Chapter 4

Interpretation of the classroom events

4.1 Introduction

This dissertation reports on a defined group of learners' reactions to a change from a less learner-centred learning environment to a more learner-centred learning environment. The researcher's intention in doing this was to identify and describe those factors that should be considered when learners make such changes. Throughout the year, the researcher observed learners' reactions to events in the classroom and assessed their final projects.

In order to understand the events of the year as they unfolded, the researcher will in this chapter (1) systematically report on how learners reacted to changes in their learning environment, and (2) describe the results of her assessments of the various projects that they were required to do. Examining assessments is one way of understanding the measure to which the learners did (or did not) fulfil the requirements of the projects. The results of the assessments and the learners' reactions will then be considered in terms of the APA-defined factors of learner-centred learning. (The APA proposes various cognitive and meta-cognitive, motivational and affective, social and developmental, and individual factors of learner-centred learning as the identifying principles of learner-centred learning (Lambert & McCombs, 1998).)

4.2 Classification of learner reactions

4.2.1 Introduction

As described in chapter 3, the researcher began to observe a variety of behaviours as soon as the learners started work on the projects. The learners can be divided into three distinct groups on the basis of (1) comments they made, and (2) observations of the learners' behaviour made by the teacher (the researcher). This division into groups was not a physical division made during the completion of the projects. The researcher used this division as a basis to classify learner reactions, thereby enabling both an understanding and interpretation of

classroom events. The researcher will discuss the classroom events in terms of the APA principles of learner-centred learning in this chapter after she has identified the three distinct groups.

4.2.2 Classification of learner reactions

The type of comments that were made by learners are considered in the following categories:

- comments (either negative, positive or neutral) that reflect affect towards the task

- comments about the content of the different projects

- comments about external factors (such as time)

- comments about the learners' perception of his/her ability

- comments about the difficulty level of the tasks

- comments about the relevancy of the task

The table below categorises the types of comments made by the learners.

Table 4.1: Classification of learner reactions on the basis of the type of comments made by the learners

Category	Typical types of comments made by the learners
Affect	▪ "I don't want to explore the subject." ▪ "I don't want to explore the program." ▪ Expressions of feeling being overwhelmed and wanting step-by-step guidance: "Please give us a template." ▪ Uncertainty as to how the project should be approached: " I don't know where to start", "What must be included on this page?", "How will I know if the work is right?"
Relevance	▪ Topic considered to be highly irrelevant: "I'm not interested in tourism." ▪ Topic considered to be fairly relevant "It is interesting." ▪ No specific comment made about the relevancy of the topics.
Significance	▪ Very significant: "I have really learnt a lot." ▪ Fairly significant: "I have practised some skills." ▪ Insignificant: "I don't learn anything." ▪ "It is a waste of time as we won't get marks for it."
Time	▪ Too time-consuming to do the research: "It takes too much time to find the information. We won't be able to finish." ▪ Too time-consuming because the projects are not performed as part of everyday class work and are performed in addition on an already-full workload: "We are tired. We have too much other work."

4.2.3 Classification of learner reactions on the basis of the observations of the teacher

The observations of the teacher were divided into the following categories on the basis of:

- the effort that learners put into the task

- the approach that learners had to the task

- the ability of learners to work independently

- the ability and willingness of learners to work in a group

- the attitude of learners

Table 4.2: Categorising learners' observed behaviour

Category	Observed behaviour
Effort	▪ Initially most learners put in some effort. ▪ While some learners slackened their effort as the project progressed, others sustained their effort. ▪ Some learners gave up after a while and stopped any effort to complete projects.
Approach	▪ Some learners started the project with confidence. ▪ Some learners were very uncertain about what to do when they were given choices about content and presentation in a project.
Independent work	▪ Some learners needed encouragement to complete the project. ▪ Some learners could not make any progress without the teacher's guidance.

	▪ Some learners found the project challenging, especially when they were required to carry out independent research on a topic and thus could make progress on their own. ▪ When they asked for assistance, the researcher suggested to learners that they revise their strategies so that they could find their own solutions to the problem they were experiencing. It was common for learners to react with irritation when the researcher only gave them *pointers* – thus compelling them to find solutions for themselves.
Group work	▪ Some learners worked well with others toward their joint goal. ▪ Some learners were very negative, and did not play their part in the group work. They merely relied on their fellows to complete the group project and thought that they would get the same reward (marks) as the others. ▪ Some learners took too much responsibility. They did not trust the others in the group to do the work well enough.
Attitude	▪ Some learners had very negative attitudes. They tended to cut classes and leave work totally incomplete. ▪ Some learners had positive attitudes. They tended to feel positive if they thought that they had learned a lot. ▪ Some learners had very positive attitudes. A lot of effort was put in over a period of time. ▪ Some learners had fairly positive attitudes. They could do the work easily, but felt they did not get much out of it.

Although the learners' behaviour varied across the three different types of projects throughout the year, their behaviour and comments had enough in common to warrant dividing them into three distinct groups.

These observations were made in the classroom between January and the completion of the tasks at the end of September. The description below is based on observations of the whole period.

4.3 Three discernible groups

The learners were grouped together during the analysis of classroom events on the basis of certain observed commonalities. The groups are clustered together mainly on the basis of similarities between actual progress made and the effort that the learners expended. It was noticed that although the other categories were not necessarily identical for all the learners placed together in a group, the differences were not too far apart. The composition of each group therefore fairly reflects a uniformity of attitudes. The groups are named after their basic approach to the projects. They are the Positive Group, the Ambivalent Group and the Negative Group.

4.3.1 The Positive Group

The learners grouped together as the Positive Group made fewer comments on the projects and started work right away. The comments they did make included concern about the topic of the CASS projects (most learners failed to see its relevance), and some comments about "how things used to be". But learners did on the whole find the projects significant. Most felt that they provided good practice for the examinations and that they gave them opportunities to learn and refine some skills.

These learners invested a lot of effort in their projects. They wanted suggestions or help with specific, small problems from the teacher. The learners in this group were able to plan the content of the projects and were not overly concerned with the "correctness" of what they were doing. Instead they interpreted the questions for themselves with a minimum guidance from the teacher. They showed the ability to work independently. These learners also showed a little irritation when they were guided to the solution of their problems rather than having the teacher

point it out. In spite of this, many learners remarked that they had learned a lot when they had to figure out solutions for themselves. The attitude of the learners in this group was either *positive* or *neutral*.

4.3.2 The Ambivalent Group

These learners were more vociferous in criticism and complaint than the Positive Group. They made numerous comments, especially about the relevance of the topic and the projects. Many learners in this group expressed frustration with the process of learning by doing projects. There were also complaints about the time allotted to complete the project, especially in the light of the time it took for them to obtain the information that they needed. It was observed that many of the learners in this group had difficulty in planning the project and in making a start. Some learners in this group said that they could not do the project and they wanted the teacher to give them "a template" on which they could make some changes. A template would effectively cut out the element of being able to choose content for the project and some of the thoughtful input that learners made. It would also reduce the learning process to the level of an unthinking application of computer skills. Using a template would also mean that the learners would not have to plan or structure their learning events. Most of the learners in this group put a fair amount of effort into their projects. Although the progress for this group was slow, learners did make progress. Learners in this group also tended to be fairly ambivalent in their reactions: the same learner would express very negative feelings and attitudes towards the projects on one day (or during one period), and then would later express much more positive views. Many learners agreed that they learned a lot by doing projects but that they disliked the process. They preferred to have solutions to problems given to them instead of being given pointers towards solutions. Some of these learners did appear to be very uncertain of themselves when confronted with choices about content and the appearance of the project.

4.3.3 The Negative Group

The learners in the Negative Group made more negative comments than the learners in the other groups. Some learners in this group said that they could do the project easily and that it was not challenging. Others said that they did not

know what to do and could not apply the skills without assistance. What all the learners in this group had in common was a lack of satisfactory progress. Most of the learners in this group thought that the topic was irrelevant. They seemed to be inclined to do the same things repeatedly without planning the project properly. Most learners of this group also demanded a template on which to base the projects. The learners in this group took very little trouble over the projects; they seemed to feel that if they could not do it perfectly immediately, it was not worth doing at all, or that they were incapable of learning the skill. Many of these learners also felt that the projects were not relevant to or significant for their learning. Most of these learners were very irritated when, having asked for a solution to a problem, they were merely given pointers and not solutions. Some of the learners in this group did not ask for assistance. When pointers were offered to them, they retorted that the work was easy and that they could do it. Some asked for constant assistance but wanted solutions to be given without any input from themselves or any attempt on their part to try to solve the problem.

4.4   Results of the final assessment of the projects

The projects were assessed at the end of the year. This assessment shows the performance of the class on the three types of projects. The learners have been numbered and performance on each different type of project plus the performance the group (as discussed above) is shown.

4.4.1 Individual assessment

The class projects and CASS projects were assessed on the basis of the skills that had to be displayed. The mark for the CASS project is an average of the three sub-projects out of a total of 20. The mark for the class project is an average for the 8 projects that made up the class projects, and is reflected as total out of 20.

The FutureKids Project was assessed in terms of the skills that were needed to complete the project, the complexity of the project, and the thought that had gone into the pages that required reflection. Marks were given on the basis of the following scale:

1. Not done at all.

2. Done, but not satisfactory – very little effort, thought and skill was expended.

3. Satisfactory – minimum requirements were mostly met.

4. Good – all minimum requirements were met and more than the minimum of thought, skill and effort was expended.

5. Very good – The project gave evidence of (1) mastery of the programs used, and (2) the reflection and effort expended on the project (an indicator of achievement of the mastery required in these areas).

