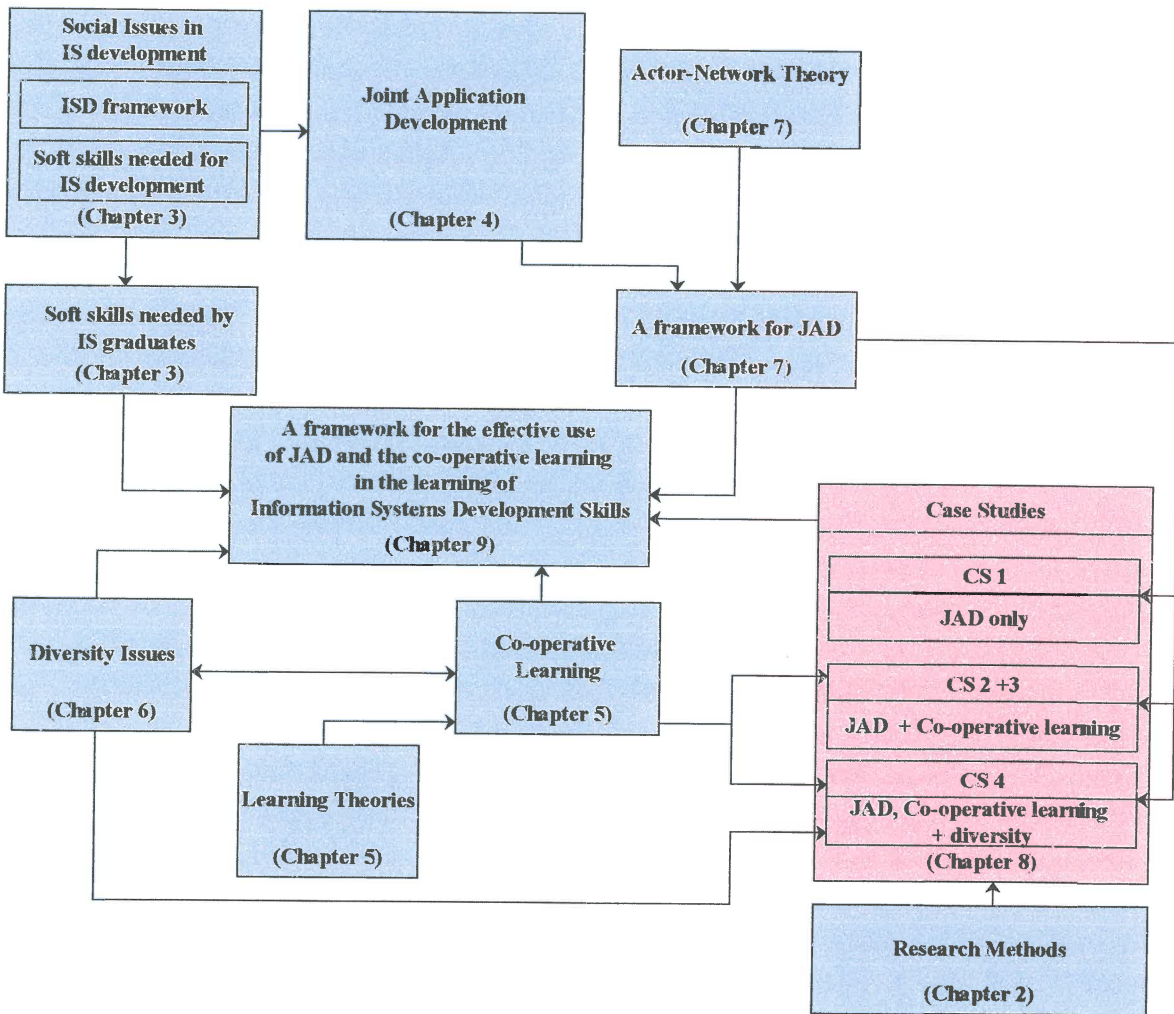


Chapter 8

Using JAD and co-operative learning in the classroom



Chapter 8

Using JAD and co-operative learning in the classroom

Joint Application Development (JAD) workshops had been introduced into the Port Elizabeth Technikon as a learning method as early as 1995. Initially they had been introduced to give the students a feel for how a JAD session was run, but later they were used more extensively as lecturers felt that they helped the students to learn the modelling techniques practised in the sessions. This was just a feeling that the lecturers had, however, and it had never been researched.

The students worked in groups at white boards that were placed around the classroom. The students role-played the various players in the JAD workshops, for example the facilitator or the scribe, while modelling systems using various techniques like entity-relationship (ER) diagrams, function structure diagrams or object-oriented techniques.

This chapter describes the progressive development of the framework for the use of JAD and co-operative learning techniques using four case studies to test the application of the framework. Table 8.1 gives some information about the four case studies. The first case study was a pilot study, carried out at the Port Elizabeth Technikon, that studied the use of the JAD techniques alone in the classroom. Problems with students' participation and the formation of "cliques" within the groups led to the use of co-operative learning techniques in the next case study. The second case study, also at Port Elizabeth Technikon, was one of the two main case studies where various data collection methods were used to determine the students' experiences of using the JAD techniques together with the techniques of co-operative learning. The third case study, at Border Technikon, was done in order to determine if the problems experienced by the Xhosa-speaking

students in the diverse cultural classroom at the Port Elizabeth Technikon, were also experienced in a more homogeneous environment. As the Xhosa speakers did not experience these problems, ideas for helping students work in the diverse cultural environment, were then introduced into the framework and tested in the last case study. The fourth case study was the second of the two main case studies and, once again, a variety of data collection methods were used to get a more complete picture of the students' experiences.

	Institution	Student group	No. of students in class	No. of students answering main questionnaire	Main language groups
Case Study 1	Port Elizabeth Technikon	Information Systems 2	90	75	English, Xhosa, Afrikaans
Case Study 2	Port Elizabeth Technikon	Information Systems 2	113	97	English, Xhosa, Afrikaans
Case Study 3	Border Technikon	Information Systems 3	80	61	Xhosa
Case Study 4	Port Elizabeth Technikon	Second years - mostly doing IS2	129	117	English, Xhosa, Afrikaans

Table 8.1: Overview of Case Studies

Throughout the case studies the grammar of students' comments quoted has not been changed. Most of the results can be found in Appendix B. The discussion of the results is found in this chapter, together with descriptions of the methods used for each case study and a formulation of the framework. The framework was set out before Case Study 1, 2 and 4. It was not modified between Case Studies 2 and 3 as the aim of Case Study 3 was to determine if the methods used in the previous case study worked in the same way in the culturally homogeneous groups at Border Technikon as they had in the culturally heterogeneous groups at the Port Elizabeth Technikon.

8.1 USING JAD IN THE CLASSROOM: CASE STUDY 1

This case study was carried out as a pilot study in 1998 using the Information Systems II class at the Port Elizabeth Technikon. Although the technique had been used for three years prior to this, it had never been studied to see if it was effective or not.

This section gives a description of how the technique was used. The framework is presented and then the results of the study are discussed. These are looked at critically in order to determine what problems were found and offer suggestions as to how these problems can be overcome. The cyclic pattern of reflection, decision, action and experience described in Figure 2.2 for the critical theory is thus used as described in Figure 1.1.

8.1.1 Preparatory sessions - Case Study 1

The students were given preparatory sessions on the use of JAD in industry and the roles played by the facilitator, scribe, users and developers. They were also given some training on the running of meetings, setting up an agenda and keeping minutes.

8.1.2 Running the JAD sessions in the classroom - Case Study 1

8.1.2.1 The nature of the material used

The students were given a scenario for a system for which they had to do the function structure diagrams and the ER diagrams. The scenarios were written in such a way that the students had to determine for themselves what part of the scenario would help them build the functions and what they needed for the data.

The scenarios were from one to two pages long and all the students were given the same material. They were supplied with this material in the previous week and expected to

read it before the class. Appendix C.1 has an example of the type of exercise given to the students.

8.1.2.2 The layout of the classroom

The groups worked in a classroom where each group could be assigned to a board. The classroom had five boards around the sides and desks and chairs that could be moved. The students sat in a horseshoe facing the board with the facilitator (one of the students) standing at the board and recording the design as given to him by the other students in the group. The modelling of the system was the output that was recorded on the board. A diagram showing the layout of the classroom is shown in Figure 8.1. The student

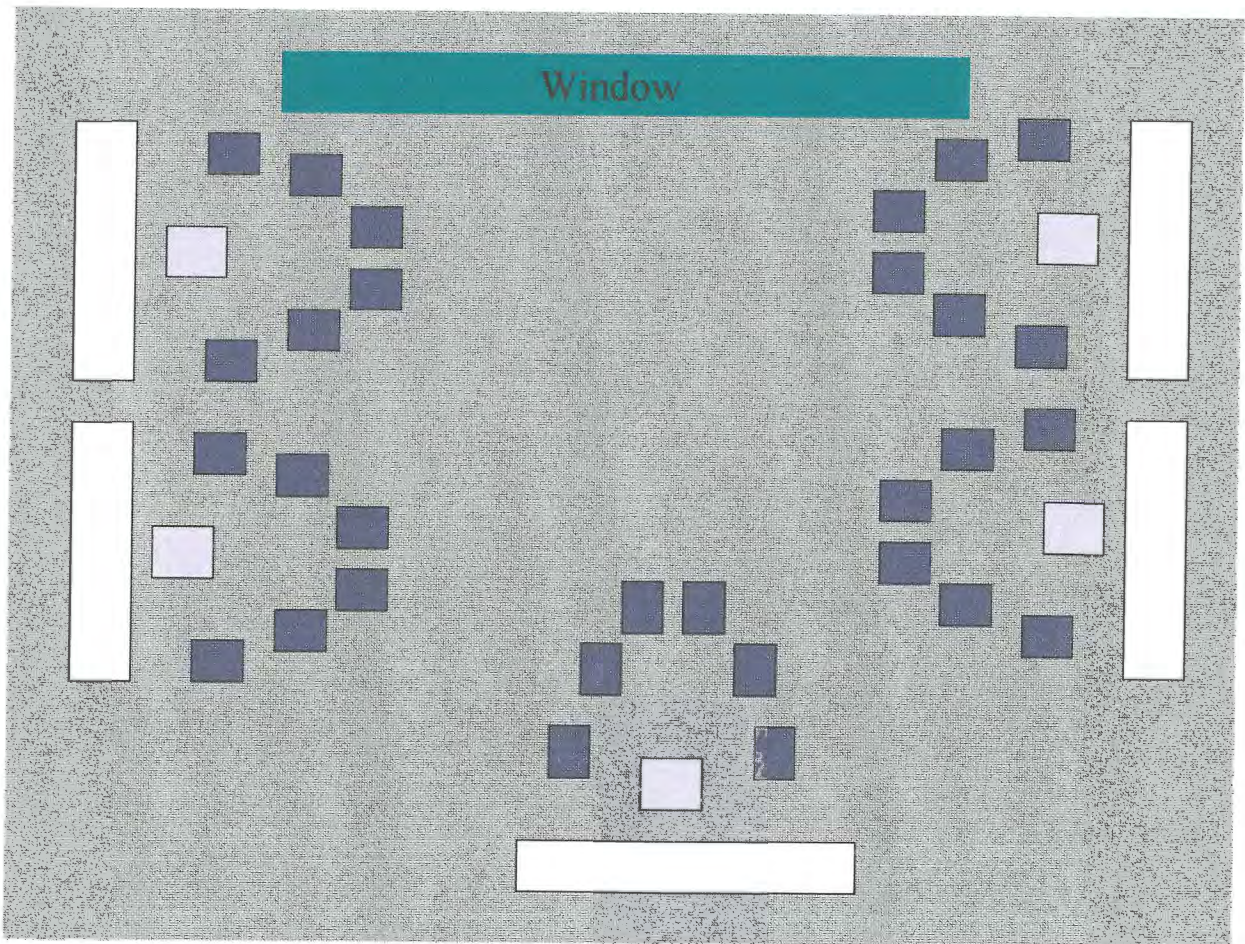


Figure 8.1: Layout of the classroom

facilitator is depicted as purple block with the other students as blue blocks.

8.1.2.3 The composition of the groups

There were five groups, one for each white board available in the classroom. The groups were made up of between six and eight students. The groups were not assigned by the lecturer. The students would form groups as they came into the classroom. This meant that many of the groups were made up of friends with a few late arrivals being added to the group by the lecturer. As will be seen from the results of the student survey, this caused problems within the groups.

8.1.2.4 The JAD process

The students were given the exercise and were required to model both the functions and the data for the system. One of the students was made the facilitator and another the scribe, with the rest acting as users or IT developers. These tasks were rotated so that all the students should have had a chance to be the facilitator and scribe. The facilitator's main task was to make sure that all the students participated, that none dominated and that the group stayed working on the topic. The facilitator was supposed to keep everyone working towards the objective. If there was conflict, the facilitator had to help the group to get to a consensus and negotiate a solution. The students were taught a little about facilitation skills before being asked to do this in class.

The task of the lecturer was not to solve problems or negotiate when there was a conflict but rather to make sure that the JAD facilitator was doing his or her job. The lecturer also checked the results of the design, discussing any problems with the group as a whole. Only in exceptional circumstances would the lecturer get involved in solving the problem with the students. This usually happened when the students were going round in circles without being able to come to any result.

8.1.2.5 Assessment

No marks were given to the group. The lecturer went through the solution with the group and discussed any problems with them. The students did not evaluate their group's processing. The students were evaluated on their knowledge of function structure diagrams and ER diagrams during tests and examinations administered at a later stage.

8.1.3 Original framework for the use of JAD in the classroom

Firstly, the actors within the framework are firstly determined. These actors are both human and non-human. Figure 8.2 gives an indication of these actors.

