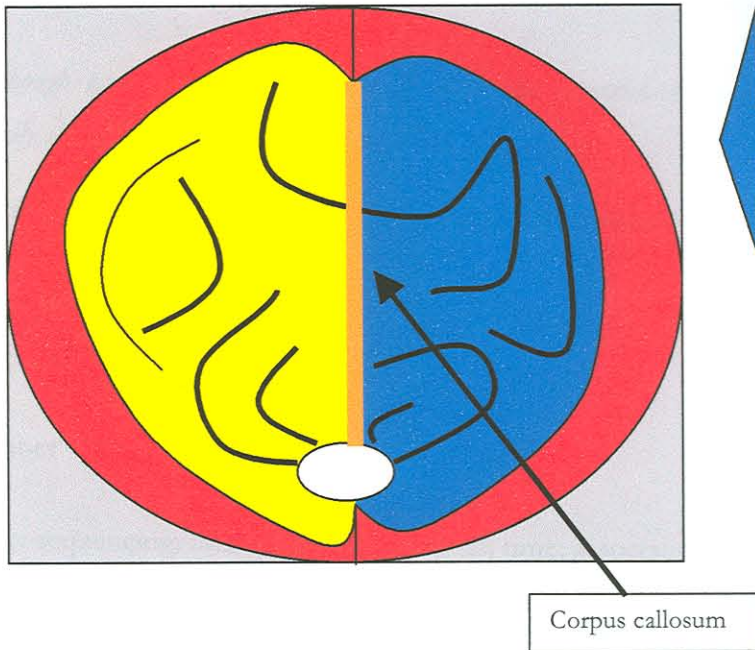


FIGURE 6: A schematic representation of the two hemispheres of the brain [Sketch adapted from Pretorius, 1994: 162]

According to Sperry's research, the left brain is responsible for the comprehension process whereas the right brain deals with the apprehension process. (The comprehension process is abstract, symbolic, analytical and verbal, whilst the apprehension process is concrete, holistic and spatial.)

To use music as an example: the left hemisphere governs the ability to read music as it is specialised for understanding language communication, but the right hemisphere controls the ability to recognise, appreciate and remember melodies. The right hemisphere is more specialised in nonverbal understanding such as emotion, pattern recognition, etc. [Kolb, 1984].

Buzan emphasizes in his book that:

...although each hemisphere is dominant in certain activities, they are both basically skilled in all areas ... [Buzan, 1995: 33].

He lists the skills available to all people (which was previously attributed to either the left or right hemisphere) as:

- Language: words; symbols
- Number
- Logic: sequencing; listing; linearity; analysis; time; association
- Rhythm
- Colour
- Imagery: daydreaming; visualisation
- Spatial awareness: dimension; Gestalt (whole picture)

He says the theory of the way that the human brain remembers gave shape to his development of “mind mapping”.

The human brain remembers:

- items from the beginning and the end of a learning period;
- items associated with patterns already stored;
- any outstanding items;
- items which appeal to any of the five senses; and
- items of particular interest.

De Bono [1992] coined the phrase “lateral thinking” which emphasizes the searching for different approaches and different ways of looking at things. According to him the brain forms patterns of thinking. The natural inclination is to follow these patterns of thinking to solve problems. Lateral thinking is moving “sideways” across these fixed perceptions to try to explore different concepts. Various methods can be used to get us out of the usual line of thought. Mind mapping is such a method.

Release from fears and inhibitions is an important part of creativity [De Bono, 1992].

Mind mapping is able to do just this – release the designers of the mind map from their fears and inhibitions and thus create the opportunity for creativity. And it is this *creativity* that allows the designers of a mind map to move away from the traditional linear method of organising facts.

Mind mapping (in this study) gave learners an effective method of coming to grips with a large body of information. Students were expected to brainstorm a section of the work and to produce a mind map. It was felt

that this process of ordering facts non-linearly but hierarchically should help to bridge the gap between thinking and writing. All participating team members were allowed to make use of a (two A4-sized or one A3-sized) mind map (covering all the work they had done) during written examinations.

Learning styles

It may be said that mind mapping is suitable only for students with a particular learning style. Kolb [1984: 70] used the Learning Style Inventory (LSI) to investigate individual orientations to learning. The LSI measures a person's emphasis on the four learning **modes**, namely:

- An orientation to **concrete experience**.

In this mode feeling is more important than thinking: emphasizing the uniqueness and complexity of present reality rather than theories and generalisations, it favours an artistic approach above a systematic, scientific approach to problems.

- An orientation to **reflective observation**.

Impartial observation is the strength of this mode of learning – it emphasizes *how* things happen rather than *what will work*.

- An orientation to **abstract conceptualisation**.