Table 4.3 (below) shows i*ndividual results.* These reflect the mark each student received for each type of project. The last column of the table reflects the group into which the learner was placed on the basis of observations that were made by the teacher and comments that were made by the learner.

Table 4.3 Individual results

Student No	Class projects	CASS project	FutureKids Project	Group
1	17	16	14	1
2	17	12	12	2
3	9	2	4	3
4	18	10	14	1
5	12	13	12	2
6	12	12	12	1
7	16	13	12	1
8	13	4	5	3
9	15	13	13	2
10	13	12	14	1
11	14	11	6	1
12	13	8	13	2
13	8	0	2	3
14	15	9	13	2
15	12	12	14	2
16	12	9	10	3
17	16	14	12	1
18	13	5	0	3
19	6	0	0	3
20	11	5	0	3
21	4	5	6	2
22	16	13	17	1
23	19	14	18	1
24	18	18	14	1
25	17	18	13	1
26	17	16	13	1

Learners who scored less than 6 out of 20 (30%) for any of the projects may be said not to have displayed the skills or knowledge required. Learners who had between 7 and 14 (70%) for the projects displayed a satisfactory to good level of skill and knowledge, and learners who scored more than 14 showed that they had mastered or displayed more than the skills and knowledge required.

4.4.2 Individual assessment results and the groups

The Positive Group has 12 learners, the Ambivalent Group has 7 learners and the Negative Group has 7 learners. The learners' results are considered on the basis of the groups into which the learners were divided because of the observations of the teacher and the comments made by each learner.

In order to compare the performance of the learners in the FutureKids assignment to the performance of the learners in class projects or to performance of the learners in the CASS project, it is necessary to convert the marks for the FutureKids Project to a mark out of 20.

4.4.3 Assessment results: The Positive Group

The assessment results for the learners who make up the Positive Group (on the basis of observation and comment) is given in the table below.

Table 4.4 Individual results: The positive group

Student No	Class projects	CASS project	FutureKids Project
1	17	16	10
4	18	10	14
6	12	12	12
7	16	13	12
10	13	12	14
11	14	11	6
17	16	14	12
22	16	13	17
23	19	14	18
24	18	18	14
25	17	18	13
26	17	16	13

Each learner's result for each of the project types can be seen on the graph below. From this graph it is clear that – for most learners in this group – the CASS and class projects score fairly closely together, but that the FutureKids project does not follow this pattern so closely. It is also clear that the class projects tended to have higher scores than the other two types of projects – except for one learner whose marks for all three types of projects were similar. Only one learner in this group had a mark below the satisfactory mark for only one project (the FutureKids one).
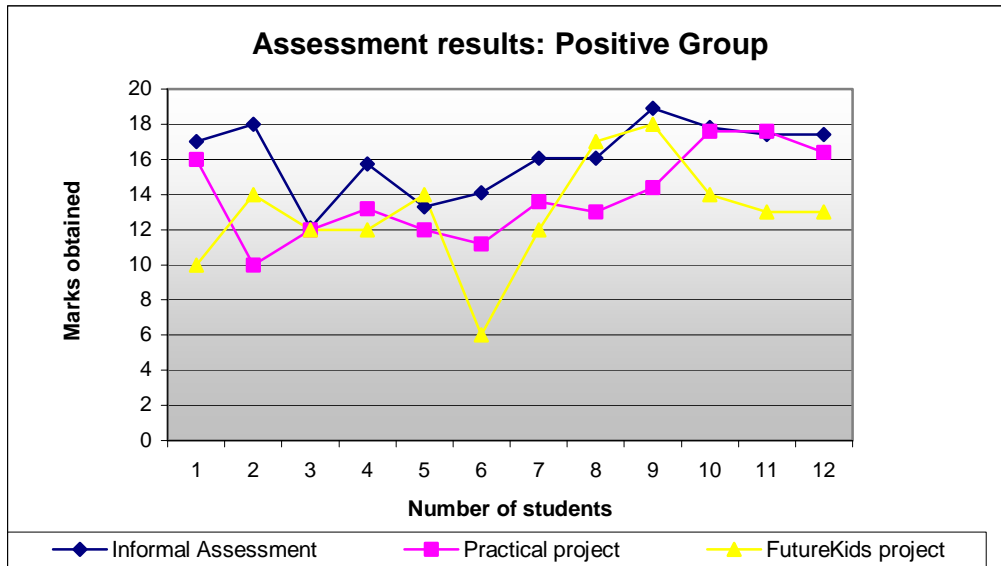
Figure 4.1 Assessment results: The Positive Group

4.4.4 Assessment results: The Ambivalent Group

The assessment results for the learners who make up the Ambivalent Group (on the basis of observation and comment) is given in the table below. There were 7 learners in this group.

Table 4 5: Assessment results: The Ambivalent Group

Student No	Class projects	CASS project	FutureKids Project
2	17	12	8
5	12	13	12
9	15	13	13
12	13	8	13
14	15	9	13
15	12	12	14
21	4	5	6

The result of the assessment of the different projects is reflected in the graph below. The result for this group seems to be more diverse. There is a big difference in the results for learners 1and 5 for the three different projects, while

learners 2, 3, 6 and 7 have similar results for the three projects. Learner 4 shows similar results for the FutureKids and class projects, with the CASS project showing much lower results than the other two types of projects.
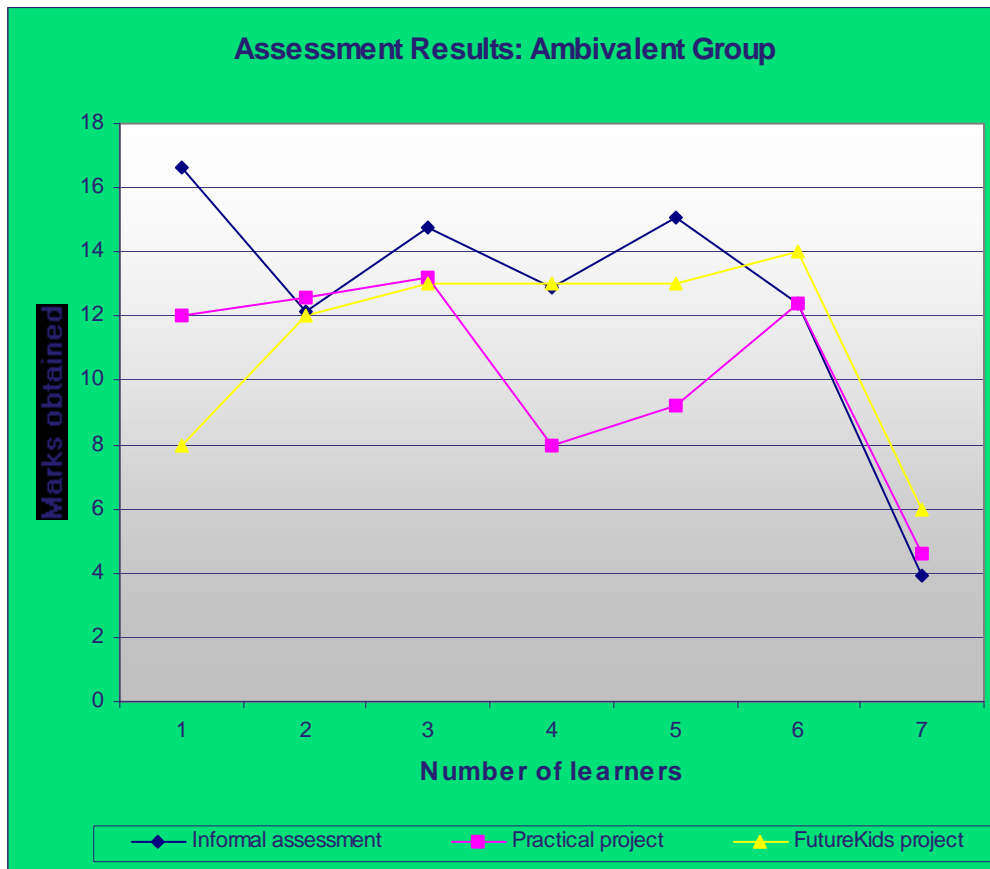

Figure 4.2: Assessment results: The Ambivalent Group

4.4.5 Assessment results: The Negative Group

The assessment results for the learners who make up the Negative Group on the basis of observation and comment is given in the table below.