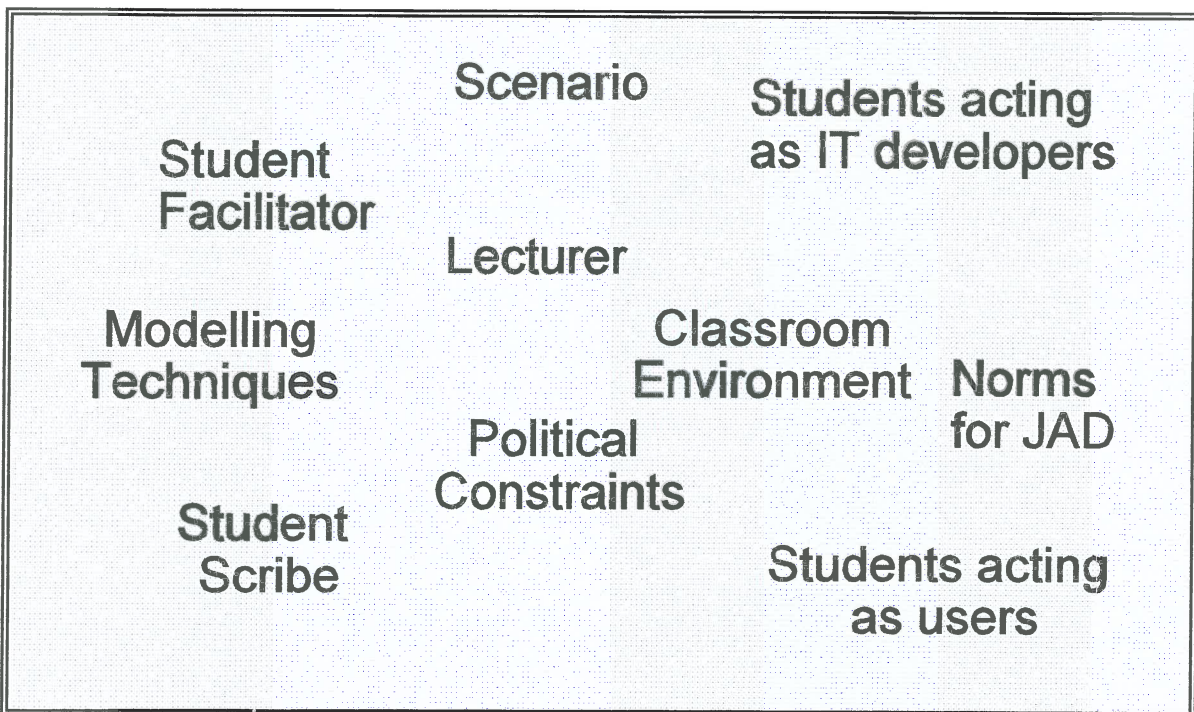


Figure 8.2: Actors in the learning environment network

The **students** act as **facilitators**, **scribes**, **users** and **IT developers** in the classroom. The role of the student facilitator and scribe was rotated. The **lecturer** gave the students a **scenario** which they were required to model using the **modelling techniques** that had been taught to them. The lecturer also moderated the groups as they worked in the

classroom. The **classroom environment** was set up to be conducive to holding multiple JAD sessions with a white board for each group, and desks and chairs that could be moved to form the horseshoe-shaped groups. The lecturer determined **norms** for the JAD session. The last actor was the **diversity** that existed in the classroom. This diversity was multi-cultural, multi-lingual, multi-gender and from students with different academic abilities.

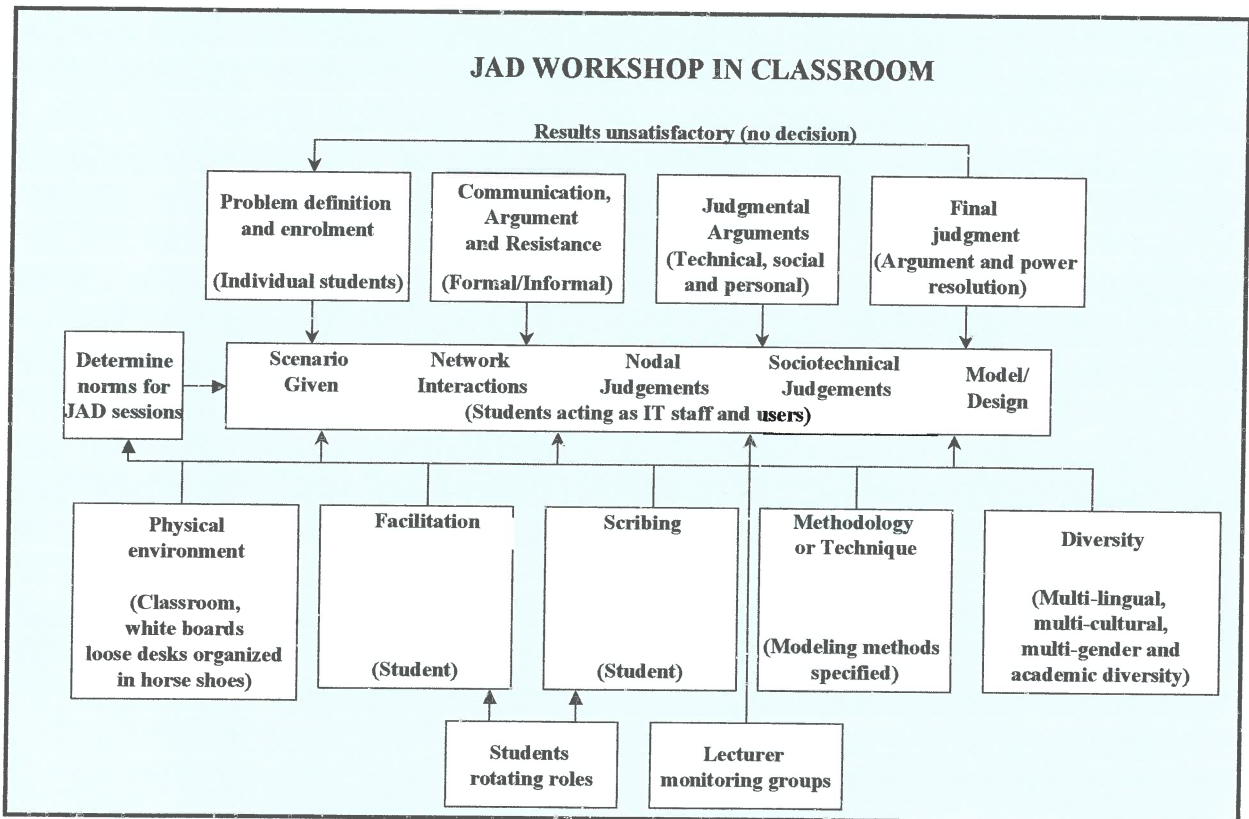


Figure 8.3: The JAD workshop in the classroom

Figure 7.4 for the use of JAD in industry was modified to show its use in the classroom. This is shown in Figure 8.3. The students were involved in the communication, facilitation, scribing, decision making and modelling of the system. In this Case Study, the lecturer defined the norms and gave the students the scenario. They then had to go

through the process of deciding as a group what the design for this scenario would be using the techniques of JAD. As with the JAD workshop in industry this was a process of problem definition, enrolment, communication, argument, judgemental arguments and final judgement.

The students rotated the roles of facilitator, scribe, users and IT personnel. The physical environment of the classroom with its multiple groups, whiteboards, desks etc played an important role in the effective use of JAD in the classroom. The methodologies or techniques used and the political constraints, like the diversity within the classroom, played a role in the way in which the decision making took place. The lecturer was also involved in monitoring the groups. Essentially the method remains a group decision-making process, however, with the model being the end result.

The entire framework will not only consist of what happens in the workshop in the classroom, however. Figure 8.4 shows the additional factors that occur before the JAD sessions and the learning that should take place. These are shown in purple in the figure.

The composition of the groups is an important input into what happens in the JAD sessions in the classroom. In the first case study, the groups were formed by the students themselves as they entered the classroom with late comers added to the groups by the lecturer. The composition of the group is thus an input into the learning environment. Additional to the model are also the pre-skills that the students were taught. The students were given some instruction in JAD facilitation and running meetings.

Output from the process is also shown in terms of the learning that it was hoped would occur. The learning involves the learning of the modelling techniques, together with the JAD, group, interpersonal and communication skills. These are some of the skills needed for being able to work in the sense-making and argumentation orientations for

IS development. As these skills are learnt, they will in turn, affect the way in which further workshops are run and decisions are made, which is why these skills are depicted as both input and output to the workshop activity.

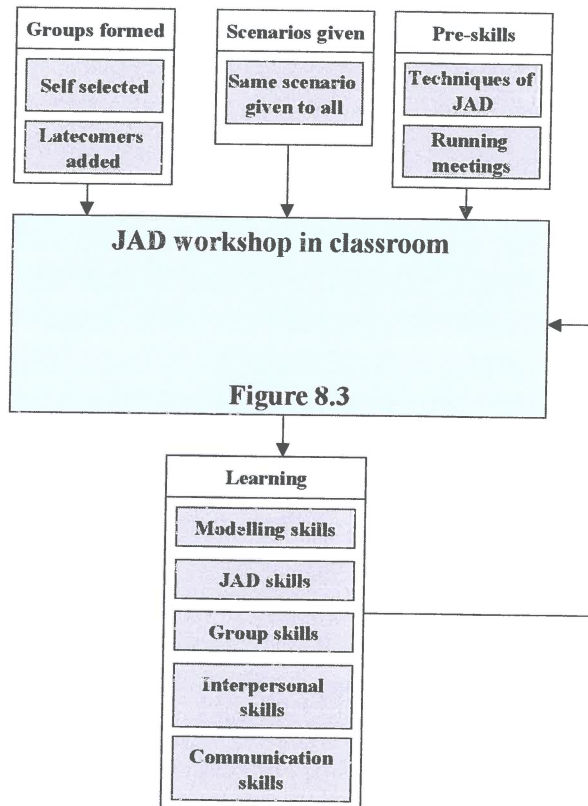


Figure 8.4: A framework for the use of JAD in the classroom

8.1.4 An overview of the results of the pilot case study

The students were given a questionnaire with both open and closed questions. The questionnaire can be found in Appendix A.1. There were 90 students in the class with 75 of them completing the questionnaire. The qualitative results will not add up to 75 as some students put more than one answer per question and others put no answers. The answers from the open-ended questions were categorized to help gain insight into the answers provided by the students.

Most of the quantitative results are compared to the other case studies and can be found in tables in Appendix B.5. The students' answers to the open-ended questions were categorised and the categories with the number answering in each category can be found in Appendix B.1. A discussion of the results is given here.

The class was made up of students following either a business- or a technically-oriented stream. The business stream made up 77,3% of the students, with 22,7% from the technical stream. The students were predominantly from the three language groups found in the Eastern Cape in South Africa, namely English (44%), Afrikaans (36%) and Xhosa (14,7%). Other African languages made up the remaining 5,3%. These results can be found in Table B.7. Although the students were not asked their gender in this questionnaire, the Technical class was all male and the Business class fairly evenly mixed with respect to gender. The Technical class was also predominantly white with the Business class being more mixed. (Questions on these aspects were asked in the questionnaires in the following years but were not asked in the pilot study questionnaire.)

The students were asked how they were allocated to groups and how they would prefer to be allocated to groups. Most of the students (58,7%) said that they were sometimes allocated to a group and at other times chose their own. Most of them seemed to prefer this method (53,3%). Another 22,7% said that they chose their own groups and a slightly higher percentage of 32% said that they preferred this method. There were 17,3% who said that they were always placed into a group with 14,7% saying that they preferred this method. An informal method of assigning people to groups had been used during this case study. As the students came into the class, they were able to form groups with their friends at the different boards. The late arrivals were then placed into the smaller groups as they arrived. As we will see later, this method seemed to cause some problems with friends forming "cliques" and others feeling left out. Although a great number of students prefer to be able to choose their own groups, it is felt that putting them into groups may be more effective.

Most of the groups seemed to be fairly heterogeneous with respect to gender, race, academic ability and language. As the Technical class had been all male (100%) and predominately white, there was little opportunity for them to be in heterogeneous groups with respect to these factors. The rest of the students were in heterogeneous groups, however.

8.1.4.1 Working in groups

The students were asked various questions about how they experienced working in a group. Table B.8 in Appendix B.5 gives an indication of these questions and the percentages of students that answered in each category. The answers to the open-ended parts of these questions can be found in Appendix B.1.1.

There were 24,3% of the students who felt that they enjoyed working in the groups all the time. Most of the students (68,9%) enjoyed it most of the time with 6,8% enjoying it seldom. According to their answers in the open-ended questions, they particular enjoyed hearing other people's ideas, interacting with other people, working as a team, arguing, debating and reasoning with one another, working with people that they would not normally work with and taking part. There were also a couple of negative comments made by individuals like: "*Do not have attend boring lectures*" and "*I did not have to work as much*".

Some of the problems experienced were individuals who did not contribute and others who tried to dominate the group. There were also problems between the different language groups. As the groups formed themselves initially and then had additional members added to them later, they were often initially formed by students from one language group, for example, Afrikaans. The students who were added at a later stage might then be English or Xhosa and when the group would speak Afrikaans, which the Xhosa speakers could not understand, they would naturally take exception to this. This caused some major friction within the groups which the lecturer had to diffuse. As one

of the students, commenting on what they disliked about working in groups, said: *"It was always difficult for me because we were forming our own groups, so if you don't have those friends who know you, you struggle a lot."* Another individual commented that he or she had the problem of *"forcing myself to take part as I am shy"*.

Most of the students felt that they were able to have their say most of the time (66,2%), although only 28,4% felt that they were always able to have their say, as shown in Table B.8. They felt that the student facilitators did try to accommodate everyone and that everyone was able to have his or her opinions taken into consideration. Some of the facilitators had some problems with controlling the group and only asking certain individuals questions, however, as indicated in the answers to the open-ended questions given in Appendix B.1.1.

While a large percentage of the students felt that they were always (21,6%) or most of the time (68,9%) able to contribute to the group themselves, only 6,7% felt that all the group members were contributing to the group all the time. There were 61,3% who felt that the others contributed most of the time with 26,7% feeling that others seldom contributed. As shown in Appendix B.1.1 a large number of the students said that while most of the students contributed, there were usually some who did not. They attributed this to shyness, laziness and to some people knowing more than others. A few students said that they worked well together. Quite a few students felt that their own opinions were listened to and taken notice of. Some said that they were able to discuss if they had a difference of opinion. There were also a few students who felt that they could not take part because they were too shy or did not understand the work sufficiently. Two participants complained that they tried to take part but others did not take notice of their contribution.

Although we had hoped that the facilitator would be able to handle most of the problems mentioned by the students, this did not seem to always be the case. More training might be needed and further monitoring by the lecturer in order to overcome these problems.

It would also seem that the students did not feel the need to explain to other students who were slower than themselves.

There were 54,7% of the students who felt that they were always accepted as group members, with 38,7% feeling that they were accepted most of the time and 6,7% feeling that they were seldom accepted. Most of the comments made by the students were positive although two students did mention that the other students formed cliques and did not accept them. This problem could once again be attributed to the way in which the groups were formed.

It was interesting to note some of the individual comments that students had. The comments ranged from *"Most times we were in a group with friends - felt I could contribute as a member"* to *"The groups were made according to friends, I have few friends"* or *"Some students 'click' and doesn't always accept you"*. Other comments were, on the positive side, *"Everyone was equal and no-one discriminated against the other. Any input was discussed"* and on the negative side, *"Some members showed that they felt they could do a better job than you by their body language."*

There was definitely room for improvement in the results for this section. It would seem that the informal method of forming groups was not effective. The students also needed to learn more about how to work together.

8.1.4.2 Learning in groups

Table B.9 in Appendix B.5.3 shows the results for the students' perceptions of their learning. The results for the open-ended questions can be found in Appendix B.1.2.