This mode of learning favours thinking above feeling and focuses on using logic, ideas and concepts. It favours a scientific approach to problems rather than an artistic one.

- An orientation to **active experimentation**.

This mode is pragmatic about what works. It is unconcerned about understanding. Thus the emphasis is on doing rather than observing.

LSI also measures the extent to which a person emphasizes abstractness over concreteness and the extent to which the person emphasizes action over reflection.

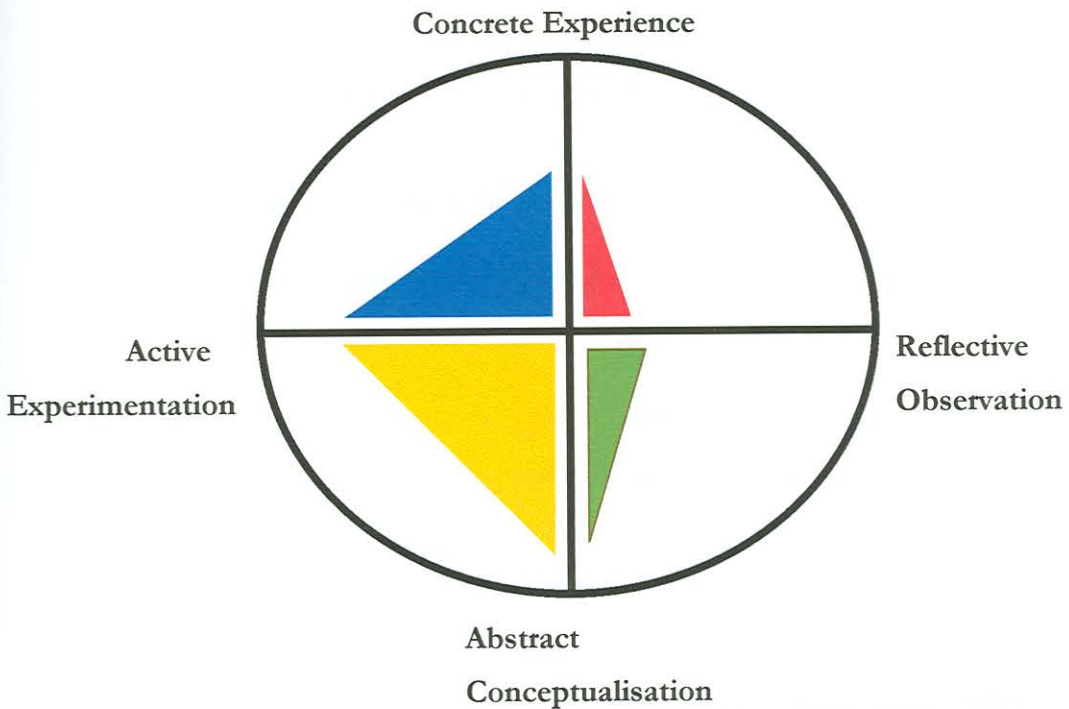


FIGURE 7: Example of a learning-style profile

Kolb's conclusions about learning styles fit in well with Jung's typology [Jung, 1977] of psychological types, namely:

1. mode of relation to the world via introversion or extroversion;
2. mode of decision-making via perception or judgement;
3. preferred way of perceiving via sensing or intuition; and
4. preferred way of judging via thinking or feeling [Kolb, 1984: 67-85].

Kolb states that –

...a major function of education is to shape students' attitudes and orientations toward learning - to instill positive attitudes towards learning and a thirst for knowledge, and to develop effective learning skills.

He is of the opinion that learning is best conceived as a process, not in terms of outcomes.

It is the notion of constant, fixed elements of thought that has had such a profound effect on prevailing approaches to learning and education, resulting in a tendency to define learning in terms of its outcomes, whether these be knowledge in an accumulated storehouse of facts or habits representing behavioural responses to specific stimulus conditions.

How do we then reconcile **Outcomes-Based Education** (OBE) with Kolb's opinion of "outcomes" as explained above? In the new South African Curriculum 2005: Lifelong learning for the 21st century, outcomes-based education is a term that is often used. According to Prof Sibusiso Bengu, the aim of the new curriculum is to shift from a curriculum that was content-based to one which is based on outcomes [Curriculum 2005, 1997]. It is perhaps best to consider the definition of "outcomes" as proposed by

the South African Qualifications Authority (SAQA) before simply discarding the thought of outcomes.