Table 4.6: Assessment results: The Negative Group

Student No	Class projects	CASS project	FutureKids Project
3	9	2	0
8	13	4	5
13	8	0	2
16	12	9	10

18	13	5	0
19	6	0	0
20	11	5	0

The result of the assessment for the different projects for each learner of the Negative Group is represented in the graph below. The difference in the results for the different type of projects is much bigger than with the other two groups. While the class projects were mostly satisfactorily completed for all learners (except learner 6), the CASS project and FutureKids Project were mostly unsatisfactory. Four of the 7 learners in this group did not do the FutureKids Project at all. Only one learner in this group completed the FutureKids Project in a satisfactory way. While more learners (5) completed the CASS project, the results on this project were also poor, with only one learner obtaining more than 40% for the project.
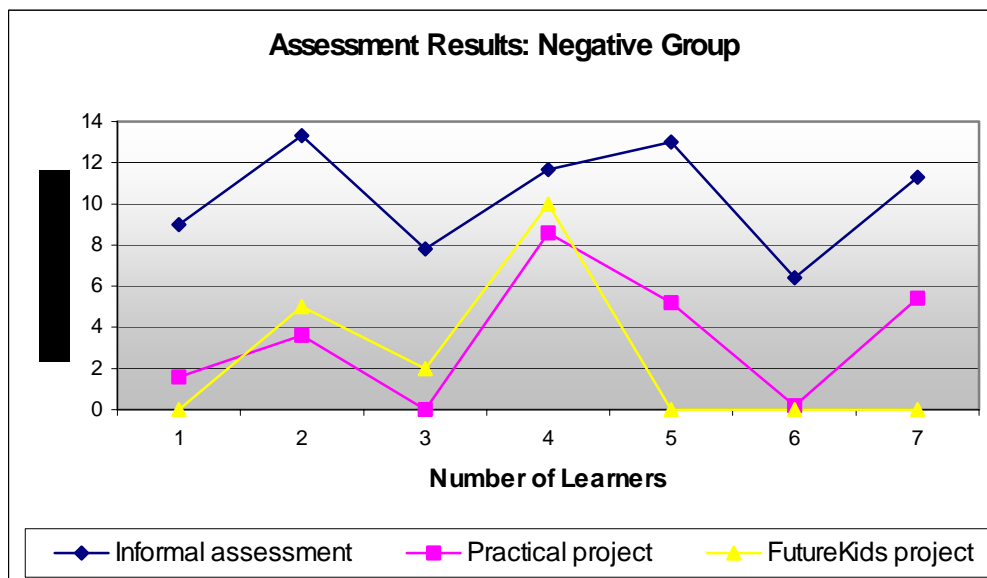

Figure 4.3: Assessment results: The Negative Group

4.4.6 Assessment results and the type of projects

Besides looking at the results of the assessment from the point of view of the groups into which the learners have been divided, the results can also be looked at in terms of the projects.

The table below reflects the number of projects that have been completed and the quality of each project as reflected by the assessment.

Table 4. 7: Projects and the assessment results

Assessment results	Class projects	CASS project	FutureKids Project
Not satisfactory: 0-30%	2	7	5
Task completed, but does not meet outcomes: between 30 and 45%	1	4	4
Tasks completed satisfactorily: 46-60%	5	9	10
Task well done: between 61 and 80%	16	4	6
Task very well done: above 80%	2	2	1
Total	**26**	**26**	**26**

The results of the assessment are expressed as percentages in the table below.

Table 4.8: Assessment (expressed in percentages) for project types

Assessment	Class projects	CASS project	FutureKids Project
Not satisfactory: 0-6.5	7.69	26.9	19.2
The task is completed, but does not fulfil the outcomes: between 30and 45	3.85	15.4	15.4
Tasks completed satisfactorily: 46-60	19.23	34.6	38.5
Task well done: between 61 and 80	61.54	15.4	23.1
Task very well done: above 80	7.69	7.7	3.8

Although the sample is too small for any meaningful statistical analysis, expressing the results per project as a percentage does tend to highlight trends within a class's results.

When expressed in a graph, the trends are clear:
- More of the class projects were completed satisfactorily or better than either the FutureKids or CASS project.
- Fewer FutureKids Projects were completed very well than either the CASS or class projects.
- More class projects were rated *better* than *satisfactory*. Fewer FutureKids projects and CASS projects were rated as being *more than satisfactory*.
- Although the CASS project and the FutureKids Projects seem to follow the same pattern, more FutureKids Projects were left incomplete than were

CASS projects – with many fewer class projects being left incomplete or rated as *very poorly done*.
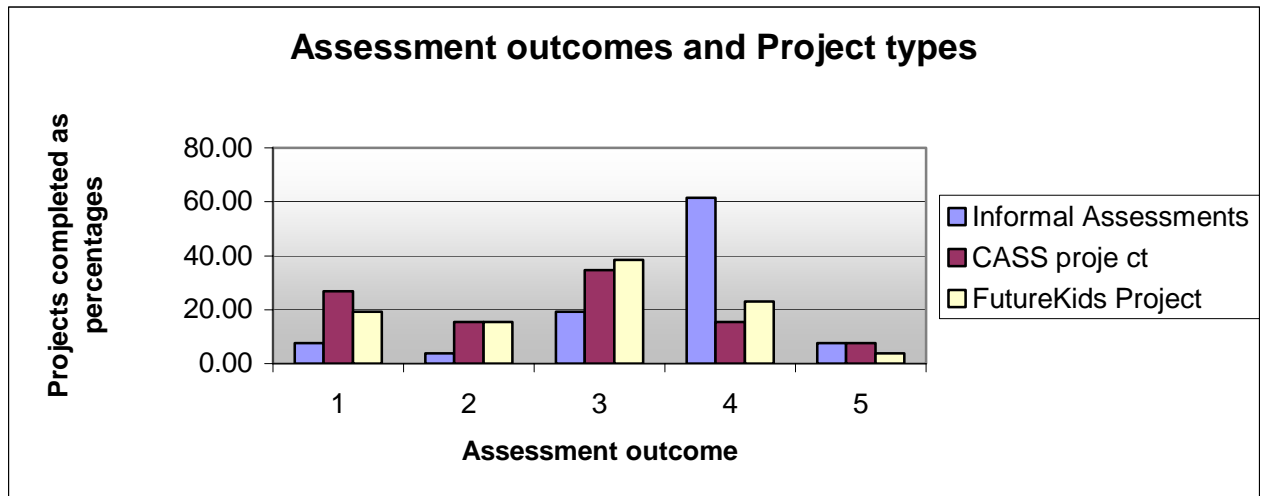

Figure 4.4: Assessment outcomes and project types

In figure 4.4 above the numbers 1 to 5 on the Assessment outcomes axis reflect the quality of the result (as in tables 4.7 and 4.8).

In order to answer the research questions, the results of the assessment of the projects and the events in the classroom need to be considered against the background of the factors of learner-centred learning that have been identified as the principles of learner-centred learning by the APA.

4.5 Classroom events

The interpretation of the events in the classroom is considered from two different angles: that of the Gagné's (Kearsly, 1998; Mwamwenda in Potgieter & Cronjé, 1998) nine events of instruction for effective learning, and the APA's (Lambert & McCombs, 1998). principles for learner-centred learning. The results of the assessment are considered on the basis of the principles of learner-centred learning.

4.5.1 The classroom events and Gagné's nine events of instruction

- **Gaining attention**

    In the CASS project and the formal class projects, learner attention was secured by giving learners a copy of detailed information about and guidelines for completing the tasks. For the FutureKids Project the learners were shown a completed project in HTML format projected by a data projector. Although the finished electronic CV interested most learners, attempts to arouse interest in the CASS project were less successful because some negative comments were heard as soon as the projects had been handed out. Some learners asked why the topic of tourism had been chosen, while others immediately asserted that they did not know what to do.

- **Informing learners of the objective**

    Learners were informed verbally about the objective of the project. Learners were informed about the objective of the FutureKids Project several times during the year. Although this tended to act as a motivator for some learners, other learners did not attach any importance to the objective of this project once they had been told that they would receive no marks for the completion of the project.

- **Stimulating recall of prior learning**

    As large parts of the projects required the application of computer skills that had already been learned, learners were reminded of those skills. They were also encouraged to show each other previously learned skills in order to stimulate recall. While the teacher revised the skills with which most learners had problems, the reactions of learners to the revision of the skills was three-fold: some learners were happy to revise, some learners felt that they had still not mastered the skills, and yet others felt that the teacher was wasting their time and that they did not need to be reminded of the skills needed for the project.

- **Presenting the stimulus**

    The stimulus was presented in the form of (1) the Internet where the learners could do their research, and (2) the programs used to complete

the projects. Those parts of the projects that had been begun or that had been partly completed were also used as stimuli for more complicated parts of the project. The learners were told how the part of the project that had been completed could lead to further parts of the project. This was mostly true for the CASS project. For the FutureKids Project, the stimulus was mainly presented by means of discussions about the realities of the learner's life and the possibilities for the project that flowed from these realities. For the formal class projects, the stimulus was presented in the form of the program that learners were expected to use to complete the project.

- **Providing learning guidance**

  The learners' questions were answered by questions to encourage learners to discover the necessary principles and skills for themselves, by pointers presented by the researcher, and partly through the showing of some of the skills. The questions and incomplete instructions were meant to guide the learning process and act as a stimulus for the learner to explore on his or her own. The learners were also given guidance in the form of discussion about where the project would fit into the bigger picture, and assistance to the learner in choosing what material to include or exclude from his or her projects. Giving learners partial answers in order to stimulate learner interest and to encourage them to take responsibility to experiment and find the complete answer for themselves, was met with varied comments. Some learners felt that although it was less easy to use their prior knowledge and the pointers given to arrive at the answer they were seeking, this option was very satisfying both emotionally and intellectually because it was more challenging. Others were merely irritated by this approach. These learners interpreted the teachers' reluctance to provide "finished" answers as either incompetence on the teacher's part or a demonstration of negative attitudes on the part of the teacher.

- **Eliciting performance**

  Learners were continually encouraged to consider their projects and the progress they had made. For the CASS project they were asked to

reconsider what was needed for the project (and in what way their projects already reflected that), and what would be needed to complete it. For the FutureKids Project, the lines between learning guidance and eliciting performance were less clear-cut and the discussion of the learners' projects and their lives at that juncture served both to provide guidance and to elicit performance. The learners were encouraged to reflect on what they had learned and how they were learning in order to stimulate more learning.