Eighty-eight percent of the students felt that the techniques always (32%) or most of the time (56%) were useful for helping them to learn. There were 9,3% who felt that it was seldom useful and 2,7% who felt that it was never useful. The 2,7% who felt that it was

never useful clarified their answers in the open-ended questions by noting that they already knew the work so they did not learn anything more. The students commented on how the techniques helped them to think and understand the work better and how it helped to hear other people's opinions. They said that working practically helped them to remember and learn and that it helped them in tests and exams. An example of one of the student's comments is: *"It made one think and also consider another's point of view. The solution was seen thru different angles."*

8.1.4.3 Facilitation and language

Table B.10 in Appendix B.5.4 gives the quantitative results for the questions and Appendix B.1.3 the categorisations of the answers to the open-ended questions. Although many of the students seldom enjoyed being the facilitator (20,6%) or never enjoyed being the facilitator (5,9%), there were many who enjoyed it most of the time (54,4%) or always (19,1%). They said that they liked being in control and getting people to work together towards a solution but did not like it when the members of their group did not co-operate. They also disliked losing control of the group or when people would take over the discussion. Some students mentioned that they had never been the facilitator. Methods needed to be introduced to make sure that all students were given this opportunity.

The students were also asked about communicating in their home language while being the facilitator. Only 35,7% of the students were always able to use their home language, 18,6% were able to use their home language most of the time, 18,6% were seldom able to use their home language and 27,1% were never able to use their home language. The answers to the open-ended questions showed that the students were quite positive about English being used as the language of the group as this was what everyone could understand. A few did mention that it was more difficult for them to get their point across in English than it would have been in their home language. One of the students commented that there were no words for some of the terms in their home language.

Another suggested that the students be asked to speak simple English so that they could all understand.

8.1.4.4 Use of JAD

The students were asked to comment on whether they thought the techniques they used would be useful in industry. This question is included in this section as it shows if the students were able to decide if what they were learning is applicable and if they had seen the relevance of it. There were 39,7% of the students who thought the techniques would be very useful, 55,9% thought they would be somewhat useful, 2,9% thought they would be seldom used and 1,5% thought they would never be used. Many students mentioned that it was useful for Systems Analysis and Design, with some of those insinuating that it would only be useful for that. Some mentioned that they did not know what happened in industry. It would seem that some work needs to be done in order to show the students the relevance of this for later work although most of the students did see that it would be relevant. A great many of the Technical students thought that it would not really be relevant in their line of work. This perception needs to be revised.

The students seemed to have a good idea as to why the method of JAD was used in the classroom. They mentioned that it helped them to get used to what happens in industry, helped them to work in groups, improve communication and understand better what they were learning. A number also mentioned that it forces them to participate. All of these had been aims of using JAD within the classroom.

The students had been put into a classroom without boards at the start of the semester and thus worked in conventional groups rather than in the JAD method. They were asked "*At the beginning of the semester, there was only one white board in the classroom and how had to work in normal groups, which method do you prefer?*" Most of the students (82,2%) enjoyed working on the boards. There were 15,1% who had no preference and 2,7% who preferred conventional group work.

8.1.5 Reflections on Case Study 1

While the results of the questionnaire were reasonably positive, improvements were needed to solve some of the problems described by the students. As mentioned by Johnson, Johnson and Smith [1991], students do not just co-operate because they are put in a group and told to do so. The essential features for co-operation should be fostered using the techniques of co-operative learning discussed in Chapter 5.

Most of the difficulties seemed to be with the students not participating and with conflict due to differences in the students' knowledge, language and culture. These problems have been addressed in many research projects in co-operative learning.

Some of the problems that the students pointed out could be linked back to inadequate training on how to work effectively in groups. Other aspects could be directly attributed to the informal method of composing the groups which caused some people to feel left out of the group interaction. The scenarios given were also not created to promote co-operation among the students.

This ends the first cycle as shown in purple in Figure 1.1. The method for using JAD in the classroom was planned, the theoretical framework developed, the case study done and the results evaluated in order to determine problems and reflect on them.

In order to address these problems, co-operative learning techniques were combined with the JAD techniques and tested to see if they did improve the situation and reduce the problems experienced by the students.

8.2 USING JAD AND CO-OPERATIVE LEARNING TECHNIQUES : CASE STUDY 2

This section describes how the techniques of co-operative learning were combined with

the JAD techniques in order to promote effective learning of group and modelling techniques. The section first describes the methods used, then gives the framework and lastly the results of the second case study and reflects on the results. Appendix B.2 contains the categorisations of the open-ended questions for this case study and Appendix B.5 contains some of the quantitative results which were compared with the other case studies. This teaching method was described in Thomas and de Villiers [2000] and the results of the first and second case studies in Thomas [1999].

Case Study 2 was done in April - May 1999 in the Information Systems II class at Port Elizabeth Technikon. There were 113 students in the class with 87 completing the main questionnaire. The students were divided into three classes with a maximum of 42 students in one class. The composition of the student body will be discussed with the results of the questionnaire. The students for this case study are considered to be similar enough to compare with those from Case Study 1 and comparisons are made during the discussion of the main questionnaire. These results are found in Appendix B.5. It must be recognised, however, that no two classes are the same and that comparisons of this nature can be dangerous.

8.2.1 Preparatory group skills awareness - Case Study 2

Co-operative learning literature stresses that just placing students in groups and expecting them to co-operate will not be effective. Johnson, Johnson and Smith [1991] among others, stress the need for students to be given some training in the group skills that they will need to promote co-operation.

This skills training was done over three 1 ½ hour sessions prior to the running of the JAD sessions. A fourth week, specifically on the skills needed for JAD, was also included. A brief summary of each of the preparatory lessons is given here.

The students were given lessons on communication skills, with a focus on those skills

that are needed to communicate between users and IT personnel. Different types of communication methods were used and the need for modelling techniques and two-way communication was emphasized. The importance of making notes during communication was also demonstrated.

This workshop is explained in a little detail here to give an example of the type of activity that one can do in order to allow the students to actively participate while learning these skills. It also shows how one can adapt exercises so that they are IT-oriented so that the students see their relevance. The original exercise can be found in Pfeiffer and Jones [1981, p.69-74].

The students are divided into small groups and each group is given the same set of K-nex® sticks and connectors to use. K-nex is a building toy that has sticks of different lengths and connectors that allow you to connect those sticks in different ways. Very complicated 3-D models can be built with the toy. One of the groups is sent outside and asked to build a model. This usually takes about 15 minutes, so one should have some other activity for those inside to do in this time.

The group outside is termed the “users”. The groups inside are the “developers”. The groups inside send one person each out to the “users”. The users cover up their model and must then explain to the “developers” how to build their model. Different communication techniques are used. For example, the first time, the “developers” are not allowed to ask questions or to use pen and paper. The next time people may talk, but still do not use any writing equipment. Later they may use pen and paper and still later the “users” may draw them a model so that they can see what is done. In the last phase, one or two “users” are assigned to each “development” group to help them to build the model.

A discussion is then held on the different problems that were experienced. The “users” normally accuse the “developers” of not listening properly and they have

a problem because they have to repeat themselves over and over again. The problems of the “developers” are also discussed. These usually include the “users” not being clear and they get accused of trying to lead them astray. The different communication techniques are discussed as well as the problems associated with each. These communication problems are then related back to the IS world. One should leave at least 15 minutes at the end of the class for this discussion, otherwise the students just see it as a big game and while they may enjoy it, they will not see the relevance.

The students were also taught how to run problem-solving meetings during the second session. The students were shown a video on how to make meetings more effective. They were then given an exercise to allow them to practise problem solving and decision making strategies within a meeting. The art of reaching consensus rather than compromise was emphasized.

In the third session, the students were given a lecture on group dynamics, group decision making and group cohesion. They, themselves, then determined group norms for their groups and for the class.

Lastly, the JAD process was described to the students giving them background on the participants and how to make the JAD sessions effective. This formed part of their curriculum. Lecturers acted as difficult users to role-play some of the problems that could be experienced and to give some ideas as to how those problems could be overcome.

8.2.2 Running the JAD sessions - Case Study 2

8.2.2.1 The nature of the material used

The modelling techniques that were used in the JAD sessions during the second case

study were the drawing of Use-Case and ERD models. The students were given the scenarios the week before and were expected to read them before the next class. The material was divided into various sections and given to different students, for example, in the Library assignment found in Appendix C.2 all the students were given the general information with one student being given the information for the front desk, another for ordering of books and a third for the finance part. The giving of the different information to the different students was in accordance with the advice from co-operative learning literature that this is one method of promoting participation and individual accountability within the group. Appendix C.3 gives an example of the grocery store. In this example, some students worked in the stores and others at the tills and were given different information. They were also given the information using different terminology. This was done in order to show the students how factors like terminology can cause problems within a JAD session.

8.2.2.2 The composition of the groups

The students were very carefully assigned to groups for this case study. The students were asked to fill in questionnaires that covered their knowledge of some of the business areas that could possibly be done in the JAD sessions, for example, library, grocery store, restaurant, health club, free clinic, etc. (See Appendix A.7.) The questionnaire contained questions, which asked them if they had worked in that type of business, knew it well, knew it slightly or did not know anything about it at all. They were also asked to fill in their mark for the previous year for Information Systems I as well as their gender, home language and language of preference for group work. Almost all of the students chose English as their language of choice for group work and it was decided for this case study to keep the students in heterogeneous groups with respect to language so that they would be “forced” to work in English.

The lecturer then divided the students into five groups per class, that is, one for each board that was available in the classroom. The lecturer tried to get a good mix in terms

of the business areas, gender, language and academic ability. The group sizes varied, depending on the number of students in the class, with a minimum of six and maximum of nine students being assigned to a group.

8.2.2.3 Layout of the classroom

The layout of the classroom did not change from 1998 although there was at least one of the classes that had many more students in it. This meant that the groups were larger and the classroom more noisy.

8.2.2.4 The JAD process

The method of running the sessions was approximately the same as it was in the previous case study. The lecturer was more involved in pointing out where there were problems in the group interaction, however. The co-operative learning literature suggests that the lecturer should, not only monitor the product being produced by the groups, but should also monitor the group interactions.

8.2.2.5 Assessment

Assessment was done on the group processing as well as on the modelling techniques.

The groups assessed themselves during the first and last JAD sessions by means of a questionnaire where they had to answer questions about their group processing. The questionnaire can be found in Appendix A.5. After the first questionnaire was handed in, the lecturer set up a summary of the answers for each group. This was used as a discussion document at the start of the second JAD session. They were made aware of any problems that they themselves had identified, for example, if they were interrupting one another too much. They were also made aware of their strengths. This questionnaire was also handed out after the last JAD session. An overview of the

analysis of the two questionnaires can be found in Section 8.2.6.

An independent observer was used for some of the sessions. She helped to evaluate the class as a whole as well as evaluating individual groups. Her comments have been integrated into the discussion that follows.

The students were also asked to give a buddy rating of each other during the last JAD session. This was used as a practical mark for the students. The buddy rating form can be found in Appendix A.6. The students tended to give one another rather high marks, however.

The students had been given a test that included Use-Cases and ERDs before they started the JAD sessions. They were still busy learning about ERDs at the time of the pre-test so the ERD in the exam was quite different in standard than the test. The results of the pre- and post-test evaluations of the Use-Cases can be found in Section 8.2.7. The examination was done individually and helped to promote individual accountability.

8.2.3 The circles of learning co-operative learning method as applied to JAD

The circles of learning co-operative learning method was described in Section 5.2.6. Eighteen steps were identified for the implementation of circles of learning. Some of the steps were considered optional. Each of these eighteen steps will be listed in Table 8.2, together with an indication of how the step is catered for when combining the methods of JAD with the methods of co-operative learning.

As one can see from the table, this method did try to keep close to the circles of learning method as possible. Slight variations were necessary to try to keep the method as close to the industry methods of JAD while incorporating the co-operative learning techniques.

Recommended steps	Implementation in JAD
Clearly specify instructional objectives.	This is done by giving the students the objectives of learning the modelling techniques as well as the objectives of learning to work with other people in small groups.
Limit the group size to no more than six with smaller size groups for students that are new to co-operative learning to ensure that everyone will participate.	Although the group sizes in the JAD sessions were sometimes eight or nine people, the use of the white boards and the roles that were played within the session allowed for easier communication and participation.
Structure groups so that they are heterogeneous with respect to ability, sex and culture. Homogeneous groups can be used sometimes in order to master specific skills.	Heterogeneous groups were used in the JAD sessions.
Arrange groups in circles to facilitate communication.	The groups were arranged in a horse shoe with the white board at the front. This facilitated good communication with the written work being done on the white board.
Use instructional materials that will promote interdependence among students.	The instructional materials (scenarios) were divided among the students so that different students were given the details of a part of the system to be modelled. This was done to promote positive interdependence among the students.
Assign roles to ensure interdependence. One could assign a summariser-checker to summarise the lesson and quiz group members; an encourager to encourage everyone to participate; a recorder to write down group decisions and an observer to make sure that the group collaborates.	The students were given the roles of facilitator and scribe. Other students played the roles of users and IT personnel. The facilitator can be likened to the encourager and the scribe to the recorder. A summariser-checker was not needed as the lecturer played that role and an observer was not used for the second and third case studies.
Explain the academic task.	The task was explained to the students.
Structure positive goal interdependence by having the group produce a single product or by providing group rewards based on the individual performances of the different group members.	The group was required to model the Use Case models and the ER models on the board for the scenarios given. No rewards were given for this.
Structure individual accountability for learning by giving individual tests or expecting the individual to explain the work to others.	The students were only tested individually at a later stage although the students' group processing was evaluated by their fellow team members.
Structure inter-group co-operation.	This was not done. Each group worked on their own.
Explain the criteria for success. Explain how the individual grades work and how one can earn points for one's group.	Criteria for success were determined by the group effort as well as in the individual's participation in the group. This was explained to the students.

Recommended steps	Implementation in JAD
Specify desired behaviours. These might include: Using people's names, taking turns, making sure each person understands and agrees with the group's answer.	The desired behaviours were those that were expected for a JAD session in industry. These included making sure that people agreed, listening with respect to others and other behaviours that would be desired in group behaviour.
Monitor students' behaviour continually looking for problems with the task or with the collaborative effort.	The lecturer did this.
Provide task assistance. At times the teacher will need to intervene, clarify instructions, encourage discussions or even teach.	This was done to a certain extent although the lecturer tried to keep her intervention to a minimum.
Intervene in order to teach collaborative skills of effective communication, building a trusting environment and managing controversy.	When problems in collaboration were seen, these were pointed out to the students. They were reminded of what they had previously learnt.
Provide closure to the lesson with summaries by students and teacher.	This was not done as a class although the lecturer did it individually with each group.
Evaluate the students' work. Group or individualist incentives can be used although there should be some group incentive.	The lecturer evaluated the models of the groups and discussed any problems with the group.
Assess group functioning through ongoing observation and discussion of the group process.	The groups assessed their own group functioning using a questionnaire and the lecturer discussed any problems that they had with them.

Table 8.2: Circles of learning method and JAD method

One of the advantages of the circles of learning method is that it caters for students learning about group dynamics and learning to work co-operatively which is one of the aspects that we wanted to achieve with the use of JAD.