Eight learning areas have been defined for the new curriculum, namely:

1. Communication, Literacy and Language Learning
2. Numeracy and Mathematics
3. Human and Social Sciences
4. Natural Sciences
5. Arts and Culture
6. Economic and Management Sciences
7. Life Orientation
8. Technology

For these eight learning areas eight critical outcomes are proposed by SAQA. Thus learners in all the learning areas should be able successfully to demonstrate the following abilities:

- To communicate effectively using visual, mathematical and/or language skills in the modes of oral and/or written presentation;
- To identify and solve problems by using creative and critical thinking;
- To organise and manage themselves and their activities responsibly and effectively;
- To work effectively with others in a team, group, organisation and community;

- To collect, analyse, organise and critically evaluate information;
- To use science and technology effectively and critically, showing responsibility towards the environment and the health of others;
- To understand that the world is a set of related systems - this means that problem-solving contexts do not exist in isolation; and finally
- To show awareness of the importance of effective learning strategies, responsible citizenship, cultural sensitivity, education and career opportunities and entrepreneurial abilities.

These “outcomes”, I believe, are not the same as those that Kolb referred to.

In his research Kolb found that the learning styles of people sharing a common occupation were not necessarily the same but that their learning styles were more strongly associated with their undergraduate educational experience. He finally concludes that –

...one's undergraduate education is a major factor in the development of his or her learning style [Kolb, 1984: 88].

This is good news as it means that at undergraduate level the student's learning style is not yet a *fait accompli* and a new method such as the designing of mind maps can still be introduced very fruitfully.

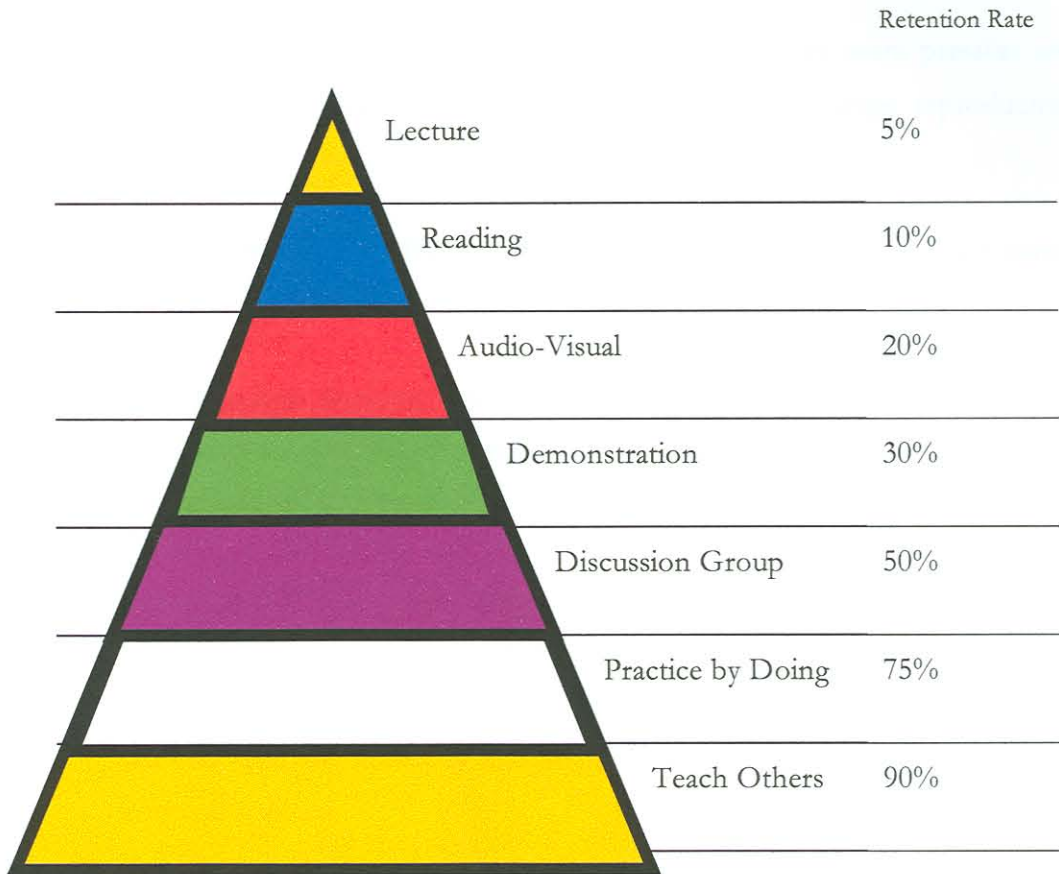


FIGURE 8: Learning pyramid developed by the National Training Laboratories in Bethel, Maine [<http://cac.psu.edu/ets/presentations/CatalystTexts/pyramid.html>]

Mix of formal (lectures) and informal sessions

The “Learning Pyramid”, depicted in *Figure 8*, indicates that the average retention rate of students who attend a lecture (5%) is by far inferior to the retention rate of cooperative learning (90%) where students make use of their learning by sharing it with their team mates.