- **Providing feedback**

   The formal class projects were assessed and the assessment marks were given as feedback. However, this process did not take place quickly enough after the project was completed and the feedback was sometimes too late really to help learners to rectify the problems that had occurred. The feedback for the FutureKids Project was verbal and continuous. Feedback was often given by way of encouragement for work that had been successfully done, or while giving suggestions about what might be done for the rest of the project. Learners who reacted very negatively were given less guidance and feedback as the time went on.

- **Assessing performance**

   The learners' performance on the project was assessed at the completion of the projects. This assessment did not form part of the learning process and was a summative assessment of the learners' performance on the tasks. The learners received the mark and assessment matrix in their CASS files, but they were not given the opportunity for formal self-assessment.

- **Enhancing retention and transfer**

   Learners were given the mark sheets in their CASS files for the formal and CASS projects. Learners were expected to study these in order to identify outstanding problem areas and to transfer what had been learnt to future assignments, especially the high-stakes examination that followed shortly after the completion of the projects. For the FutureKids Project, the lines between the different steps were not so clearly drawn and the process of

discussing the learners portfolios also served to enhance transfer to other situations.

All nine of these steps occurred on a continuous basis throughout the year and were not so clear-cut as might seem from the discussion above. The interaction between teacher and learners was hindered by the expectations of both groups. The learners expected to be taught in the manner they were accustomed to, and the teacher expected the learners to take more responsibility for their own learning.

This discrepancy between expectations often led to frustrations, both on the part of the teacher and learners. It was also noted that some learners reacted very negatively to suggestions and guidance from the teacher. These negative reactions became a topic for discussions about the work that provided more stimuli and guidance and that helped to elicit better performances as well as to give feedback. These discussions became not only shorter but also less frequent as time went on. With learners with more positive attitudes, the discussion were much more valuable and progress on tasks more evident.

4.5.2 The classroom events and the principles of the APA

The factors that influence learning and learners cannot be regarded in isolation because they are interactive and integrated (Alexander & Murphy, 1998). When attempting to understand events in the classroom, it is important to keep in mind that the APA's proposed statement of principles simply makes it easier to identify the various relevant factors and the extent to which they have to be considered when one changes from a more teacher-centred classroom to a more learner-centred learning environment.

4.5.3 Classroom events and the cognitive and meta-cognitive factors of learner- centred learning

From observed behaviour in the class it was clear that learners encountered more problems in the CASS and FutureKids projects. The nature of the class

projects did not make the same demands on the learners because learners had to execute a number of instructions to complete the class projects. This required certain computer skills, but made no great demands on the learners' abilities to plan, structure and monitor their work. in contrast to the CASS and FutureKids projects, learners did not have to devise as many strategies to complete projects. Although the class projects are hands-on projects and therefore not entirely teacher-centred, these projects were closest to what learners had experienced in other classes.

Because the CASS and FutureKids projects are more learner-centred, they made different demands on learners. The reactions of learners to the CASS and FutureKids projects are discussed in terms of the way in which learners approached the following cognitive and meta-cognitive tasks:

- planning, analysing and strategising
- monitoring
- revision and self-reflection
- taking ownership of their own work
- validation of their learning

4.6 Planning, analysing and strategising the learning task

Frequent learner comments included statements like:

- " I don't know where to begin."
- " I don't know if it is right."
- "I need a template."

Learners also expressed feelings of uncertainty about how to approach the projects of which they could choose the scope and content

Such comments indicate that these learners found planning the projects and selecting the appropriate units for learning problematic. Asking for prescriptions also indicates that learners also had problems in selecting the appropriate tools for completing projects.

Most learners managed to find appropriate sources for the work. Learners who asked for step-by-step guidance and templates were observed to experience severe difficulties in planning projects and selecting strategies to solve problems. Although such learners would often ask for assistance, they actually seemed to be asking for someone *to take over the responsibility* for selecting content and strategies for completing the tasks.

It was observed by the researcher that learners who needed a lot of facilitation from the teacher often had more difficulty with planning the project than with the actual skills that were necessary for the project.

The learners in **the Positive Group** were able to plan the projects and although some learners did indeed hark back to "the way things used to be" (by which they meant the traditional instructivist and teacher-centred learning environment), these learners were able to structure projects successfully. Some of the learners in this group found these projects challenging because they had the freedom to structure and plan projects as they wanted to. Learners in this group also mentioned that they liked applying the skills they had learnt in a way that they themselves could design.

The learners in **the Ambivalent Group** had more problems with the planning and structuring of the projects. A lot of the uncertainty and frustration that was expressed by this group might have been caused by learners' uncertainty and their inability to plan the projects meaningfully. The learners in this group needed a lot of input and guidance from the teacher to help with the progress of the work – both in planning and structuring projects. It was noted, however, that learners quite often wanted the teacher to "take over" the planning and structuring process, and not merely guidance. This could indicate that the learners felt that they were not able to do the planning and structuring of the projects themselves. The extent of the influence of the affective aspect and the cognitive aspect cannot be separated.

Like the learners in the Ambivalent Group, the learners in **the Negative Group** could also not plan and structure the projects. The learners also demanded a template, and it was observed that they had real difficulty in planning the projects. The learners in the Negative Group either wanted the teacher to take over the planning process, and lay out the strategies needed to complete the project, or else they avoided doing the project properly. The facilitation of the teacher was needed for every step of the work that was completed. Some learners remarked that they could do all this and that they did not need to complete the project.

4.7 Monitoring, self-reflection, taking ownership, and the validation of the work

None of the learners in any of the groups were used to verbalising thoughts about how they learned or about which way is the most effective for the learner. Nor had they ever spent time before verbalising reflections on what should change to make their learning more effective.

Learners were asked to reflect on the way in which they learn, and to think about whether they were *learning* by doing the various projects. This reflection on their own learning processes is expressed in terms of how personally significant they found the projects on the basis of how much they thought they were learning by doing the projects.

The learners replies and comment on how much they were learning can be expressed on a four-point scale as follows:

1   I learn a great deal by doing these projects.
2   I learn by doing these projects.
3   I learn little by doing these projects.
4   I learn nothing by doing these projects.

Eleven learners said that doing the projects was significant to their learning, and that they were learning a lot by doing the projects; 7 learners reported that they were learning by doing the projects (but were not learning a great amount); 3

learners said that they were learning "a little" by doing the projects; 5 learners thought that they were learning "nothing" by doing the projects.

Table 4.9: Learners' opinions about the significance of the projects compared to the groups

Significance of projects to learning on an four-point scale	Number of learners in The Positive Group	Number of learners in The Ambivalent Group	Number of learners in The Negative Group	Total number of learners
1	4	4	3	11
2	5	2	0	7
3	1	0	2	3
4	2	1	2	5
Total	12	7	7	26

A comparison of the learners' view on whether they were learning significantly with the satisfactory completion of the project, revealed the following pattern:

Table 4.10: Comparison between perceived significance and task completion

View of the significance of the project	Number of learners	Satisfactory completion of the Class projects	Satisfactory completion of the CASS projects	Satisfactory completion of the FutureKids Project
1	10	10	10	10
2	6	6	5	5
3	5	4	3	3
4	5	4	4	4

The learners who felt that they were learning a lot, all completed the projects in a *satisfactory* or *better* way, while most of the learners who felt they were learning nothing did not complete the projects that were more learner-centred.

Some learners were more outspoken when it came to how personally relevant they thought the projects were. Many learners did not specifically comment on how relevant they thought the projects were. If the learners thought that the projects were not relevant, they did not appropriate ownership of the work. This meant that they were not adequately involved in the learning process.

In order to get a clear picture of the learners' views of the relevance of the projects, they were given numbers according to the following scale:

1.   The learner made no comment on the relevance of the project (i.e. was neutral).

2.   The learner was positive.

3.   The learner was negative (i.e. he or she thought that the project was not relevant).

4.   The learner was very negative (i.e. he or she stated strongly that the project was irrelevant).

These numbers were then compared to task completion in order to identify a trend. The results are reflected in the table below:

Table 4.11: Task completion and relevance

Student No	Class project	Practical project	FutureKids Project	Group	Relevance
19	6	0	0	Negative	1
20	11	5	0	Negative	1
6	12	12	12	Positive	1
15	12	12	14	Ambivalent	1
9	15	13	13	Ambivalent	1
7	16	13	12	Positive	1
2	17	12	8	Ambivalent	1

1	17	16	10	Positive	1
26	17	16	13	Positive	1
25	17	18	13	Positive	1
24	18	18	14	Positive	1
23	19	14	18	Positive	1
4	18	10	14	Positive	2
3	9	2	0	Negative	3
16	12	9	10	Negative	3
5	12	13	12	Ambivalent	3
12	13	8	13	Ambivalent	3
18	13	5	0	Negative	3
8	13	4	5	Negative	3
10	13	12	14	Positive	3
11	14	11	6	Positive	3
14	15	9	13	Ambivalent	2
22	16	13	17	Positive	3
17	16	14	12	Positive	3
21	4	5	6	Ambivalent	4
13	8	0	2	Negative	4

From this table it is clear that:

- most of the learners were either very outspoken about the relevance of the project or they did not discuss the relevance of the tasks in the class
- the comments on relevance and the division into groups do not follow a pattern

When learners' views about how personally relevant the projects were, are compared to the satisfactory completion of the projects, it becomes clear that there is a definite pattern.