8.2.4 A framework for the use of JAD and co-operative learning in the classroom

The framework was modified to include the co-operative learning methods. Figure 8.5 shows the new framework. Boxes with changes have been coloured in purple.

The groups were formed by the lecturer rather than the students choosing their own. The groups were also made heterogeneous. The whole scenario was no longer given to all

the students, but the scenario was split among the students. The principles of co-operative learning as well as the rules for the circles of learning co-operative method were adhered to.

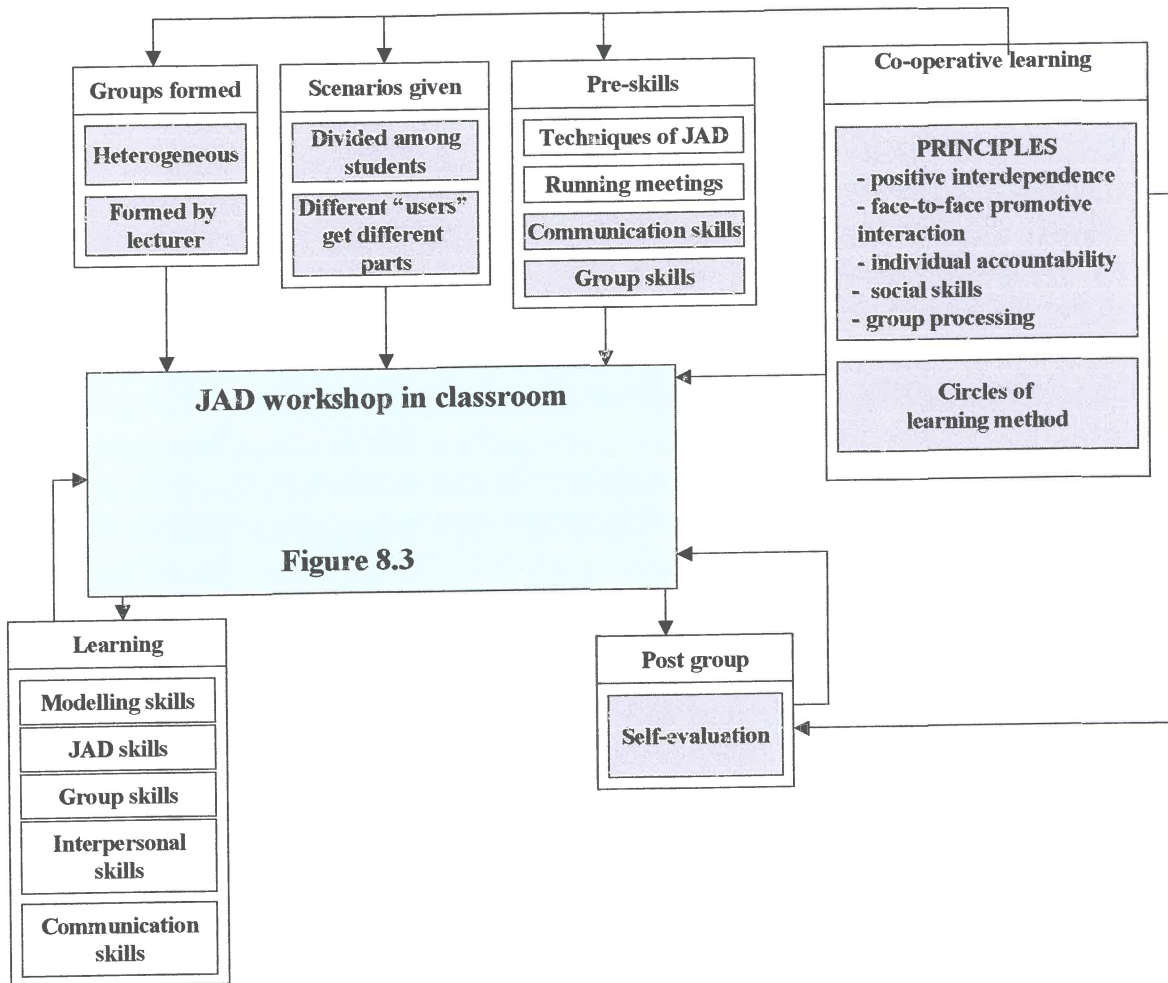


Figure 8.5: A revised framework for the use of JAD and co-operative learning in the classroom

The students' pre-skills training was also modified, including more workshops on communication and group skills. Students set up their own norms for group work rather than have these dictated to them by the lecturer.

Each group evaluated their group processing after the JAD workshop and these results were used to help them learn and modify their group behaviour.

8.2.5 An overview of the results of Case Study 2

Appendix B.2 contains the categorisation of the students' open-ended questions for this case study. Appendix B.5 gives tables showing the quantitative results and their comparison with the other case studies.

The students were from two streams with 66,6% from the business stream and 33,3% from the technically-oriented stream. The students were once again mainly from the three language groups in the Eastern Cape, namely English (57,5%), Afrikaans (26,4%) and Xhosa (13,8%). Other language groups made up the remaining 2,3%. The students were predominately male (69%) with only 31% females overall. The technical class was 93% male but the business class was more mixed with 57% males and 43% females. These results can be found in Table B.7.

Whites made up the majority of the students during this case study (66,3%) with 16,3% Africans, 12,8% Coloured and 4,6% Asian. The business class had a more mixed composition with 61,4% Whites, 19,3% African, 15,8% Coloured and 3,5% Asian. Whites still dominated the class by 61% to 39%, however.

8.2.5.1 Working in groups

Table B.8 compares the quantitative results of the four case studies with respect to working in groups. The categorisation of the open-ended questions can be found in B.2.1.1. As pointed out previously, one must be careful making comparisons between the two groups. Although they were both Port Elizabeth Technikon student groups doing Information Systems II, they cannot be seen as being equal in every respect.

The students' enjoyment of the group work was very similar to Case Study 1 with 25,2% enjoying it all of the time and 64,4% enjoying it most of the time. The students' comments on why they enjoyed it were also very similar, with the students mentioning interacting with other people, hearing other people's ideas, working as a team, finding a good solution together, facilitation, debating, arguing and reasoning with one another, and meeting and working with other people that they would not normally work with as being reasons for their enjoyment. One of the more interesting comments made by an individual was the following: *"I got to know a lot of people and found out it was not so bad working in groups as I had thought."*

Once again "people who did not contribute" was number one on their list of dislikes along with people not taking their ideas into consideration and people who dominated the group.

As mentioned above some of the students disliked not having their ideas taken into consideration. On further analysis it was discovered that eight of the ten students who answered this were Xhosa speaking students with two being English speaking. The problem of the Xhosa speakers being left out of the groups was also noticed by the observer in the classroom. One of the groups that she noticed this phenomenon was in a group that had an African student who was a very high achiever. Despite this, the student's input was not sought by his fellow students. It is, perhaps, best summarized by one of the white, English-speaking, female students, who in her answer to the question on why she thought JAD was used in the classroom, said the following: *"I think that JAD is a brilliant method of educating. If the members participated it would be beneficial. South Africa still has serious racial problems and language barriers. It is sad that students can't even do mock JAD without racial conflict."* There did not seem to be the language problems of the previous case study and there was no open racial conflict. There did, however, still seem to be a problem with students perceiving other students as being of lower status than themselves. It also seemed that sometimes the Xhosa speakers felt shy to participate in the group. This could be because of language

difficulties or feelings of low self-esteem. This aspect would need to be addressed in later studies.

There was quite an increase from the first Case Study in those who felt that they could always have their say - from 28,4% to 40,7%. It would seem that significant improvement has been achieved in this area. One must, however, be careful about saying this as the question in the first case study said "When you were a member of the group and not the JAD facilitator, did you feel that the facilitators gave you a chance to have your say *when you wanted to?*" One of the students in that case study mentioned that they felt that you could not expect to always have your say at the time when you wanted to - which is correct. The question was thus modified and could have been responsible for some of the change. There was also a larger number of students who said "seldom". If you take the never and seldom together, however, one finds a shift from 5,4% to 8,1%, which is not really that large. Many students commented that everyone was able to have their opinions taken into consideration and that the facilitators tried to accommodate everyone. Six people commented that their ideas were sometimes ignored, whereas only two people had mentioned this in the previous case study. A smaller number than previous years commented on the problems that facilitators had. One student felt that "*There must be respect within the session and this needs to be enforced by the facilitator.*"

The students were asked about their own and others' contribution to the groups and here we find a huge improvement from the previous case study. The percentage of people who felt that they themselves always contributed rose from 21,6% to 44,7%. It would seem that the co-operative learning techniques have been effective in this area. There was a slight drop in the number of people who felt that they seldom contributed - from 9,5% to 7,1%. There were also many more positive comments in the open-ended section of the question with 55 people making positive comments compared to the 22 of the previous year. The most common comment was that their input was listened to and taken notice of. Students also mentioned that if they differed on some point then they

could say so. Some still felt too shy or insecure about their knowledge to participate, however.

In the previous case study, 32% of the students felt that other people contributed seldom (26,7%) or never (5,3%). This dropped to only 16,3% feeling that other people contributed seldom and 0% never, which was a great improvement. There was also quite a big improvement in those who felt that other people always contributed - from 6,7% to 17,4%. It would seem that the techniques of co-operative learning have helped to improve the students ability to co-operate and participate. The positive comments in the open-ended part of the question increased from six in the previous case study to 27 in this one, although the problem of people not contributing was still very prominent with 40 students mentioning it. There was much greater variety in the reasons that students gave for non-participation during the second case study as compared to the first. Some attributed it to shyness, others to laziness, the problem of other people dominating, people having their own conversations or people not feeling part of the group. Two students also mentioned the problem of minorities feeling intimidated. As mentioned before, the observer found that the Xhosa-speaking students did not participate very much within the sessions.

There were 71% of the students who felt that they were always accepted in their group, 22,1% felt that they were accepted most of the time with 5,8% feeling accepted only seldom and 1,2% feeling that they were never accepted. This was very satisfying and shows a fostering of group cohesion which is very important. On the whole the students felt more accepted within the groups. The feelings of always being accepted rose from 54% to 71% using the new methods. The forming of well-defined groups and the teaching of group skills does seem to have improved the group cohesion and feeling of belonging that the students have. Students commented that the atmosphere was friendly and that people listened to them. There were, however, still some students who felt that their ideas were ignored or that they were the odd one out.

On the whole, the comments made were very positive. One of the interesting comments made by a student was *"We were a well combined group. Found it easy to feel accepted. We took time to get to know each other in the beginning of our first JAD session."* Group cohesion needs to be fostered more carefully in the groups. Asking the groups to give themselves a name and to learn each other's names can help.

Another comment that made one think that maybe it was not only the Black students who had been having problems was the following: *"Being blonde and female, I was treated as the secretary by our 'superior' male members."* The observer had noticed the opposite problem in one of the groups where there were three dominant females who tended to ignore the male members of their group.

8.2.5.2 Learning in groups

The questionnaire for this case study contained questions which asked the students more specific questions about their learning. They were asked about their perceived learning in general, as well as their group skills of acting in a group, interacting with others and speaking in front of others. The results cannot be compared with the previous case study as the answers for the learning in general were changed and the other questions had not been asked at all. The results are compared to Case Studies 3 and 4 in Table B.9 and categorisation the of the open-ended questions can be found in Appendix B.2.1.2.

Overall 60,5% of the students felt that they had learnt a lot during the JAD sessions with 32,5% feeling that it helped them a little. The remainder either felt that they already knew the techniques (3,5%) or that they had not learnt anything (3,5%). Almost all of the comments made were positive ones with the most being how it helped them to hear the opinions of others and how it helped them to learn about ERDs, Use Cases and JAD. Five students mentioned that working practically helped them to think better.

It was surprising that only 18,6% of the students felt that they were already confident about how to act within a group. This shows how much need there is for this type of activity. There were 48,8% who felt that the JAD sessions had helped them a lot, with 26,7% feeling that it helped them a little. The remainder (5,8%) felt that it had not helped them at all. The students felt that they were less intimidated. One student mentioned that *"It made me realize that anyone can speak their mind no matter who he/she is"*. Another interesting comment was the student who mentioned that she loved being in control and it made her realise that she sometimes needed to contain her enthusiasm in order to let other people have a turn. Another student said: *"Why would JAD help? Confidence comes from within oneself."*

There were 26,7% who felt that they already interacted well with other people. Another 36% felt that it improved their interaction a lot and 31,5% felt that it improved a little. The other 5,8% felt that it did not help at all. Students mentioned how they had learnt to listen to other people and give them a chance, how they had learnt to get many people's ideas and come to a decision and how they had learnt to speak freely in front of others. One person felt that it only helped them a little because if they did not respect someone then they would not interact with them. This was a little disappointing as the point was stressed that in working in groups in industry one will need to be able to work with all types of people - even if one does not "respect" them.

Many of the students commented that they felt that they were more confident to speak in front of people than they had been before. There were 46,5% who felt that it helped them a lot, 26,7% who felt that it helped them a little and 4,7% who felt that it did not help them at all. The rest (22,1%) felt that they already had this skill. One of the students commented: *"It was a wake-up call for me to actually see what talking in front of people was all about."* Another said that: *"Although I am not so shy, JAD improved my self-esteem so I am more confident now."*

8.2.5.3 Facilitation and language

The students were asked about how they enjoyed being the facilitator as well as their experiences of using English when facilitating. These two questions were asked in the previous case study and a comparative table is given in Table B.10.

Most of the students fell in the category of enjoying being facilitator most of the time (65,1%). There were 19,8% who felt that it was enjoyable all the time, 11,6% who felt that it was seldom enjoyable and 3,5% who felt that it was not at all enjoyable. The figure for those who enjoyed it a lot is almost the same as for the previous year. There was a shift from those who seldom or never enjoyed it to those who enjoyed it most of the time with that figure rising from 54,4% to 65,1%.

The students enjoyed having control and getting people to work together to get a solution. They also enjoyed structuring the ideas of others to get a good solution. Less people than the previous year commented negatively on people who did not participate, but some still felt unable to control the group and that people did not listen to them. The noise level was mentioned by four people. There were more students in each class, which led to bigger groups and a noisier classroom than in previous years. The students were given some instruction on listening skills, not talking while others were talking and not interrupting until a person had finished their thought. They do get quite enthusiastic, however, and find it hard to keep to these rules. It is difficult to determine how to get around this problem besides by trying to enforce the rule of only one person speaking at a time. One does not want to stifle the students' enthusiasm too much.

One student mentioned that they disliked the fact that they had to think a lot. This is not considered a negative comment by the lecturers!

There was a large increase this year in the number of students whose home language was English (57,5% from only 44% in the previous year). This led to a situation where

55,3% of the students said that they were always able to communicate in their home language. The percentage of students never able to communicate in their home language was 30,6% with 8,2% saying they were able to communicate in their home language most of the time and 5,9% saying they were seldom able to communicate in their home language. These latter two percentages should have been 0% if instructions had been followed as the work should have been done in English only. It seems like some of the groups in the Technical stream, which had a large number of Afrikaans speakers, did switch to Afrikaans at times. One of the students complained about this saying that the people would sometimes swop to Afrikaans which he did not understand.