When considering the mixture of formal lectures, small group work and individual study Jaques [1991: 49] mentions the following working hypotheses:

- Courses with high student-contact hours and heavy exam pressure are likely to **inhibit** deep, holistic thinking and encourage reproductive learning.
- Students who prefer holistic and deep relativistic thinking are more likely to prefer small discussion groups.

And as holistic thinking is what we would like to cultivate in our students, we would seriously have to consider the mixture of formal and informal sessions.

The mix of formal and informal sessions would probably also reflect the role of the lecturer in the learning situation [Jaques, 1991: 24]. The more authoritative lecturer will probably be inclined to opt for more formal sessions and the more facilitative lecturer will probably opt for more informal sessions.

In formal sessions (and the authoritative mode) the lecturer can be:

- **DIRECTING**

The lecturer takes charge of the discussion by re-routing it when he/she thinks that is necessary. The lecturer will also decide what further work needs to be done on the topic.

- **INFORMING**

Here the lecturer will summarise the work and highlight how the work relates to work previously done.

- CONFRONTING

By directing questions to specific students the lecturer will be challenging, and will agree or disagree with the answer given. Furthermore the lecturer will provide the students with direct feedback.

In the informal sessions and in the facilitative mode the lecturer could be:

- RELEASING TENSION

By allowing a lighthearted approach to the subject matter, arousing laughter and dispelling any fears the students may have.

- ELICITING

By drawing out student opinions, allowing independent problem-solving and promoting self-discovery and personal insight, if necessary, facilitating student interaction.

- SUPPORTING

Affirming the value of the student's contribution by not being critical and by approving or agreeing with what the student says.

In this study it has been found that students enjoy the more informal format of lectures, in spite of their initial reluctance to accept a change [Venter & Blignaut, 1997].

Assessment

Assessment can be twofold:

- the assessment of the group (group function) and
- the assessment of the individual learning that has taken place.

When considering group function it is often the lecturer who feels responsible if group function is not what it is expected to be. However, the

success of group function does not depend only on the skills of the lecturer. As Jaques notes –

...evaluation works best if it is seen as a continuous process engaged in by all those who contribute to the setting up and participating in the group [Jaques, 1991].

When it comes to the individual assessment, what instruments can be used to measure the dimensions of learning we wish to measure? If we acknowledge that there ARE several types of learning which we deem important, then written examinations cannot be the only method of assessment.

The objectives of present-day instruction are more than the mere memorisation of information; they include the acquisition of lifelong skills. These lifelong skills [Denning, 1993] include an awareness of the need to function in an internationally networked world, skills in communication both oral and written, ability to work productively in teams, and flexibility and adaptability in the job market. New types of instruments are required to allow the assessment of these qualities.

According to Dochy and Moerkerke the balance of power between teacher and student is changing. Thus assessment in the near future will probably be important throughout the learning process, focus on mastery of skills, appear in many different forms, use forms of communication technology and multimedia, and be administered by students, teachers, peers and external bodies [Dochy & Moerkerke, 1997].

Conclusion

The South African Department of Education embarked on a curriculum review in 1995 that culminated in the publishing of Curriculum 2005 in 1997. This new curriculum has brought concepts such as teamwork, group

work, lifelong learning and critical thinking to the fore. Furthermore, the transformation that is currently taking place in postapartheid South Africa has changed most universities' student population profiles from linguistically and culturally **homogeneous** student bodies to student bodies that are linguistically, culturally and even academically **diverse**. These changes, apart from providing a challenging education environment, has made the experience of the Historically Black Universities (HBUs) more relevant to tertiary education in general. This thesis with its emphasis on cooperative learning and teamwork in a multicultural environment where the students are from diverse backgrounds therefore could contribute to the discourse on the new approach to teaching in a transforming South Africa.

In the literature much has been said about cooperative learning [De Villiers, 1996a, 1996b], learning in small groups [Brodie, 1995], the effect of cooperative learning on intergroup relations in a multicultural setting in secondary schools [Malory John Du Plooy, 1993], and the teaching of Computer Science [Terry, 1995]. However, none, as far as I know, pulls together cooperative learning, group constitution and the teaching of Computer Science in a multicultural setting, as is done in this study.

In this chapter the literature on the different aspects of cooperative learning, team constitution, team function, as well as the literature on related topics such as methods of assessment, learning styles and methods of knowledge representation were discussed. In the next chapter various research methodologies will be discussed. It was felt that the problem should be viewed from several perspectives and therefore more than one methodology was used in the research effort. To manage these different methodologies, Soft Systems Methodology (SSM) was used.