Table 4.12: Perceptions of relevance and task completion

View about the relevance of the project	Satisfactory completion of the Class projects	Satisfactory completion of the CASS projects	Satisfactory completion of the FutureKids Project	Number of learners in group
1	0	0	0	0
2	7	7	7	7
3	7	7	7	7
4	10	7	8	12

One may note that:

- none of the learners found the topics of the projects personally very relevant
- all learners who found that topics had some relevance to themselves completed the projects satisfactorily
- learners who did not see the personal relevance of the projects were less likely to complete the projects that requires high intrinsic motivation

4.8 Classroom events and motivation and affective factors of learner-centred learning

The following table shows the degree to which the different projects can be considered intrinsically motivating.

Table 4.13: Motivation and the projects

Characteristics of intrinsic motivation		Class projects	CASS projects	FutureKids Project
Challenge	Flexibility		✓	✓
	Set criteria for performance	✓	✓	✓
	Feedback	✓	✓	✓
	Range of challenges		✓	✓
	Personally meaningful goals			✓
Curiosity	Incongruity			
	Complexity		✓	✓
Fantasy	Fantasy		✓	✓
Choices			✓	✓
Relevance				✓

The degree to which the projects are intrinsically motivating (with reference to the criteria used in table 4.13) is discussed below.

When extrinsic rewards are given it may undermine the intrinsic motivation of the task (Lumsden, 1994). When extrinsic rewards are given for a project, it makes the project less intrinsically motivating.

4.9   The degree of intrinsic motivation of the different projects

(1) The FutureKids Project

This project is seen as being the highest intrinsic motivator because:

- it gave the learner a large range of choice about what should be included or left out of the product
- there was no external reward offered for the completion of the task. Part of the task was that learners could burn a CD-ROM containing the project.

- there was a high degree of challenge inherent in the task. Learners had to learn new computer skills and refine existing skills. Learners also had to reflect on their learning.

- the levels of challenge were flexible as all the parts of the project were not equal in difficulty level and the learner could use different programs. The topic of the project was the learner. While this made the topic relevant to the learner, not all learners found that it personally meaningful to master the skills needed to do the projects.

- the task had no set situation that would stimulate fantasy or curiosity − except for their own interpretation of how the CD could be used as a reflection of their actual skill at a given time or how it would be reviewed by themselves at some point in the future. The learners' fantasy was stimulated in a different way when they were asked to create some pages which would be relevant to the future.

(2) The CASS project

This project is seen as being a medium intrinsic motivator because:

- there was little choice as to the theme. But learners could choose their own applications of the information gathered.

- Marks were allocated for this task (it would count 10% of the final CASS mark). The total CASS mark counted 25% of the final mark. The CASS project contributed 10 to this mark. This external motivator made the project less intrinsically motivating.

- There was a high degree of challenge in this project because learners were expected to apply the skills that they had learned in a way that was not prescribed too closely. The learners had to decide how applications could be used to portray the information gathered.

- The criteria to complete the project successfully were set out. Feedback was given throughout, but not in the form of marks.

- The goals for the successful completion of the projects were prescribed, and some learners did not find these goals personally meaningful.

- The fantasy of creating this project for the local tourism industry was part of the situation that was set for the project and the learners could decide how the programs could be best applied in the given situation.

- Learners' curiosity was stimulated by the requirement of Internet searches to find tourist destinations.

- The topic was not really relevant to the lives of the learners, except to those who might have had some family business interests in tourism.

(3) The class projects

These projects are seen as being lower in intrinsic motivation because:

- no choices in the execution of these tasks were given. Learners were expected to apply the computer skills in a prescribed way.

- Marks were allocated for each task. While the number of marks allocated varied, all together the tasks would count more or less the same as the CASS project. The tasks were graded throughout the year. This made the task less intrinsically motivating.

- There were limited amounts of challenge inherent in these projects. They were more were like drill exercises of skills learned than a challenge to apply such skills in different situations.

- The class projects did have set criteria for performance.

- The goals of the projects were prescribed and were not necessarily personally meaningful to the learners.

- The exercises allowed little space for fantasy or curiosity.

- The topics of the exercises were mostly personally irrelevant to the learners.

4.10   Intrinsic motivation and the results of the assessment

The percentage of tasks left incomplete indicates that the highest percentage of tasks left incomplete were those with the highest levels of intrinsic motivation.

Table 4.14: Tasks left incomplete

	Low intrinsic motivation / Class projects	Medium intrinsic motivation / CASS projects	High intrinsic motivation / FutureKids Project
Tasks left incomplete	12	3	5
Total possible tasks	208	26	26
Percentage of tasks left incomplete	5.8%	11.5%	19.2%

Note the relatively high percentage of tasks requiring a high intrinsic motivation that has been left incomplete.

Motivation can be measured by the effort expended (Small, 1997). Although some projects were completed, the effort expended on these projects was very small because the learner had not done much more than go through the motions. One can argue that, for these tasks, the motivation was very low – more or less on a par with those in which the tasks were left incomplete. When the tasks left incomplete are compared to those for which effort expended was unacceptably small, the following pattern emerges:

Table 4.15: Tasks for which an unacceptably low level of effort was expended

	Low intrinsic motivation	Medium intrinsic motivation	High intrinsic motivation
Tasks for which unacceptably low levels of effort were expended	13	7	9
Total possible tasks	208	26	26
Percentage of tasks left incomplete	6.3%	26.9%	34.6%

The following factors may have undermined the intrinsic motivation that explains the pattern of non-completion of the more intrinsically motivating projects:

- The class was not familiar with the teacher and the teacher did not comply with their expectations of the classes because she employed a different teaching strategies and created a different kind of learning environment from those to which they had been previously exposed. This may have caused a lack of connectedness or understanding between some learners and the teacher in the class environment. Learners may also resist change because they have become used to the way things have always been done (Teel & DeBruin-Parecki, 2001). This resistance does not help to create a learning environment of mutual respect and trust.

- Many learners expressed the wish to be given a template, a test or a set of instructions that would exclude the necessity of planning and making choices when doing the project. Teel and DeBruin-Parecki (2001) note that learners may resist changing to a learner-centred classroom because they feel and expect that decisions should be made for them and that they should follow orders.

- It was observed that many learners had a negative attitude towards the projects. This was especially true for the learners in the Ambivalent and Negative groups. The performance on the CASS and FutureKids projects was the poorest for these 2 groups. This negative attitude may be part of a reaction to having different expectations with regard to what actually happened (Teel & De Bruin-Parecki, 2001).

- Some learners questioned the significance of the projects. It was clear that these learners did not feel that the projects were at all relevant, neither on a social nor on a personal level.

Some learners expressed feelings of anxiety about their ability to do the projects. Anxiety has a negative influence on motivation (Open Learning Technology Corporation, 1996). Some learners experienced many problems in the planning of the project. From that point onward they seemed to believe that they could not do the projects. This caused a decrease in levels of motivation.

Table 4.16: Anxiety and the division into groups

Group	Number of learners	Frequency of the expression of anxiety			
		Seldom / never	Sometimes	Often	Very often
Positive	12	4	7	1	0
Uncertain	7	0	3	3	1
Negative	7	3	3	0	1
Total		7	13	4	2

If one compares the frequency of **expressions of anxiety** about the projects with the groups into which the learners were divided, the following pattern emerges:

- In the Positive Group, most learners sometimes expressed feelings of anxiety, but none did so very often.

- In the Ambivalent Group, learners expressed feelings of anxiety more that in the Positive Group (with one learner expressing feelings of anxiety very often).

- In the Negative Group, learners very seldom expressed feelings of anxiety (only one learner frequently expressed feelings of anxiety).

The 5 learners who **never expressed anxiety** about their ability to do the work performed as follows

Table 4.17: Performance of learners who never expressed anxiety.

Class projects	CASS project	FutureKids Project
9	2	0
8	0	2
16	14	12
11	5	0
4	5	6

It is noted that most of these learners performed very poorly on the CASS and FutureKids projects. One learner who never expressed anxiety performed well on the projects.

Twelve learners **infrequently expressed anxiety** about their ability to complete the projects. Their performance on the different tasks were as follows:

Table 4.18: Performance of learners who expressed anxiety infrequently

Class projects	CASS projects	FutureKids Project
17	16	10
17	12	8
18	10	14
12	12	12
16	13	12
13	4	5
14	11	6
12	12	14
19	14	18
18	18	14
17	18	13

All of the learners who at times expressed anxiety had scores of 60% and more for the Class project, while the performance on the CASS project varied (with mainly between 50 and 90%, with one learner scoring less than 30%). Three of the 12 learners scored below 50% on the FutureKids Project (with 7 projects between 50 and 75%, and one project above 80%).

Seven learners **fairly frequently** expressed feelings of anxiety.

Table 4.19: Performance of learners who fairly frequently expressed feelings of anxiety

Class projects	CASS projects	FutureKids Project
12	13	12
15	13	13
13	12	14
15	9	13
12	9	10
6	0	0
16	13	17

One of these learners performed poorly in all the projects while the performances of all the others' varied. For the class projects these learners (with one exception) scored 60% and above. For the CASS projects, 3 learners scored less than 50% while the others scored between 60 and 65%. For the FutureKids Project, the learners scored between 60 and 85%, with one learner not completing the project at all.

Two learners **frequently expressed feelings of anxiety**.

Table 4.20 : Performance of learners who frequently expressed feelings of anxiety

Class projects	CASS projects	FutureKids Project
13	8	13
13	5	0

For the class projects, both these learners scored 65%. For the CASS project, both these learners scored below 50% (one of them below 30%). For the

FutureKids Project, one of the learners left the project totally incomplete while the other scored 65% for the project.

When one considers these results, it does not seem as though any specific pattern emerges.