Using English does seem to be a positive move, however. The lecturer tried to make sure that the groups were heterogeneous with respect to language. The lecturer perceived that there was less conflict between the language groups than there had been in previous years.

8.2.5.4 Use of JAD

The students felt that the techniques that they had learnt would be very useful (57,5%), somewhat useful (36,8%) or seldom useful (5,8%) in industry. Table B.11 shows the differences between these values from the previous year.

It is interesting to see that there was a huge difference from the previous year. It is difficult to speculate as to what made the difference. One of the factors that came out in the open-ended questions that may have influenced the answer to this question was that the students were more aware of the group skills and how they are used in industry. This led them to make comments on the usefulness of the group skills learned rather than the modelling techniques only. They mentioned how it helped them to develop their listening, communication and group skills that would be useful in industry. The students also mentioned that it was useful for systems analysis and design and that it would help them to actively involve the users.

One of the students made the following statement which possibly sums up what the lecturer was trying to achieve: *"From the examples done in class you gain a good understanding of techniques and when you understand the techniques, you realize the usefulness of those techniques."*

The students were once again asked why they felt that the JAD techniques had been used in the classroom. The students mentioned that it helped them to get used to what happens in industry, taught them to work in groups, helped them to understand what they were learning, gave them JAD skills, helped them to interact with others, improved their communication skills and helped them gain confidence in themselves. More students made positive comments, especially about the group skills, than in the previous case study. This is probably because these skills were emphasized and because they had to evaluate themselves with respect to those skills.

The JAD method of learning was chosen as a method of choice by 76,2% of the students, with 8,3% feeling that they would rather do more traditional group work and 15,5% feeling that they would rather learn individually. It was interesting to note that some of the students got together in classrooms before exams and worked in the JAD method while learning for exams.

8.2.6 An overview of group questionnaire and observation results - Case study 2

The groups had been asked to evaluate their functioning as a group after the first and third (last) JAD session. The table with the results is given in Table B.1 in Appendix B.2.2 of the thesis. An independent observer was also asked to fill in the questionnaire for the groups that she observed during the third JAD session. She also commented on each of the groups she observed. These results can be found in Table B.2 in Appendix B.2.2. A more detailed version of the observer's comments can also be found in Appendix B.2.2.

As the students were only involved in three JAD sessions and were tested after the first one and after the third, no really significant improvements were expected. There were, however, significant shifts in seven of the variables. These rows have been shaded in Table B.1. It would seem that the group members were better at making sure that the objectives were clear to everyone, that the groups were more sensitive to one another's feelings and that they were better at handling conflict. The groups also seemed to be able to structure the lesson more effectively and finish in time. The students also perceived an improvement in their facilitation skills, their ability to ask questions in order to clarify points and their ability to make sense of what the group was telling them. There were no other significant changes.

The observer observed four groups and found problems with some of the students trying to dominate in three of the groups. She also found problems with the participation of the African members of the three of the groups. In two of these groups, she found that the African student did not participate themselves, although one of the students was an A-aggregate student, and with the third she found that the African student was not treated as being of equal status although he did try to participate. One of the groups that she observed also had problems with the female members dominating and the males sitting back and only participating every now and then. Details can be found in Appendix B.2.2.

8.2.7 Assessment of students learning - Case Study 2

The students were given a test of their knowledge of Use Cases before the JAD sessions were held and the examination question served as a post-test. The three Information Systems II lecturers were satisfied that the questions were of the same standard. This was not done for the ER diagrams although more time was spent on these as the question in the examination was much more difficult than that of the test.

It must be remembered that no effort was made to stop the students from doing any extra studying of their own as this was felt to be unethical and not in line with the attempt to

study the topic in context. The results from the t-test are given in Table B.3 in Appendix B.2.3. It is debatable as to whether these statistical results can be considered to be relevant, even though the p-value was highly significant ($p = 2.86E-09$), as no effort was made to stop the students learning from any other method. The graph for the regression analysis is given in Figure B.1 in Appendix B.2.3 and also shows a significant improvement in the marks. The black line is drawn to show where the dots would be situated if the students achieved the same marks in the pre- and post-tests. Those above the black line improved their marks and those below the black line did worse in the post test than the pre-test.

A cross-tabulation of the students' results, as shown in Table 8.3, is also interesting. This table shows the students' results during the pre-test and their corresponding results in the post-test. The table shows that 3 students had between 0 and 49% in the pre-test and stayed between 0 and 49%. Two of the students with between 0 and 49% went up to the 50-64% range and another 2 went up to the 65-79% range. There were 17 students who moved from the 65 to 74% range to the 80 to 100% range and 13 students who moved from the 50 to 64% range to the 80 to 100% range.

PRE-TEST	POST-TEST				Total
	0-49%	50-64%	65-79%	80-100%	
0-49%	3	2	2	0	7
50-64%	2	4	9	13	28
65-79%	0	2	19	17	38
80-100%	0	0	8	32	40
Total	5	8	38	62	113

Table 8.3: Cross-tabulation of pre- and post-test results - Case Study 2

In total 43 student improved their mark categories and 12 dropped. (Eight of those 12 dropping from the 80 to 100 % category to the 65 to 74% category.) It would seem that the method is especially effective for those students whose grades were in the middle categories.

8.2.8 Reflections on Case Study 2

There would seem to be an improvement in the students' participation when comparing this case study to the previous one. Group cohesion also seems to have improved with students feeling more accepted within their groups. The teaching of group skills before the time seems to have been effective in allowing students to be aware of what should happen in groups, how to come to decisions in groups and various other aspects of group dynamics. The division of the material also seems to have been effective in making students more accountable and "forcing" students who may otherwise have been quiet, to participate.

Another positive aspect was that the groups were more heterogeneous and this seemed to help solve the problem of students feeling like there were "cliques" within the groups and that they were left out. There were, however, still problems with perceptions of low status of some of the minority groups with eight of the thirteen Xhosa speakers saying that they did not like it when their contributions were ignored. It is possible that the students should be made more aware of their tendencies towards bias and stereotyping.

The JAD groups also seemed to be effective in helping the students to learn, although as no control groups were present, it is difficult to make that statement with any certainty. The increase in the marks was seen to be highly significant when analysed statistically.

The group activity questionnaires from after the first and third sessions, seemed to indicate that there was some improvement over the three weeks in the way that the groups operated. One of the aspects that needs to be looked at, however, is the tendency of some students to dominate within the groups. One of the roles that Johnson, Johnson and Smith [1991] suggest for group learning is that of an observer who observes the group and indicates if they find any problems in the group processing. It may be a good idea to try using a student observer in the next case study.

This ended the second cycle of the research although the framework and method were not changed before doing Case Study 3. It was decided to do a third case study using almost exclusively Xhosa-speaking students at the Border Technikon, another tertiary institution in the Eastern Cape. This would enable us to see if the problems were from the Xhosa-speakers culture, or whether the problems they experienced were caused by the heterogeneous nature of the groups.

8.3 USING JAD AND CO-OPERATIVE LEARNING: CASE STUDY 3

The third case study was done during the second semester of 1999 at the Border Technikon. The Border Technikon has its main campus in Pottsdam, with satellite campuses, situated in East London and Bisho. Border Technikon was set up during the apartheid era as a Technikon for Africans only. The Bisho and Pottsdam campuses are situated in what was then the Ciskei. Although the Technikon is now accepting students from all culture groups, the student population remains almost exclusively black. Most of these students come from schools in disadvantaged areas and their exposure to technology has been limited. Information Technology is taught at the Main campus and the East London campus. The study was done with the Third year IT students as JAD was part of their syllabus and their lecturers felt that they would be able to handle the questions at that level.

The framework was not modified between the second and third case studies although the method did have to be changed a little due to the researcher only being there for a week and not knowing the students. The students were also only given the questionnaire on the group interaction at the end of the first session and the main questionnaire at the end of the second. This was due to time constraints. The group questionnaire was thus used to help the students determine what problems they were having as a group, rather than as an analysis tool. On overview of the results of the research through to the third case study was presented in Thomas and de Villiers [2000b].

8.3.1 Preparatory group skills awareness - Case Study 3

The researcher went to Border Technikon for one week to work with the students. During this time two classes were held with each group, each class being approximately 2 hours long. The students had covered lectures on meetings and how to set up meetings in the previous year and one of the Border Technikon lecturers did the lesson on Group Dynamics and setting up group norms with the students before the time.

The first lecture included a half hour lecture on the JAD process, JAD participants and facilitating a JAD session. The students then went directly into the JAD session.

8.3.2 Running the JAD sessions - Case Study 3

8.3.2.1 The nature of the material used

The material used was the same as for the Port Elizabeth Technikon students. Only two scenarios were used, one in each session. The students were given the material and given different roles to play in the session as had been done for Case Study 2.

8.3.2.2 The composition of the groups

As the author did not know the students, the method used to divide them into groups was fairly simple. The group in Pottsdam, for example, needed to be divided into seven groups with approximately seven students in a group. The lecturer counted the students from 1 to 7 and put all the 1's into a group, all the 2's into a group etc. This split people who were sitting near each other in order to prevent "cliques" being formed. The groups seemed to be fairly heterogeneous with respect to their abilities. There were many more females than males which meant that some of the groups was almost exclusively female. As almost all of the students were Xhosa speaking, getting the different languages into the different groups was not an issue.

8.3.2.3 Layout of the classroom

There were seven groups in Pottsdam and four groups in East London. Two of the groups used the white boards that were across the front of the classroom and the others used flipchart boards or used flipchart paper that had been stuck to the walls of the classroom. The students did not seem to have too much of a problem using the paper although they usually had to do a rewrite at least once during the session.

8.3.2.4 The JAD process

The method used was the same as for Case Study 2.

8.3.2.5 Assessment

The groups assessed themselves after the first session using the questionnaire in Appendix A.5. This questionnaire was also used by the observer who sat in the classes in East London. The lecturer went through the questionnaire after the first session and prepared a feedback sheet for the students on what they could improve in the following session.

The lecturer went through each groups' solution at the end of the session but no marks were allocated for the solution. Their knowledge of JAD and of ER diagrams would be evaluated in the examination.

8.3.3 An overview of results of the main questionnaire - Case study 3

The students were given a questionnaire with both open and closed questions. The questionnaire was an adaption of the one used in Case Study 2 and can be found in Appendix A.3. In total 61 students completed the questionnaire. The qualitative results from the open-ended questions are given in detail along with the qualitative results in

Appendix B.3. Where students' exact words are used, there may be some grammar errors as English was often the students' second or third language.

There were 22 students at the East London campus (36,1%) and 39 at the Main campus (63,9%) who filled in the questionnaire. The students were mostly Xhosa speakers (91,8%) with a further 4,9% speaking other African languages and only 3,3% speaking English. There were many more females than males in the classes with 78,7% females and 21,3% males. The students were all African (96,8%) except for one coloured student (1,6%) and one Asian student (1,6%) at the East London campus. The results are tabulated in Table B.7.

8.3.3.1 Working in groups

The students were asked the same questions about working in groups as the students in Case Study 2 had been asked. Overall the students were extremely positive about doing the group work in the form of the JAD sessions. The students at Border Technikon cannot be considered to be the same as those from Port Elizabeth Technikon, as they have different backgrounds in terms of their schooling and their tertiary experiences. Although the students were asked to answer the questions truthfully, it must be considered that the students, were perhaps more inclined to answer in a positive way as the lecturer was visiting their campus. The atmosphere in the classroom was very good, however and it seemed as if most, if not all, of the students were participating and enjoying the experience.

Table B.8 gives some indication of the percentages from the four case studies with respect to the students' group experiences.

Most of the students (61,4%) felt that they always enjoyed working in the JAD groups, with 29,8% enjoying it most of the time, 7% enjoying it seldom and 1,8% never enjoying it. Students mentioned how it helped them to hear other people's ideas and to interact

with other people. They also said that it helped them understand better and get a better solution. Three people mentioned that it helped them to have someone criticize their ideas, which is a comment that had not been made by the students at Port Elizabeth. This idea that they found it useful having someone pointing out where they went wrong was expressed in some of the answers to other questions too. A comment of interest by an individual was the person who said: *"I was able to participate which is something that I am not used to."*

Although some of the students mentioned that they disliked it when people did not contribute, this comment was only made by six students. Something that they also disliked was conflict. One person commented on the problem of people who just agreed with everything. This seems to have been a larger problem than in the previous case studies as will be seen by the answer to the question on the contribution of others. Another individual comment was from a student who said that he disliked it *"when the group proceeded when everyone did not understand."*

Seventy percent of the students felt that they were always able to have their say in their groups with 30% feeling that they were able to have their say most of the time. It would seem that the Xhosa speakers do not have a problem with having their say if they are in homogeneous groups with other Xhosa speakers. Only one person made a negative comment in this section and that person felt that some of the facilitators tried to dominate the session.

This is reflected in the students' answers about their own contribution to the groups. Sixty-five percent felt that they always contributed with the remainder (35%) feeling that they contributed most of the time. Even the students in the groups which had to use English as their language of communication did not have difficulties in getting everyone to participate. This would support the idea that it is the groups with students from heterogeneous cultures at the Port Elizabeth Technikon that are causing the problem and not their inherent Xhosa culture. Students said that the others took notice of their input and that their ideas were often used by the group. Some of the individual

comments are interesting. One student wrote: *"Everytime that comes discussions, I participate very much so that I can know my own mistakes and give my views to the group."* Another commented: *"I had to support my ideas and did not undermine others intelligence so we were all equal."*, while yet another said: *"I actually felt good about myself because it is something that I am not used to."*

The students also felt that the other members of the group were contributing. There were 55,2% who felt that other people always contributed against a maximum of 17,4% in the previous two case studies. The groups seemed to be able to get everyone to participate and contribute far better than had been the case in the previous case studies although six of the students again mentioned the problem of some people just agreeing to everything. Comments by individuals included: *"They had to (contribute). The session was very interesting for anyone to keep quiet."* (Brackets provided.) Another said: *"When we were having a problem, for example, someone takes time to understand what we are saying, we tried all ways to make her understand."*

A very high percentage of students felt that they were always accepted (88,3%) with the remainder feeling like they were mostly accepted (11,7%). The students felt that the others listened to them and that the atmosphere was friendly. There were quite a lot of interesting comments made by individuals. Some of the comments included: *"I felt shy initially but ultimately I felt free."*, *"I was not with my friends but after JAD we were all laughing and no one was classified as 'stupid'"*, *"Nobody showed any disapproval"*, *"I never felt inferior or stupid. I always felt my contribution was worthwhile"*, *"Their faces meant it. There was not anyone who was shy or uncomfortable."*, *"Not once did I feel shy or lost."* and one merely said *"Yes, yes, yes."* It is interesting how many of these comments are about how they did not feel stupid or disapproved of. Perhaps the students' fear of appearing 'stupid' or 'inferior' is why they have difficulty contributing in the mixed groups.