4.11 Social and developmental factors of learner-centred learning

The literature provides the tools to shape the discussion of the events in the classroom pertaining to the social and developmental factors of learner-centred learning. The figure below contains the structure for this discussion.

Developmental stage of self-authorship
Level at which the material is presented
Quality of the setting as far as atmosphere and diversity, respect and support is concerned.
Using the social environment – asking and giving assistance.
In cooperative learning: • individual accountability • shared goals • positive interdependence

Figure 4.5. Tools derived from the literature study to shape the discussion

- **Self-authorship** entails the development of the individual's level of making what he has learned his or her own, while maintaining his or her own identity internally and in the social environment (Baxter Magolda, 1999). Learners asked to be given the content so that they could include only what was being prescribed in their projects. This indicates that they did not trust the meaning that they were making. The learners compared what

they had included with the content of the other learners to see if they were "correct" because the teacher insisted that the learner should include in the project what they thought satisfied the outlines of the project.

- **The level at which the material is presented** should be appropriate for the developmental level of the learners. The learners had difficulty planning and completing some of the projects. Learners indicated that they wanted to return to the "way things were", and they requested that they be given content for the projects − even for the FutureKids Project (for which the topic was entirely personal to the learner). Their requests could indicate that the developmental levels of the learner and the projects were not compatible enough. Learners had more difficulty completing the CASS and FutureKids projects satisfactorily. In both these types of projects the learners had to incorporate their own content while the content of the class project (which gave the learners fewer problems) was given. The teacher and learners were new to each other and the developmental level of the learners was not specifically taken into consideration when the projects were designed and allocated. The responses of the learners indicate that the level of the tasks given may not have been appropriate to the developmental level of the learners.

- **The setting** and the support experienced by learners contribute to the effectiveness of the learning that takes place in it. The classroom had a very relaxed atmosphere in which learners were encouraged to discuss the projects they were engaged in and to exchange sources that they had found. Learners were also encouraged to discuss their progress and any difficulties they had with the teacher. Initially learners did not discuss their progress and problems with the teacher − other than asking for the projects to be changed or for content to be designated. But eventually most learners began to engage in informal discussions of their learning with the teacher. It was noted that the learners who had a very negative attitudes towards the projects and the way in which they were expected to learn did not initiate discussions with the teacher and were very non-

committal when the teacher initiated discussions of their work with them. Learners never indicated in any way that they found a lack of respect for themselves or their diversity in the classroom. Discussions and guidance were given in both languages. Learners were answered in the language in which they asked a question and the teacher was sensitive to the language in which the learner received tuition, always addressing the learner in appropriate language. Learners indicated that they did not like being given guidelines or pointers when asking for assistance. Most learners wanted to be given the solution. This aversion may indicate that learners experienced the teacher as being insufficiently supportive.

- **Using the social environment** as a resource for the solution of the problems encountered when completing the projects was not observed early on in the year. But, as time went by, more and more learners asked one another for sources needed to complete the projects.

- **Cooperative learning.** One part of the CASS project required the learners make a magazine as a group project. The learners had to make a magazine to which each learner contributed. The group project would then be assessed The learners could choose the members of the group themselves. Each group had 4 or 5 members. The group was expected to divide the work for the magazine so that each member would contribute equally to make the magazine and would select those articles that would suit his/her abilities and strengths best. This was intended to give each member a special importance within the group. The groups did most of the work on the magazines outside of the class time. There were 4 groups with 4 members each, whilst 2 groups had 5 members. Although 5 of the magazines were of a good standard, the remaining two were poorly done. Both these latter two projects were poor in quality because one or two learners tried to carry the burden of the entire magazine alone.

  o **Individual accountability**. Each member had to take the **responsibility** for the part of the project that he or she had to

make. In some groups, learners cooperated really well and all the members made a contribution to the magazine. Some learners, however, simply did not contribute to the effort and left it to the rest of the group to ensure that the quality of the finished product would be acceptable. Some members were deeply unhappy because the defaulting member(s) refused to cooperate. The learners who *were* motivated to do the task thus felt helpless and cheated. They did not want to be penalized for the defaulting member's lack of application, and felt hard done by because they did more than their required part for the same marks that the others received. Many learners, especially those in the unsuccessful groups, complained that *assessment for group work is unfair*. Learners also felt that since the final mark contributed to their *individual* results at the end of the year, a group mark should not be awarded. Two groups were particularly unsuccessful as the burden was taken up by only one or two learners.

o **Shared goals**. The learners were presented with a **shared goal**: the completion of the magazine. The learners had to write articles on new developments in the world of computers. The information for these articles was to be found on the Internet and in computer magazines. A number of advertisements were required, and learners had to write a letter column that gave advice and answered questions about computers. The learners also had to design and make several advertisements and an impressive title page. An index and editorial article was also required. The most successful groups gathered together over a weekend to create the magazine while others worked on their own to produce the content which was then put together in a magazine by a single learner. Ideally, each member had to contribute to the goal in order to complete it. But what happened in practice was that each learner tended to complete his own part without sharing his or her knowledge or skills with the rest of the group.

o **Positive interdependence** Although the project was planned with positive interdependence in mind, some learners simply did not contribute to the group effort at all. These learners did not respond when the rest of the group asked them to do their part: they usually just said that they did not have time or that they did not like the projects and so were not going to do them. The experience of working in groups was therefore very frustrating to some learners who complained that group work was "unfair". All but one group handed in a magazine. The quality of one magazine was exceptionally poor. in contrast, one magazine was of excellent quality. Although most magazines were neat, content did not reflect any new learning and tended to lean heavily on the copying of articles from magazines and the Internet instead of showing evidence of proper research and creative activity.

4.12   Individual factors of learner-centred learning

The learners came to the learning experience with different backgrounds and life experiences. The individual factors below include observations made concerning the learning styles of the learners and issues of self-efficacy, gender, language, and level with which they engaged with the subject.

4.12.1   Self-efficacy beliefs

The effect of **self-efficacy beliefs** of the learners was not measured, but because the following self-efficacy beliefs have a bearing on the events in the classroom (Pajares, 2000), the researcher's observations about the behaviour of the learners are described in the terms of self-efficacy beliefs listed below.

● **Choices made by the learners**

Learners not only made choices on a cognitive level by choosing the best tools to complete the project; they also made a choice about whether or not to participate in group activities and to complete or not complete the projects. The type of choices made by the learners is

reflected in the effort they expended on projects during the year. The assessment of the choices made by learners is reflected in the assessment of the effort as described below (see following item). The learners who chose to cut class regularly and not participate in the group project were deemed to have made no effort to complete the projects and were awarded a 1 for effort. Those learners who attended class more regularly than the previous group and who participated a little in the group project were also the ones who tended to play around in class and work on the projects sporadically. These learners were awarded 2 for effort. The learners who attended class regularly and who chose to participate a lot extent in the group project were awarded a 3. The learners who were more conscientious in their choice of class attendance and who worked well in the groups were awarded a 4 for effort. Those who attended every class, who chose to work during class time, who participated strenuously in the group project, and who worked in group projects after class time were given a 5 for effort.

- **Effort expended**

    A varied amount of effort was expended on the different projects. Most learners put in more effort when completing the class projects while many learners put in almost no effort to complete the FutureKids Project. There were however learners who put a great deal of effort into completing the FutureKids Project although they were definitely in the minority. Most learners put some effort into completing the CASS project.

    For the purpose of this study, the learner's effort during the year was observed and an assessment out of 5 was given. These marks mean the following:

    1. No effort

    2. Some effort made to complete the project

    3. A fair amount of effort expended to complete the project

    4. A good effort

5.   A very good effort sustained over a long period of time

When the pattern of individual performance on the three tasks and the pattern of effort are compared (as they are the graph below), the patterns that emerge are very similar.
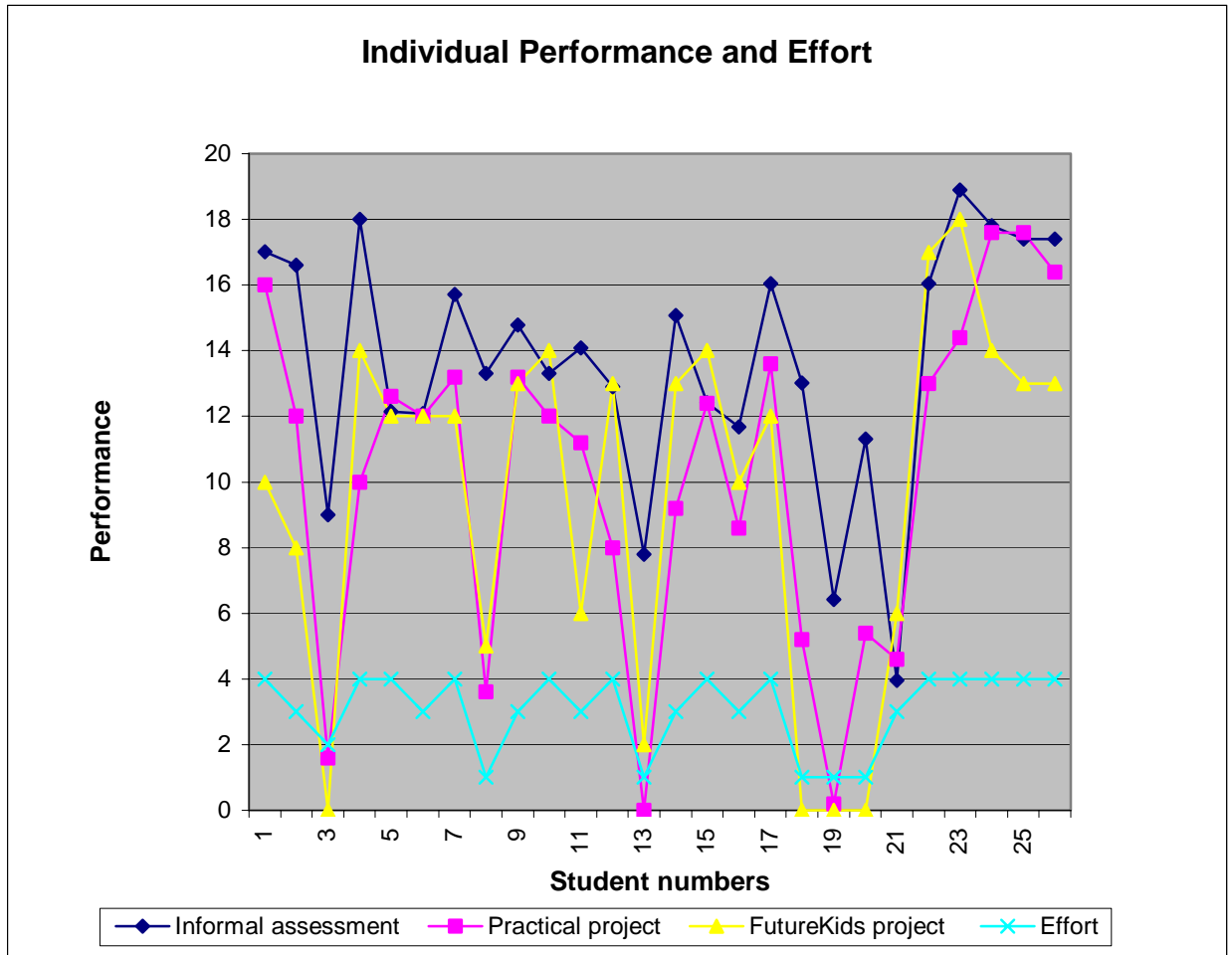
Individual Performance and Effort

Figure 4.6 Individual performance and effort

●   Perseverance

Because effort was assessed after the year on the basis of the researcher's observations of the learners' behaviour in class, the perseverance of learners as they worked on the projects is also reflected as effort in the graph above because the perseverance of the learner determined the degree of his or her effort during the year.

●   Resilience

The resilience of a learner in the classroom may be described as the learner's ability to overcome obstacles in the learning environment that (in various ways) frustrated or hindered his or her efforts and application. Resilience means having the inner strength or ingenuity to work in an unfamiliar way. It also means believing sufficiently in one's own ability to complete the project. Those learners who expressed anxiety and frustration with the learning project were also voicing their implicit belief in their own ability to tackle the work.

- Stress and anxiety

Learners who expressed doubt and anxiety about their ability to do the work needed more guidance and facilitation from the teacher. Their anxiety expressed the measure of their implicit belief in their own ability to work on the project.
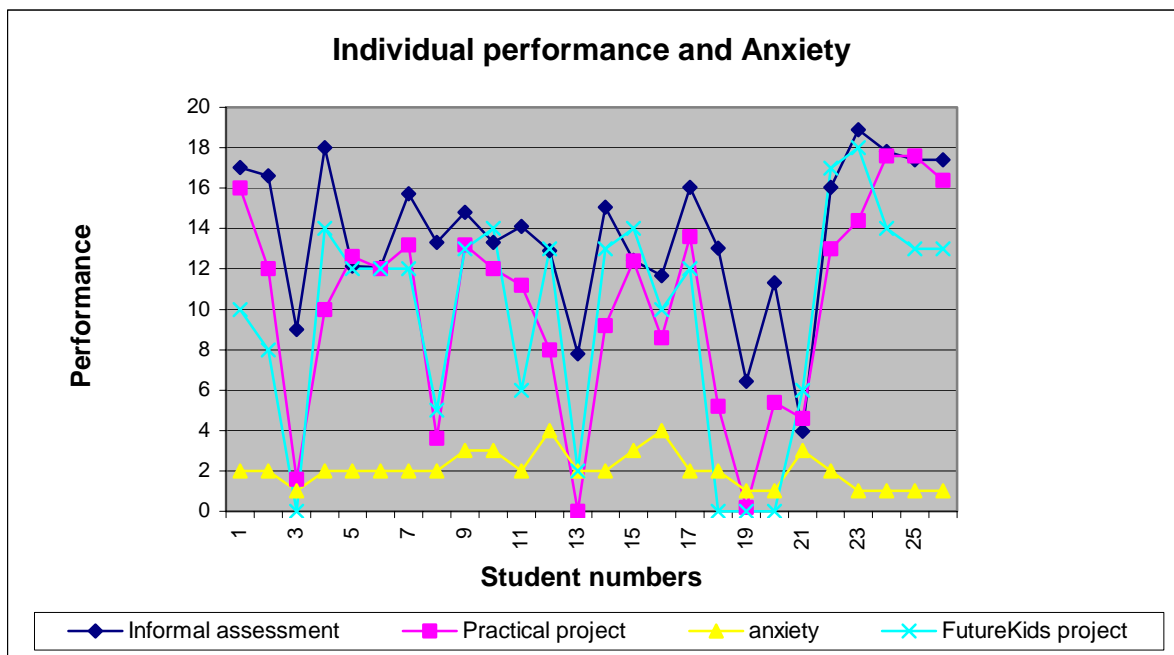

Figure 4.7: Individual performance and anxiety

A comparison between the pattern that emerges of the learners' individual performances on the three types of projects and the patterns of the anxiety expressed by the learners do not show any obvious correlation.

4.12.2 Gender

The researcher's observations in the classroom of learners' reactions to changes in learning environment shows that the different genders did not seem to react very differently – apart from the fact that the girls seemed to express themselves more freely than the boys, and that they tended to express their anxiety and frustration more often than the boys did. The boys on the other hand expressed very strong opinions more frequently than the girls. The patterns of performance of the learners are compared to gender in the graph below.
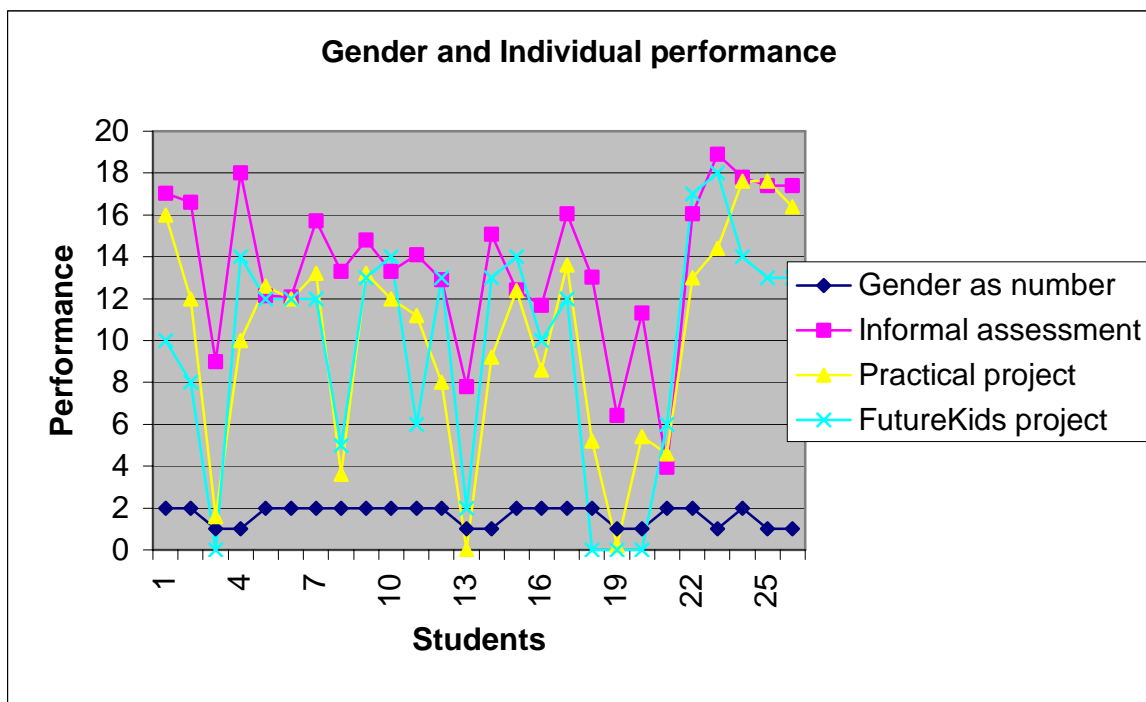

Figure 4.8: Gender and individual performance

Gender is expressed as either 1 for male or 2 for female. If plotted on a graph together with individual performances on the three types of projects, it is clear that no discernible pattern emerges.