8.3.3.2 Learning in groups

Table B.9 gives an indication of the quantitative results of the students' perceptions of what they had learnt during the third case study. The comments made by the students can be found in Appendix B.3.1.2.

An overwhelming 91,4% of the students felt that they had learnt a lot during the JAD sessions. Another 6,9% felt that they already knew the techniques with only 1,7% feeling that they had only learnt a little. These high percentages were also reflected in their feelings about how much they had learnt about being confident to act within a group. A very high percentage (82,1%) felt that they felt much more confident about how to act within a group, 14,3% felt that they already had this skill and another 3,6% felt that they had learnt a little. A number of students commented on how they initially felt shy but now feel that they can share their ideas. There were quite a few interesting individual comments. Some of these are listed here: *"Normally I do not contribute in class but this time I did."*, *"It is difficult to start talking among strangers but this helped me see that in order to do work, you must forget other things like what other people think."*, *"When I worked in groups before, I used to be shy or find that my ideas were not used because I would not say them out loud."* and *"I am a shy person but today I learn that there's nothing one can do with shyness and be confident about yourself."*

The percentage of people who felt that they had learnt a lot about interacting with others was 77,8%. Another 16,7% felt that they already had the skills, with 5,6% feeling that they had learnt a little.

There were 72,4% of the students who felt that they had learnt a lot about speaking in front of others from this exercise. Another 3,5% felt that they had learnt a little and 24,1% felt that they already had this skill. Once again the main comment made by the students was that they were shy but now felt more confident about speaking in front of people.

Some of the ways in which the students expressed this sentiment were quite interesting. One said: *“At first my voice was shaky and I spoke so fast, but in the end I was confident of what I was doing.”* Another found that it was *“Difficult at first but JAD allows you to ask other members so that the attention is not always on you.”* The third one put it in quite an interesting way. He/she said: *“I am usually afraid to be seen by those eyes looking at me but today I am not afraid of those eyes.”* This comment is interesting as Xhosas consider it respectful to look down when they talk to one another, unlike the European culture where it is considered a good communication medium to look someone in the eye.

8.3.3.3 Facilitation and language

The students enjoyed being the facilitator with 70,7% enjoying it all the time, 25,9% enjoying it mostly and 3,4% enjoying it seldom. The answers to the open-ended questions can be found in B.3.1.3 and the table with the quantitative results in Table B.10 in Appendix B.5. The students said that being the facilitator helped them to learn how to speak in front of others, that they liked having control and getting others to work together towards a solution. They also liked hearing other people’s ideas. When asked what they disliked, nine people said “Nothing” and six said they disliked people who did not contribute. One person wrote that they disliked: *“Not being able to contribute yourself because you must give others a chance.”*. Another put this in a different way, saying: *“Writing others views when I had my own right ones.”* This is obviously a problem for the brighter student although it is usual for the student facilitator to give their opinions even if they are the facilitator.

The groups were informed that they should check what language everyone in their group understood and that they could use any language that was understood by all their group members. The answer on the board had to be in English, however. At the Main campus in Potsdam, most of the groups used Xhosa with a sprinkling of English. In East London, there were some students who did not understand Xhosa which meant that English was

used in some of the groups. They would sometimes switch to Xhosa to explain something to one another and would then switch back to English again later. The scenario was also given to them in English. This seemed to suit these students well as can be seen by their participation and feelings of acceptance in the group.

It was interesting to note the students' answers to this question as the perception of the lecturer had been that most of the groups at the Main campus were using Xhosa almost exclusively and that two of the four groups at the East London campus were also using Xhosa most of the time. The students would speak in Xhosa and would put in the English terminology for things like "entity" or for some of the terminology used in the scenario. They would, for example, use English for terms like "member" in the library. The observer confirmed this for the East London groups. Only 30,4% of the students felt that they could use their home language all the time, 35,7% felt that they used their home language mostly with 21,4% saying that they could seldom use their home language and 12,5% that they never used their home language. The 12,5% (7 students) and some of the 21,4% (12 students) could be accounted for by the two East London groups which had five to six students each.

After the quantitative question, the students were asked: *"If you were not able to communicate in your home language, mention the language that was used in your group and describe your experiences using that language."*

Twenty-two of the students said that English was used in their group and 6 said that a mixture of Xhosa and English was used. Only six of the students commented on their having to use English and these said that it was good to use English as they would one day have to use it in industry and that it was an international language.

8.3.3.4 Use of JAD

The modelling techniques were felt to be useful in industry by 77% of the students and

somewhat useful by 21,3%. Only 1,7% felt that the techniques would seldom be of use to them in industry. The quantitative results are in Table B.11 and the comments can be found in Appendix B.3.1.4.

The students were also asked about the use of JAD in the classroom. They said, among other things, that it was used to improve their communication, help them gain confidence, help them to work in groups and to know what happens in industry.

The students were overwhelmingly in favour of using the JAD techniques for learning with 86% favouring JAD over conventional group work (7%) and working individually (7%).

8.3.4 Overview of group questionnaires and observations of the groups - Case Study 3

The group questionnaire was only administered at the end of the first day and was used to help the groups determine any problems that they had been having in their groups. It was also used by the observer who added her comments to the questionnaire. The table showing these results is in Table B.4 and the detail of the observer's comments can be found in Appendix B.3.2.

On the whole the groups seemed to work well together. One of the problem areas seemed to be that the groups were not sensitive to the feelings of the other members of the group. There also seemed to be a bit of a problem with the ability of the facilitator to take the discussions of the various group members and make sense of them on the board. The groups' ability to discuss differences and handle conflict also could be improved.

The observer found differences in every group. In the first group, the first facilitator tried to dominate the group and it took some time, and a change of facilitator, before the

group relaxed and were able to be productive. The second group was made up of some very strong personalities and the lecturer had to remind them a few times to listen to one another and respect one another's ideas. By the time the observer saw the group, they too had settled down and were working well together. They did not really support one another as a group, however. The observer found that the third group was very open and relaxed with each other and, although they had had a problem with handling of conflict during the first day, were able to overcome this on the second. The last group that the observer observed had a couple of students who were very quiet and, despite the best efforts of the facilitator, did not really contribute. There seems to have been quite a difference in the groups. It may be that the method of almost "randomly" assigning people to groups using the counting method did not get a very good balance in the groups.

8.3.5 Reflections on Case Study 3

The students worked very well together and were enthusiastic about the method. This is also indicated by the 86% who said that they preferred JAD over conventional group work or individual work. Although the classroom had not been set up for JAD sessions, the sessions were still successful. The students who had to use flip chart paper on the walls did not have too much difficulty and usually only needed one rewrite during a session. The lecturer was also able to monitor seven groups in one classroom which is quite difficult with conventional group work. The classroom itself was quite big so the groups were able to meet without influencing each other too much.

The results would tend to confirm the belief that the Xhosa-speaking students do not find difficulties in participating and getting involved in the group when they are among other Xhosa speakers - even when they are speaking in English. The problem seems to come from the diversity of the groups found in Port Elizabeth. This diversity seems to contribute to making the students shy to participate or causing some students to dominate the sessions more than others.

This ends the next cycle of the research and completes the pink block of the research approach given in Figure 1.1. The learning environment was planned and a theoretical framework developed before Case Study 2. This was then implemented in Case Study 2, the results studied and a further Case Study done and reflected upon.

It was felt that it was important to continue with heterogeneous groups in Port Elizabeth in order to give the students the experiences of working with students different from themselves. This meant that the problem of diversity and how to handle diversity within the classroom and for group work needed to be investigated.

8.4 IMPLEMENTING IDEAS FOR HANDLING DIVERSITY: CASE STUDY 4

Case Study 4 was done in 2000 at the Port Elizabeth Technikon with second year Information Technology students. During this case study some of the techniques for dealing with diversity in the classroom were investigated and incorporated into the learning environment. The results from the questionnaires can be found in Appendix B.4 and B.5.

Techniques for dealing with diversity and dealing with diversity in group work were discussed in Section 5.4 and Section 5.5 respectively. Many of these methods were already evident in the method of using JAD and co-operative learning used in the previous case studies but some ideas were found to enhance the method for the diverse classroom. Thomas and de Villiers [2000c] has been accepted for publication and describes some of these methods and their implementation within the JAD sessions.

8.4.1 Methods of dealing with diversity already in the learning environment

The JAD and co-operative learning environment offered an opportunity for students of different cultures, classes, ethnic groups, ages, sex and learning styles to interact with

one another. The students were given an indication of how they would need to practise their profession in a multicultural setting. The role and rationale for each activity, together with the learning objectives were discussed with the students.

The material for the case studies had been chosen to be appropriate to the diverse student body by using such diverse examples as a health club and a free clinic. Part of the material was given to the different students so that they were forced to co-operate with one another in order to get the end result.

Research has shown that contact with other groups reduces prejudice and stereotyping especially when it occurs in informal settings with people of the same social and economic status [Visser, Cleaver & Schoeman, 1999]. Getting groups of the same social and economic status is impossible in the learning situation at Port Elizabeth Technikon and one of the aims was to get the students to work with people who were different to themselves. Contact theory supports the idea of working in small groups that are structured to promote contact. This was done by combining the techniques of JAD with the co-operative learning techniques.

During the second case study, the lecturer had chosen the groups to be of mixed ability, gender, race and experience. The size of the group was also related to the task given and kept to less than nine. Further suggestions on the creation of groups were incorporated into the method and are discussed in the following section.

The students were the source of power in the classroom, acting as facilitators, scribes, users and IT personnel. They were able to work without excessive interference by the lecturer. The roles that were assigned to the students were rotated and were not based on stereotypes of gender or race. Each of the students had a chance to play the role of facilitator and act as the leader of the group.

Group skills and group function skills were also taught to the students during Case Studies 2 and 3. Workshops on communication, decision making and conflict handling

within groups were held. Each group set up its own norms for group functioning although the lecturer did monitor the groups.

Each of the aspects mentioned above had been suggested as methods of working with diverse students. The next section describes how the learning environment was further enhanced in order to enhance the learning experiences of the diverse student groups.

8.4.2 Modifications to the learning environment for catering for diversity

8.4.2.1 Assertiveness training

One of the problems found was that some students tend to be passive and do not participate, whilst others are aggressive and try to dominate the session. It was decided to give the students some insight into what it means to be assertive and techniques that they could use to improve their assertiveness.

An assertive person was defined as having respect for themselves as well as for others. The assertiveness training was done before any of the other workshops by the Student Counselling Department at the Port Elizabeth Technikon.

8.4.2.2 Multicultural skills training

There is some debate in the literature as to whether students should be given explicit instruction about one another's culture or not. Some authors [Bodibe, 1997; Koger, 1995] feel that students should be given such classes. Others like Goduka [1996] and Miller and Harrington [1990] argue that one should avoid a "tourist" view of another's culture as this makes students more aware of in- and out-group activities.

A middle road was chosen for this study. No specific instruction on different cultures was given, but while the students were doing their workshops on communications and group

processing, special problems caused by diversity were highlighted. Problems that the lecturer, herself, had experienced when trying to converse in a second language were described, for example. Another example of communication differences discussed was how the Xhosa- and English-speaking students use a different type of body language with regard to eye contact. The idea of respecting one another's viewpoint and listening with empathy to a speaker was emphasized. This was also emphasised in the assertiveness training, as acting assertively was seen as a means of improving communication and interaction with others.

The lecturer also made sure that examples and case studies used with the students in the entire course were more suited to the diverse student body. For example, most of her notes and examples used English, male names and some of these were modified to reflect Xhosa and Afrikaans names as well as names of females.

8.4.2.3 Determining the groups

The students were once again put into heterogeneous groups by the lecturer. These groups were heterogeneous with respect to their knowledge of the business areas and their academic abilities.

Although there is some literature to suggest that single language groups are more effective, there is some debate on the issue. As mentioned before, one of the aims was to get the students to work effectively with people who were different from themselves, so single language groups were inappropriate. It was decided, however to take the advice of Rosser [1998] who suggests that minority students should not be placed on their own in a group. She suggests making sure that there are at least two people of each minority in a group even if some groups then have no minority students. This was done and, although the groups were as heterogeneous as possible, no group had only one Xhosa, English or Afrikaans speaker or one female, even if this meant that some groups had no females or Xhosa speakers in their group.

8.4.2.4 Fostering group cohesion

Both the students and the lecturer often had problems learning the students' names. This was especially difficult with the Xhosa names as these contained clicks which are often difficult to pronounce. The students were given name tags to wear in the initial sessions and were asked to make sure that they all learnt one another's names, including the pronunciation. As name tags are quite common in JAD sessions, it was put to the students as a method that might be used in industry. In the later sessions they wrote their names on the board to make sure that they could remember them. This was unnecessary by the last session as they had learnt to know one another.

A group identity had been achieved to a large degree in the previous case studies. The only difference in this case study was that the group was asked to give themselves a name. This helped to promote initial discussion among the group as well as giving them identity as a group.

8.4.2.5 Monitoring the group activity

Rosser [1998] suggests that the students should monitor the roles that each of the group members plays. One of the roles suggested by Johnson, Johnson and Smith [1991] for a co-operative learning session, is the role of an observer. This role is not used in industry JAD sessions and was not used in the first three case studies. It was decided to let the scribe also act as a student observer to monitor the roles that the students play and the group activity during the fourth case study.

8.4.3 Framework for using JAD and co-operative learning with a diverse student population

The framework in Figure 8.5 was modified to model the changes made to cater for the

diverse student population and this is shown in Figure 8.6. These changes are shown by colouring in the boxes where modifications have taken place in purple.