4.12.3 Language

The language in which the learners are taught reflects some differences in the cultural background of the learners. The actual differences in culture is not discussed here, but the researcher plotted individual performances on the different projects and the language group to which the learners belong on a graph to see if any discernible pattern appeared. Afrikaans was given 1 and English 2 in order to plot the patterns of performance on the graph.
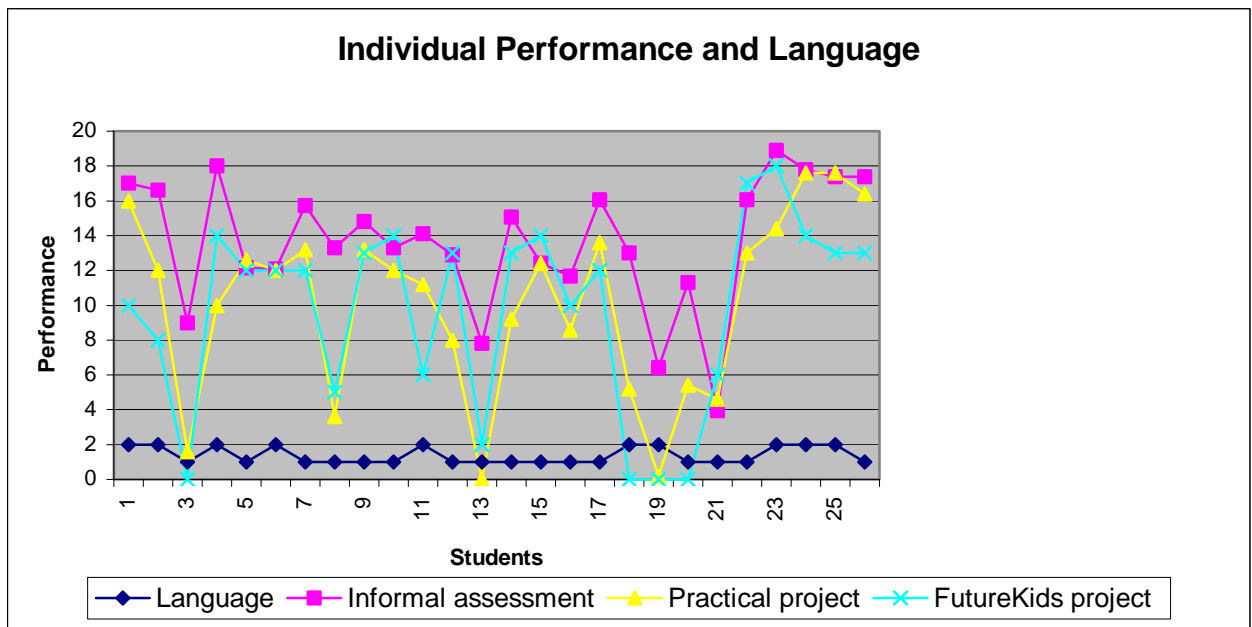

Figure 4.9: Individual performance and language

The graph does not show any discernible pattern between the language group of the learners and their performance in the three different types of tasks.

4.12.4 The level on which the learners did computer studies

Four of the 26 learners in this class took computer studies on the higher grade. This meant that in addition to the CASS assignment and the FutureKids projects (that were also completed by learners who took Computer Studies on the standard grade), these learners were required to learn to write computer programs by using Turbo Pascal as the programming language. Some of the class projects done by these learners were programming projects. The learners also had a different teacher for the programming component of their work although they worked on the CASS project and the FutureKids Project together with learners taking the subject on the standard grade.

Learners on the higher grade performed better than the learners on the standard grade. It was also noted that they were also able to plan their projects more easily. The learners on the higher grade did not express any feelings of anxiety and did not seem to experience any difficulty about doing the projects. Although some of these learners expressed frustration with the way in which the projects were done, they made excellent progress and mostly showed sustained effort during the year.

Learners on the standard grade expressed the belief that only "clever people" can do the programming component of Computer Studies. Although the higher grade learners modestly abstained from expressing this opinion, this belief seems to be established in schools, even in later years. It is likely that learners on the higher grade simply believed in their ability to be successful more than did learners on the standard grade.

The higher grade learners all completed the CASS projects and the class projects and obtained above 80% for these two types of projects; two of the learners obtained above 80% for the FutureKids Project while the other 2 obtained marks in 60% range.

All four of these learners had a positive attitude and were confident that they could master the work. Although these learners were not very talkative, when the

teacher initiated discussions, two of them expressed the opinion that the projects were too easy and that they were not learning anything. The other two said that they were learning some things and were refining some of their skills. Toward the end of the year, one of these learners often asked for help. While these learners were not all grouped together for the group project, they all formed part of the groups who communicated well and produced good quality magazines with adequate content. These learners did not complain about carrying the other learners in the group and they were in the groups who came together to complete the magazine after school hours.

4.13   Learning styles

No assessment was made of the learning styles of the learners in this group. It was noticed, however, that they approached the work in different ways and that each learner enjoyed some component of the work – even when they found the overall situation frustrating.

4.13.1 Interactivity of the factors of learner-centred learning

The different factors of learner-centred learning are interactive. One learner comment could reflect all four factors at once. A learner who says, " I am learning a lot but I don't like learning by doing projects", could be making a comment that is relevant to three of the four factors highlighted by the APA.

When a learner says, "I am learning a lot", that learner is commenting on his or her learning process. That learner's statement therefore refers to the cognitive and meta-cognitive factors of learning. When a learner says, "I don't like doing projects", that learner is expressing an affect that also implies low motivation for the task. By making such a statement, the learner could also be saying that the way in which learning happens in this instance is not his or her *preferred* way of learning (a reference to an individual factor of learning).

Although the researcher analysed classroom events on the basis of different factors of learner-centred learning in order to clarify and identify individual events, it should not be forgotten that these factors are reciprocally affected by one

another. The diagram below attempts to show the reciprocal influence that prevails between all the factors of learning.
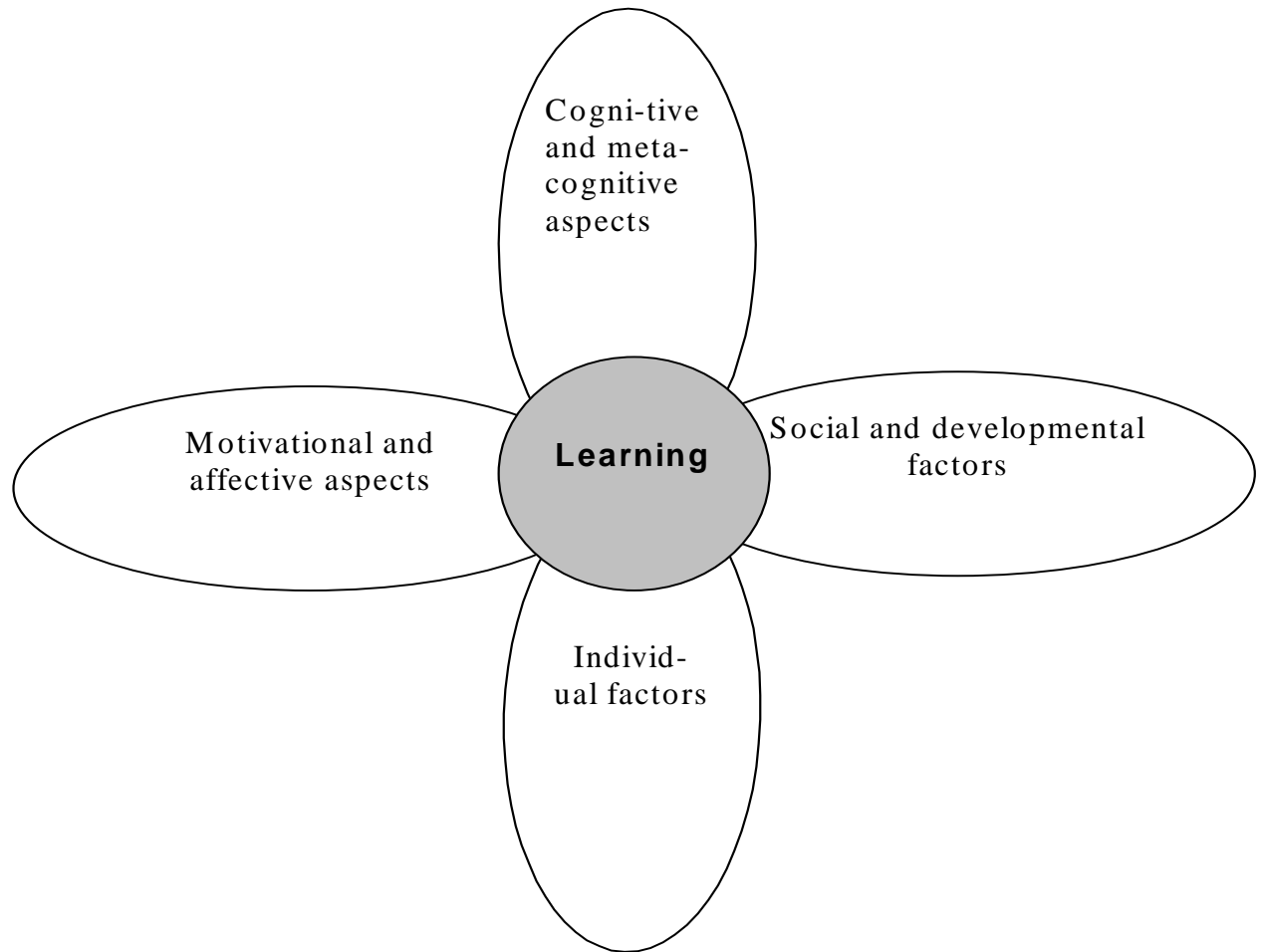
```
                    Cogni-tive
                    and meta-
                    cognitive
                    aspects


Motivational and              Social and developmental
affective aspects    Learning            factors


                    Individ-
                    ual factors
```

Figure 4.10: The reciprocal effect of factors affecting learning

4.14 Conclusion

Making the transition to a more learner-centred classroom is affected by many different factors that have a reciprocal effect on one another and that are both internal and external to the learner. The variety of reactions of the learners and their actual progress in the classroom shows that the transition has many challenges for the learners and the teachers involved.