The lecturer made sure that there were at least two students of a minority in a group, even if this meant that some groups did not have any minority members. Group cohesion was encouraged by letting the groups give themselves a group identity by choosing a

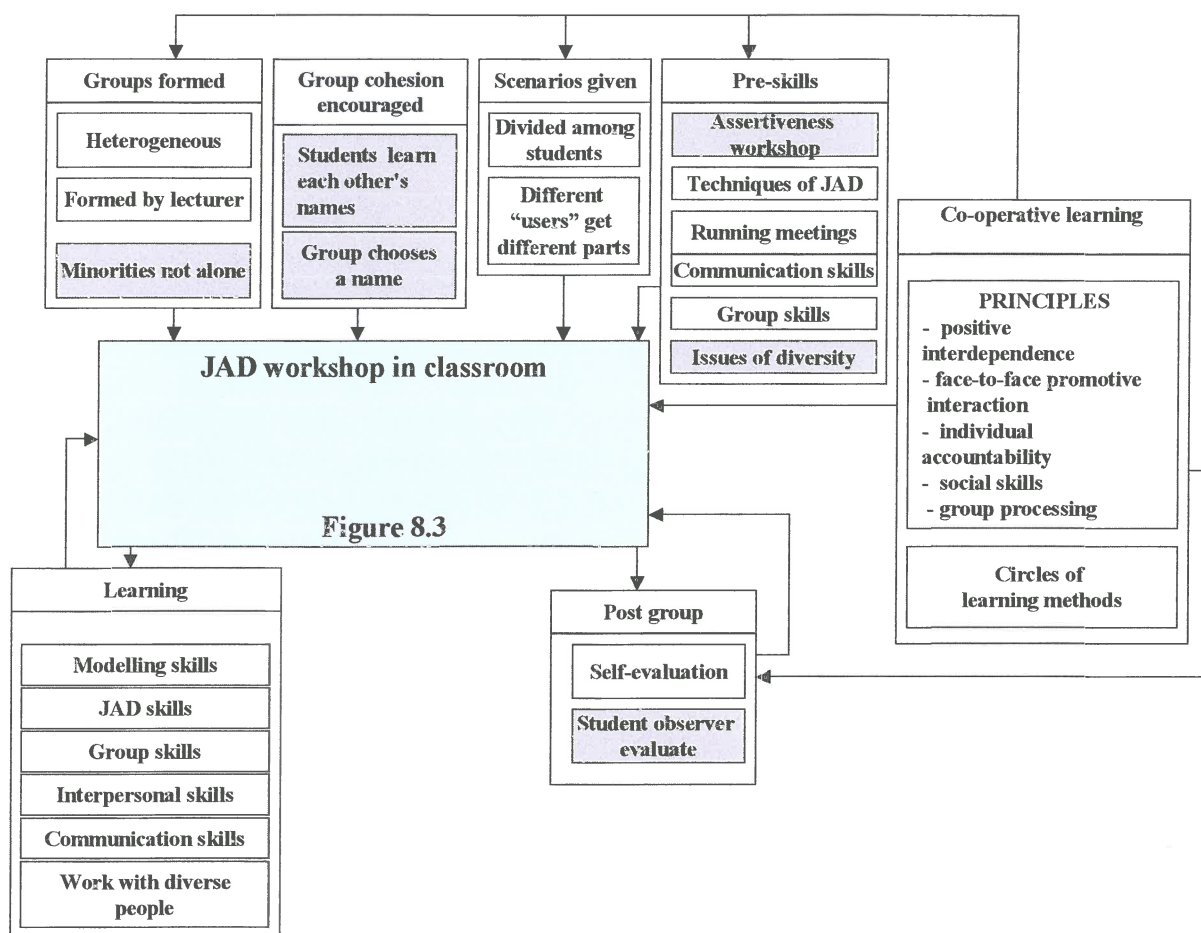


Figure 8.6: Framework for the use of JAD and co-operative learning in a classroom with diverse students

name for themselves. The students were given name tags and asked to learn each other's names during the first group session.

The scribe was also asked to play the role of observer for the group in order to help the group to monitor their own group processing.

Pre-skills training included the learning of how to be assertive rather than aggressive or passive. Issues of diversity and the influence of culture on communication, body language and other aspects were highlighted during the pre-skills training.

8.4.4 An overview of the results of Case Study 4

The students were divided into two streams, namely a Business-oriented stream (40,2%) and a Technically-oriented stream (59,8%). This was the first year that there had been more Technical students than Business students. The Business students were divided into two class groups and the Technical students were also divided into two class groups. The tables with the percentages for the composition of the groups can be found in Table B.7 in Appendix B.5.

The classes were once again made up of different language groups, namely English (44,4%), Afrikaans (30,8%) and Xhosa (21,4%). There were four students (3,4%) who came from other language groups and these were all languages spoken by Africans in South Africa, for example, South Sotho or Zulu. The spread of languages was more even than it had been in the previous years. There were many more speakers of Xhosa and other African languages than there had been in the past.

There were approximately twice as many males (66,7%) as females (33,3%) overall. The Business class was fairly evenly distributed - 53,2% males and 46,8% females, but the Technical class had 75,7% males and 24,3% females. There were more females in the classes than there had been in previous years, however.

The students came from all the race groups in the Eastern Cape region of South Africa. There were 26,1% who were African, 10,4% Coloureds, 60% White and 3,5% Asians. Although Whites formed the major composition of each class - 58,7% in the case of Business and 60,9% in the case of Technical, the black students together formed 41,3% of the Business class and 39,1% of the Technical class. The Technical class, in

particular, had many more black students than in previous years.

In previous years, the JAD sessions had been done as part of the Information Systems 2 (IS2) course. This meant that everyone who was doing the course had done the modelling techniques and were at more or less the same level. During 2000 the Technikon decided to add a module specifically for teaching the softer skills like communication and group skills needed by IT students. The course is called Business Skills. The JAD workshops were moved to this course.

This meant that, although there were many students who were busy with IS2 (78,6%), there were also a few who were not. Those busy with IS1 were students who had failed Information Systems 1 in the previous year. There were only 4,3% in this category. Those finished with IS2 (3,4%) had passed the course the previous year and were busy with Information Systems 3. The majority of those not doing IS2 fell into the last category (13,7%). They had finished IS1 but had not yet started IS2. The Technikon has an academic support program where students who do not quite have the grades to do the normal course, generally those coming from disadvantaged backgrounds, are given the opportunity to do the course over four years. In the first year, they do two of the main stream subjects, one of which is Information Systems I. They also do courses in Study Methods, Commercial Calculations and English. In their second year, the students do the new Business Skills module but do not do Information Systems 2 until the following year.

This difference in the students' knowledge of the modelling techniques was naturally a source of concern. The students do a very brief introduction to ER diagrams in their first year but have no knowledge of Use Case diagrams. The lecturer gave them one lecture on Use Case diagrams so that they at least knew what they were. No extra lessons were given on ER diagrams. Throughout the discussion of the open-ended questionnaires, one will see some of the comments made by these students about their learning and interaction, given this problem.

As mentioned before, the students were placed into heterogeneous groups but there was never fewer than two people of any minority in a group. This included the academic development students who were also placed with at least two of them to a group.

8.4.4.1 Working in groups

A comparison is done with the second case study and not the third, as the third case study was done at Border Technikon. This comparison allows us to look at the differences that took place at the Port Elizabeth Technikon between 1999 and 2000. Although Case Study 2 and Case Study 4 were done with second year students at the Port Elizabeth Technikon in consecutive years, the students cannot be considered equal in every respect, especially as some of the students were not doing Information Systems 2 in the year 2000. This should be kept in mind when discussing these results. The categorization of the answers to the open-ended questions can be found in Appendix B.4.1.1 and the quantitative results in the Table B.8 in Appendix B.5.

There were 26,5% of the students who always enjoyed the JAD sessions. Another 65% enjoyed it most of the time, giving a total of 91,5%. There were 8,5% of the students who seldom enjoyed the sessions. These values are not much different from those achieved in the first and second case studies.

The students mostly enjoyed hearing other people's ideas, working as a team and having the opportunity to share their ideas, interact with other people and working together to achieve the goal. Other factors mentioned were the friendliness, the debate with others and the way in which the JAD sessions improved their understanding.

There were many more positive comments than had been expressed in any of the previous case studies which was good to see. Some of the group members made interesting comments. One said that they enjoyed "*when we were all patient with one another and accepted each other as one.*" Another Afrikaans speaking student said that

they enjoyed “*working with different races, people with different backgrounds. I learnt a lot about the way people think and about them.*”

The main negative comments were about people who did not contribute, closely followed by those who took over and dominated the group and people who had private conversations.

In the previous year in Case Study 2, the second most used comment was that people did not take the person’s ideas into consideration. This had been mentioned by 10 people, 8 of whom were Xhosa speakers and was one of the indications that there was a problem with the Xhosa speaking students in the diverse group. The number of students experiencing this problem in Case Study 4 went down to 4, and of those 1 was English, 1 was Afrikaans and 2 were Xhosa.

There was one Xhosa-speaking student who complained that “*some of the guys speaks only to their race group sometimes - not all the time.*” One of the students who was not doing IS2 experienced it differently, however, stating that “*I don’t really know any of the second years so I felt a bit uncomfortable at first and was afraid to speak out but everyone was friendly and helpful*”. The problem of some of the students not doing IS2 was obviously a difficulty for some of the students, however, as indicated by the three students who said that they disliked the fact that some students did not know the techniques.

Most of the students felt that they were always (52,1%) able to have their say or that they were mostly (44,4%) able to have their say. Only 2,6% felt that they were seldom able to have their say with 0,9% feeling that they were never able to have their say. There was a distinct improvement in this from Case Study 2. The people who felt that they were always able to have their say went up from 40,7% to 52,1%. If one considers that in Case Study 1, this figure had only been 28,4%, then there has been a very big improvement in this area. (Although the question was modified a bit between the first

and second case studies.) The people who felt like they seldom or never had their say, went down from 8,1% in the second case study to a 3,5% combined value in the fourth case study.

The students showed in the open-ended part of the question that they felt that everyone was able to have his or her opinions taken into consideration and that the facilitators tried to accommodate everyone and give them a chance to speak if they wanted to. Some of the facilitators still had difficulties, however. Some of those mentioned were difficulties in that they only listened to some of the people, were unable to control the group and allowed some to dominate.

There were no students who mentioned that their ideas were ignored, although one Xhosa-speaking student did mention that *"because my group members were so active, sometimes you just feel to hold back until the facilitator gives you a chance."* One of the students who was not doing IS2 said: *"I did not have a lot to say, but they did listen to me and when I was wrong, they explained it to me what was wrong about what I said."*

Almost all the students (96,5%) felt that they were always (49,5%) or most of the time (47%) able to contribute to the group. Only 3,5% felt that they were seldom able to contribute. There was a rise of 4,8% from the previous year in those who felt that they were always able to contribute. From the first case study to the fourth, the improvement was 27,9%, which seems to indicate that the adding of the co-operative learning methods and the diversity methods were successful in this aspect with the co-operative learning methods being most important. Those who seldom felt that they were able to contribute went down from 7,1% in 1999 to 3,5% in 2000.

Quite a lot of the students felt that people listened to their ideas and that these ideas were often used by their groups. Others said that they spoke when they thought it was necessary. The comments were generally positive. Two of the three people who said that they sometimes did not understand the work were students not doing IS2. One of the English-speaking, coloured students mentioned that he tried to contribute but was not

taken notice of. One of the brighter students said *“No offense to the rest of the group, but sometimes I know I’m right. Even after explaining, the decision is made and it is the wrong one.”*

Contributions by others did not improve much from 1999 to 2000. The people who said that they felt that others always contributed was 17,2% compared to 17,4% in the previous year. Those who felt that others contributed most of the time went up from 66,3% to 69,8% and those who felt that they seldom contributed went down from 16,3% to 12,9%. The question of improving this figure further and how to do this would have to be the topic of future research. The co-operative learning techniques did improve the figures from the first to the second case studies but the techniques for handling diversity did not seem to improve the figures much. As 18% of the students had not yet covered the modelling techniques used in the JAD sessions, one might have expected that this figure would have deteriorated in 2000, however. The fact that the figures stayed relatively constant would be cause for some hope that if all the students had been doing IS2, as they had in the past, that the figures would have improved. This is merely speculation, however.

Even more of the students than in previous years commented that some students did not contribute although most of the students did. There were ten students who felt that this was due to some knowing more than others. The fact that ten people mentioned that the problem of non-contribution was due to some people knowing more than others, compared to only one mentioning this in the previous year, would tend to lend credence to the idea that the fact that not all the students were doing IS2 influenced this result.

It was encouraging to note the students’ responses to how they felt about being accepted in the group. There were 83,5% who felt that they were always accepted. This increased from 71% in 1999 and 54% in 1998. The remaining 16,5% felt that they were accepted most of the time. None of the students felt that they were seldom or never accepted. In 1999 these figures had been 5,8% for seldom and 1,2% for never. It would seem that the techniques implemented in 2000 for dealing with diversity were particularly

good for letting the students feel accepted within the groups.

This is also shown in the open-ended question results where students mentioned that the atmosphere was friendly and that people listened to them and treated them with respect.

It is interesting to note that there were no negative comments mentioned by more than one person. Some of the negative comments made by individuals were : *“Sometimes it felt like they knew that all your contributions meant nothing at all.”* Another said that some people are narrow-minded about taking suggestions. Some of the interesting comments on the positive side were: *“They accepted me just as I am, did not look for faults or anything.”*, *“Nobody was marginalised and everyone spoke and joked about everything.”*, *“If I did not understand, they would explain to me.”*, and *“The group was cool in that every idea was important and used to come to an answer.”*

There were hardly any negative comments and nobody felt that they seldom or never were accepted in the group. This would seem to indicate that a definite improvement had been made in this issue over the three years.

8.4.4.2 Learning in groups

The students were asked questions about whether they perceived that they had learnt through the JAD sessions. They were asked about their learning in general, the group skills learnt, whether they felt they had learnt to interact with others and whether they had learnt to speak in front of other people. The categorisation of the students' comments can be found in Appendix B.4.1.2 and the quantitative results in Table B.9. Table B.9 also contains the quantitative results for the learning across the other case studies for comparison purposes.

As can be seen from the table, the students' perceptions of their learning in general was fairly similar from 1999 to 2000. There was, however, an improvement in the students'

perceptions of their learning to act in groups and to interact with other people. The learning to speak in front of others did not change much either.

Most of the students (63,2%) felt that they learnt a lot. Another 29,8% felt that they learnt a little with 6,1% feeling that they already knew the techniques and 0,9% that they had not learnt anything. These figures changed very little from 1999 despite having students who did not know the techniques very well at all in the class. It is interesting to note that two of the people who said that they learnt only a little said that they already knew the techniques quite well and five said that they knew the techniques quite well but it helped them iron out some problems.

In the open-ended questions, the most common remark was that it helped them to think and understand the work better. Many also commented that it helped to hear other people's opinions and it taught them about group work.

One student mentioned that *"Everyone is forced to pay attention and can see what is being done clearly. If anyone is unsure of something it is usually explained to them"*. Another said *"Anything I previously struggled with has been solved and I can now use the techniques that I learnt."* On the negative side, one student said: *"I think it would have helped a lot if I were not in an environment where people tended to ignore others."* Almost all of the comments were positive, however, with only two or three individuals making negative comments.

There were 21,4% who felt that they were already confident about how to act in a group. Those who felt that they learnt a lot amounted to 58,1% with 19,7% feeling that they had learnt a little and 0,9% (1 student) that they had learnt nothing.

The percentage of the students who felt that they had learnt a lot about how to act in a group increased by approximately 10% from 1999 to 2000. It is difficult to know if this can be attributed to the techniques that were implemented to cope with diversity. The idea of acting assertively and having respect for both themselves and their fellow

students was stressed more during 2000 than in previous years. There were seven students who commented that they felt part of the group. No students had said this in previous years. Perhaps the ideas used for helping with diversity helped the students to feel more comfortable, which in turn helped them learn how to act in the group. Both the lecturer and the independent observer felt that the groups' interaction improved over the three lessons.

The students' open-ended answers were similar to the previous year although the idea of feeling part of the group was more prominent in 2000. Students said they felt less intimidated and that although they were shy at first, they now felt more confident.

One student mentioned that *"I actually cared about my group towards the end."* The idea of respect came through in the answer of another student who said *"A lot of it deals with respect for others and teamwork."* One student who was obviously confident in their own abilities said: *"I learnt to listen to other people and not always consider what I'm saying right and I learnt to change my mind when there was a need for that."* Another less confident student said: *"You realize that what you think isn't always wrong but is sometimes right."*

It was encouraging to have someone say *"It made me believe in myself always."* Group work is important for IT professionals so it was good to have a student comment: *"I were not a person for working in groups. I hated it and now I am able to do so."*

The answers to the question were particularly encouraging. The only negative comments were really neutral comments that came from the three students who felt that they were still not confident.

There were 49,6% who felt that they had learnt a lot about interacting with others. Another 27,8% felt that they had learnt a little with 20% feeling that they already knew how to interact and 2,6% feeling that they had not learnt anything.

Comparing this to the previous year, one once again sees that there was a fairly significant increase in this area. Those who felt that they had learnt a lot went from 36% in Case Study 2 to 49,6% in Case Study 4. These increases for the previous question and this one had not really been expected but it would seem that the techniques that helped the students to feel more comfortable working in their groups, also made them feel as if they had learnt more.

Students commented that they learnt to speak freely in front of people. Others said that they met new people and learnt to interact with them. Some mentioned that it taught them to listen to others. It is interesting to note that of the 32 students (27,8%) who said that they had only learnt a little, 11 mentioned that it was because they already knew how to interact with others.

The students' comments were generally positive and there were some interesting comments made by individuals: *"Once I started talking it was much better and it helped me feel confident."*, *"I usually like to walk alone but during the group sessions I adjusted and it was not so bad."*, *"I have learnt to be assertive and to question things that I am unsure of. I shall know how to approach a 'quiet' person"*. A comment that sounded negative was *"I am generally a recluse (I keep myself to myself). No man is an island but if a man could be an island then it would be me."* Although this sounds negative, the student had marked the block that they had learnt a lot. The only two somewhat negative comments, from students who said that it did not help them at all, were: *"If a person does not know how to speak his mind by now they need a psychiatrist not a JAD session."* and *"Interaction with people comes with everyday social behaviour and cannot be learnt quickly"*.

A number of the students mentioned how it helped them to have to interact with people of different races and cultures: *"It helped me understand how to interact with people of different races and cultures."*, *"I was able to interact with different people in a different language"*, *"It removed my shyness especially to different cultural groups and gender"* and *"It was good to work with the opposite sex, different races and coming into contact"*

with different backgrounds.” The first two comments were made by White students and the last two by African students. Although a lot of group work is done at Port Elizabeth Technikon, generally the students are allowed to choose their own groups and they choose within their own language and cultural groups. The students seem to appreciate the opportunity to work with other groups.

The percentage of people who felt that they already knew how to speak in front of other people was 27,2%. Many of the students (42,1%) felt that they had learnt a lot with 29,8% feeling that they had learnt a little and 0,9% that they had learnt nothing. If one considers that those who felt that they already knew about speaking in front of people then the percentages stayed relatively constant from the one year to the next. A change of only about 3 to 4% occurred.

On the positive side, one of the individual comments was: *“I did not have the techniques to speak in front of people but now I can because of the JAD sessions”*. On the negative side a student who had answered that they did not feel that it helped at all, said: *“When in a small group you quickly pick up if people are listening to you and value your opinion.”*

8.4.4.3 Facilitation and language

The question asked in the case study about being the facilitator was the same as in the previous case studies, namely: How did you experience being the JAD facilitator? The students were then asked to comment on what they enjoyed the most and what they disliked the most about being the JAD facilitator. The results can be found in Appendix B.4.1.3 and Table B.10.

Generally the students seemed to enjoy facilitating all the time (28,7%) or most of the time (55,7%). Only 13,9% enjoyed it seldom and 1,7% did not enjoy it at all. It is interesting to note that there was a shift of 9% from those who enjoyed it most of the time in Case Study 2 to those who enjoyed it all the time in Case Study 4 as shown in Table

B.10.

Students said that they enjoyed having control and getting people to work together towards a solution. It was interesting to note that seven of the students expressed the sentiment that being the JAD facilitator made them feel more part of the group. This feeling had not been expressed in any of the previous case studies.

After the first JAD session, many of the students mentioned to the lecturer that facilitation was more difficult than they had thought. This is expressed by the student who said: *"It is not that easy to always keep people on the right track when standing in front and thinking about everything that must be done"*. Other students commented on how the JAD facilitation had helped them to learn different skills: *"Teaches you to respect others and to treat others in a fair minded manner. Sometimes my opinions were not always right"*, *"I enjoyed it because I felt I had a lot to give, but also a lot to learn and I think they are important life skills"* and *"Helped me learn to keep quiet when I needed to listen and write. It was difficult but I enjoyed it."*

On the negative side the students disliked people talking among themselves and people who did not co-operate. Others did not enjoy talking in front of other people. There were much fewer negative comments than positive.

The problem of the students talking among themselves or having private conversations had not even been mentioned in Case Study 2 and yet was one of the most common problems indicated in this case study. One of the steps that the lecturer took to improve this situation was to tell the students that they should make sure that they were not sitting next to their best friend in the group. In the lectures on JAD it had been mentioned that one should try to mix the users and the IT personnel for two reasons - one was to stop private conversations and another to stop the "us" and "them" mentality of the group. When the observer and lecturer noticed the increase in the private conversations in the groups, this "rule" was stipulated to the students and did seem to help the situation.

They were then asked to comment on their experiences if they were unable to communicate in their home language. The percentage of students speaking English as their home language had dropped from 57,4% in 1999 to 44,4% in 2000. This affected the results for this question as shown in Table B.10.

Only 39,1% were always able to use their home language. Another 13,9% were able to use it part of the time with 17,4% seldom able to use their home language and 29,6% never able to use their home language. There were two groups where that the lecturer noticed that English was not always used in their discussions. The one was a predominantly Xhosa-speaking group where all the students in the group said they understood Xhosa and the other was a group with a number of Afrikaans-speaking students. The latter group agreed among themselves that either English or Afrikaans could be used as they all understood both but some of them felt more comfortable using their home language.

8.4.4.5 Use of JAD

The students were asked about whether they thought the entity-relationship modelling techniques would be useful in industry, as well as why they thought that the JAD techniques had been introduced into the classroom. The question was slightly different from that used in Case Study 2 as it specified the entity-relationship techniques. This question was asked to try to determine if the JAD sessions helped them to see some of the relevance of what they were learning. The categorisation of the results can be found in Appendix B.4.1.4.

The students felt that the techniques would be very useful (53,5%) or somewhat useful (43,9%). Only 2,6% felt that they would seldom be useful with no students feeling that they would not be used at all. These figures did not differ very much from Case Study 2 in the previous year.

The students' comments were similar to the previous year although there were more comments on the modelling improving design of systems and databases.

The students were once again asked why they thought the techniques had been used in the classroom. The learning of how to work in groups was the most prominent idea, closely followed by the idea that it gets the students used to what happens in industry. The ideas of helping with communication and interaction with others was also prominent. There were eight students who felt that it was to get them to know one another better. Improvement of the students' design techniques, group decision making, leadership and confidence were also mentioned by quite a few students. These results were very similar to those of the previous case study although the interpersonal skills development came out more prominently.

One interesting comment made by a Xhosa-speaking male was "*JAD allowed me to speak well with people. It helped me to develop smiley faces in the classroom, thereby making the classroom atmosphere more comfortable.*"

The JAD method was chosen by 72,7% of the students as their preferred method of learning, with conventional group work being chosen by 13,6% of the students and individual work by another 13,6%. These results were fairly similar to what they had been in the previous year. This is only about a four percentage point shift from the students choosing JAD to choosing conventional group work.

8.4.5 Evaluation of group processing - Case Study 4

Appendix B.4.2 includes Table B.5 which gives an indication of the way that the students experienced working in groups after the first session and after the third. The observations of the observer are also given in this part of the appendix.

As there were only three sessions, no great differences were expected and the Mann-

Whitney showed that there was a statistically significant improvement in five of the questions. The first significant factor was in the dominant members being allowed to dominate the group (p -value = 0,038). This was interesting as in the previous year this aspect had actually been worse at time 3 than it was at time 1 (although not significantly so). Another factor that improved significantly was in the facilitator's ability to determine if the members of the group had reached consensus before moving on to the next point ($p=0,030$). It was good to note that the group members were also more sensitive to the feelings of the other members ($p=0,049$). As in the previous year the students' ability to structure the session and complete the task on time also improved significantly ($p=0,022$ and $p=0,000$ respectively). All the significant shifts of the means were in the right direction. The shifts in the wrong direction were all 0,1 or less.

An independent observer observed four groups during Case Study 4. The observer did not fill in the questionnaire as the previous observers had done, but rather wrote notes on his observations. Detail of the observer's comments can be found in Appendix B.4.2.

Some of the interesting observations that he made concerned the problem of the students, especially in the larger groups, holding private conversations. The groups would form smaller discussion groups instead of discussing the problem together. He found that the placement of the students within the groups affected this. After his observations, we moved the students so that friends did not sit next to one another. This was based on the idea from JAD sessions that you should split users and IT personnel so that they do not hold private conversations.

The observer was able to be in the sessions during the first and the last JAD sessions. He found that the group cohesion had improved and that the students seemed to be more focussed and task oriented. Participation by all was more of a problem in the first session than the last, but still remained a problem in one of the groups. Domination by some also seemed to improve.

8.4.6 Assessment of students' learning - Case Study 4

The students were given a pre-test on the use of use cases and ER diagrams and the examination served as a post-test. The students had completed ER diagrams before the pre-test as it was decided to use these to measure if learning had taken place rather than the use-case diagrams. The students tend to find ER diagrams fairly difficult as is shown by the pre-test average of 50,12%.

Once again, it must be remembered that no effort was made to stop the students from doing any extra studying as this was felt to be unethical and not in line with the attempt to study the method in context. This should be kept in mind when looking at these results. The lecturers felt that the examination question was a bit more difficult than the question that had been used in the pre-test.

As the students' marks could be matched between the pre and post-test, it was possible to do a t-test and a regression analysis of the marks. These results can be found in Appendix B.4.3 in Table B.6.

The scatter plot, shown in Figure B.2 shows that there was a general improvement in marks. The straight, red line shows the line for the regression analysis. The formula for the regression line is $\text{post-test\%} = 44,018 + 2,9639 * \text{pre-test\%}$. The correlation value is $r=0,37943$. It is possible that the correlation value is a little low (although still significant) because of the big increase in scores for students in the low range.

The black line shows where the students would have lain if their marks had stayed the same for the two tests. Those above the line improved their marks and those below the line did worse. As one can see, the method seems to have been more effective for those in the low to medium range, rather than those whose scores were high to start with. It was especially effective for those whose scores were very low.

This can also be seen in the cross-tabulation of pre and post test results given in Table 8.4. The 0-49% interval used in Case Study 2 was divided into two intervals in this case study as the students marks for the ER diagrams had been much worse than those for the Use Cases. For the same reason the top interval was changed to 75-100.

PRE-TEST	POST-TEST					Total
	0-29%	30-49%	50-64%	65-74%	75-100%	
0-29%	0	8	8	3	2	21
30-49%	1	5	12	5	1	24
50-64%	1	12	14	6	5	38
65-74%	0	1	3	1	5	10
75-100%	0	0	4	5	6	15
Total	2	26	41	20	19	108

Table 8.4: Cross-tabulation of pre- and post-test results - Case Study 4

There were 21 students in the 0-29% interval in the pre-test. All of these students improved their marks: 8 going to the 30-49% interval, 8 to the 50-64% interval, 3 to the 65-74% interval and 2 making it into the 75-100% interval. In the 30-49% pre-test group, one went down, 5 stayed in the same interval and 18 moved up. The improvement in marks does not look quite as good for the higher intervals. In the 50-64% interval, 13 went down, 14 stayed the same and 11 improved. There were 108 students in total. Of these 55 improved at least one interval, 26 stayed in the same interval and 28 went down in their marks. In this case study it seemed that the students who benefited most were those in the lowest ranges.

8.4.7 Reflections on Case Study 4

There did seem to be some improvement from Case Study 2 to Case Study 4. Students felt more accepted within the groups and felt that they were able to contribute more. There was also quite an improvement in their perceptions of what they had learnt about

working in groups and interacting with one another. This is perhaps as a result of their feeling more part of the group.

The assertiveness training also seemed to help and the idea of respecting one another and improving their own self-esteem came through in many of the answers to the open-ended questions.

It would seem from the observations made that a students' place within the group has a part to play in preventing private conversations and improving group cohesion. Students should be asked to make sure that they are not sitting next to their best friend in the group. The motivation given to the students for this was that in JAD workshops one should not have IT and users sitting next to each other in order to prevent private conversations and a feeling of "us" and "them".

Giving the students the role of observer as well as scribe did not work very well in the sessions. The student observers tended to be very positive about what was happening in the groups even though the lecturer and person acting as observer found that there were problems. Using the anonymous post-group self-evaluation questionnaires seemed to be more effective.

There is still some problem with trying to get everyone to contribute, although a large majority of the students said that everyone contributed always or most of the time. This did not seem to improve from Case Study 2 to Case Study 4. One reason for this might have been that some of students were not doing IS2 and it would seem that one should be thankful that the percentages did not go down. Another factor that could be looked at is the size of the group. The smaller groups seemed to encourage participation better than the larger ones.

8.5 CONCLUSION

Chapter 8 has addressed the questions: “*How should lecturers combine the methods of JAD and the methods of co-operative learning in their classrooms?*” and “*How should the framework be designed in order to promote the learning of group skills, interaction skills and modelling skills in a classroom with diverse students?*”.

Bringing JAD techniques into the classroom has been an effective way of helping the students to learn about working in groups, interacting with others, speaking in front of small groups and learning the sense-making and argumentation skills needed by IS developers today.

The JAD techniques were made more effective by incorporating the co-operative learning methods. Students need to be taught the skills of co-operation and team work. The groups should be formed by the lecturer rather than allowing them to form in a haphazard manner. The groups should be heterogeneous. The learning material should also be divided to promote positive interdependence and individual accountability. The groups should evaluate their own group processing.

In South Africa, at least, and possibly in other countries, the problem of diversity in the groups should not be overlooked. Some students are naturally shy and play a passive role in the groups while others tend to dominate. Assertiveness training should be added to help the students realise their problems and to help give them some techniques for overcoming those problems. The groups should be formed in such a way as to make sure that no-one feels left out. This can be done by making sure that minority students are not alone in a group and that students learn one another’s names. The students should also be made aware of diversity issues in communication and group work.

The following chapter brings all of these issues together and presents the final framework for using JAD effectively in the classroom.