The use of interaction methods in a blended learning environment

Evaluating the use of interaction methods in the blended learning environment in two courses of a Masters program at the University of South Australia, unit Systems Engineering & Evaluation Centre

By: Marieke Klink

University of Twente
Faculty of Behavioural Sciences
Educational Science and Technology
Master track: Human Resource Development

The use of interaction methods in a blended learning environment

Evaluating the use of interaction methods in the blended learning environment in two courses of a Masters program at the University of South Australia, unit Systems Engineering & Evaluation Centre

By: Marieke Klink

University of Twente, Faculty of Behavioural Sciences
Educational Science and Technology, master track Human Resource Development
Enschede, January 2006

Supervisors:
Dr. Irene Visscher-Voerman (University of Twente)
A./Prof. David Cropley (University of South Australia, unit SEEC)

Executive summary

Eight lessons learned

The University of South Australia, unit Systems Engineering & Evaluation Centre in Adelaide wants to ensure that the LMEF Masters program is representative of best teaching practice in post graduate education, and, that the program is meeting the needs of the client. From this perspective, they have asked for an evaluation of the Research Methods in a Multidisciplinary Environment' course (RMME). When conducting an evaluation study, one can focus on several perspectives. Because the length of this research project was only a few months and the learning was delivered in a blended learning environment, this research project focused on the different interaction methods in a blended learning environment.

In this executive summary different recommendations will be given which are elaborated in the written implementation plan. By implementing these recommendations, the quality of the interaction methods in the blended learning environment of the RMME course can be improved.

There are many different possibilities of blending interaction methods, but there are no standard rules available to find the correct blend. The only thing that can be said is that the correct blend of blended learning must be targeted so that there is an overlap in the resources. The students should be able to obtain the same information by means of several formats and manners and the students should be able to get answers to questions which are important to them, regardless of time, location, place or learning preferences. See figure 2 for different possibilities to blend.[1]

To find out what the quality of the interaction methods in the blended learning environment of the RMME course of LMEF Masters program was and how it could be improved, different activities were undertaken.[2] In table 1, the major findings are presented. See also figure 1 for the satisfaction of the users (students and the lecturer).[3]

Table 1
Major findings

	Face-to-face students	**Online students**	**Explanation**
Overall rating	+	-	Face-to-face students could attend to the classroom sessions.
Interaction methods	-	-	Online students can only read the lecture notes and the provided articles. The provided discussion board and notice board were hardly used. Besides these interaction methods, no other interaction methods were used.
Interaction	+	-	Online students have no interaction with other students or the lecturer.
Feedback	-	-	The lecturer did not provide adequate and timely feedback.
Variation	-	-	There needs to be more variation in interaction methods.

[1] More detailed information about the literature research can be found in chapter 2 of the report.
[2] More detailed information about the activities undertaken can be found in chapter 3 of the report.

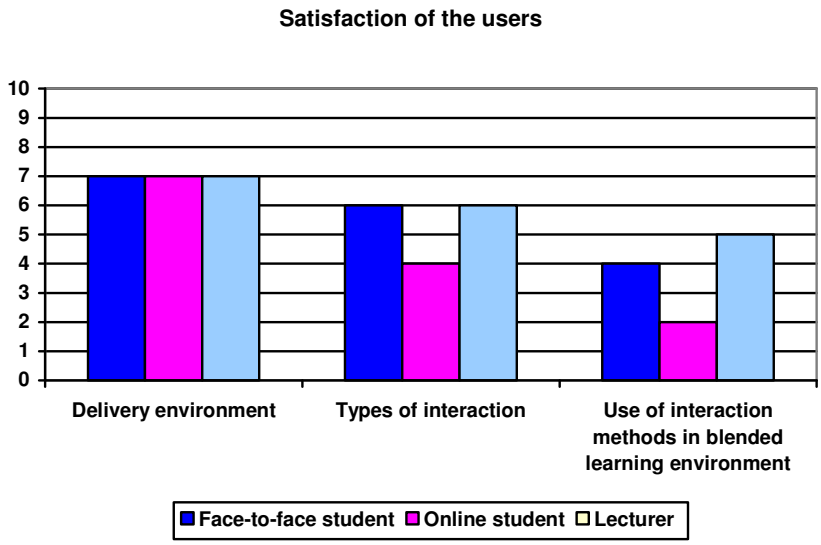

Figure 1. Satisfaction of the users

Conclusions and recommendations

From the results of this research, it can be concluded that the course needs to pay more attention to the online students and there needs to be more variety in interaction methods. The recommendations to achieve this are summarized under the following topics:

- Interaction
- Interaction (teaching) methods
- Feedback
- General recommendations
- Assignments

In total there were 34 recommendations of which three related to interaction, eighteen about interaction (teaching) methods, five on feedback, two about assignments and six general recommendations. Each recommendation is elaborated in the written implementation plan. The implementation plan is divided into five chapters: introduction, recommendations, planning, costs and risks.[4]

By implementing the recommendations, the quality of the interaction methods in the blended learning environment of the RMME course can be improved. The first priority is to implement the eight recommendations that are, in this text, presented in a framework. Based on the results, these recommendations were most important. After these recommendations are implemented, it is advised to implement the remaining recommendations.

1. Recommendations with respect to interaction

It is advised that the lecturer calls the online students at least one time during the course.

This way the online students have real-human interaction with their lecturer. This allows the students to ask questions and get instant feedback while the lecturer can further motivate them.

[3] More detailed conclusions about the RMME course can be found in chapter 4 of the report.
[4] The written implementation plan can be found in appendix 9 of the report.

After the above recommendation related to interaction is implemented, the next step is to implement the following recommendations. It is advised:

- that the lecturer creates at the beginning of the course, a place on the discussion board where students have to submit their personal background information.
- that the lecturer uses the students' background information in the material, so that especially the online students can relate to this.

2. Recommendations with respect to interaction (teaching) methods

It is advised to make use of online practice exercises.

Research has shown that practice of what is being taught moves skills and knowledge from short-term to long-term memory (Driscoll & Carliner, 2005). Because of this, the use of interaction methods is very important.

It is advised that the lecturer stimulates the students to use the discussion board by:

- **Submitting general feedback on the discussion board.**
- **Submitting relevant questions, asked by one student via for example e-mail or in the face-to-face meetings, on the discussion board.**
- **When a student places a question on the discussion board, it is advised that the lecturer also gives the other students opportunities to answer that question.**
- **It is advised that the lecturer respond after a couple of days (for example at the end of the week) to the answers given by the student.**

When relevant questions asked by one student are submitted on the discussion board, all the students can read the questions and the answers given. Especially for online students who cannot attend to the face-to-face meetings this can be very helpful.
When the lecturer allows the other students opportunities to answer a question, the lecturer lets the students think for themselves first before given or confirming the correct answer.

It is advised to make use of simulations, especially role-play and case studies.

Role-play simulation is a learning strategy in which the students assume the roles of fictional characters in a defined scenario. Role-play strategies are one of the less expensive simulation options, because the program can be run in a live virtual classroom environment. This can be done via text in the form of e-mail, instant messaging, threaded discussions, or in a traditional face-to-face session. Role-plays take advantage of adult learners' life experiences. The students are able to try out different problem-solving strategies in a safe environment. Students can be asked to do things such as take a point of view contrary to their believes and thus to explore a different point of view. Students are also able to try approaches and reflect on the outcomes (Driscoll & Carliner, 2005). A case study is a presentation, in narrative form, of an actual event that has occurred inside an organization (Driscoll & Carliner, 2005; Palloff & Pratt, 2005). They are not prescriptive, nor are they used to prove a point; they are designed to develop critical analysis and decision-making skills. Case studies should be used when the goal is to enable participants to: (1) apply previously learned theories to the circumstances in the case, (2) decide what is pertinent, (3) identify the real issues, (4) decide what should have been done, and (5) develop a plan of action (Driscoll & Carliner, 2005).

It is advised to make use of recorded lectures in an e-learning environment.

Recorded programs are becoming a common form. A popular method is the use of a live virtual classroom. Live virtual classroom programs can be recorded and then made available for viewing as recorded lectures. It is like watching a video of a live traditional classroom program (Driscoll & Carliner, 2005). This is especially important for the online students, because they do not have the possibility to attend a face-to-face classroom meeting.

After the above recommendations related to interaction (teaching) methods are implemented, the next step is to implement the following recommendations. It is advised:

- to structure the discussion board by lesson.
- that all students and the lecturer receive an e-mail when something has been submitted on the discussion board.
- to keep the notice board up-to-date.
- that, when something new is submitted on the notice board, the students receive an email.
- to submit the newest information on top of the notice board.
- to make use of hyperlinks in an e-learning environment.
- to make use of interactive animations and media.
- to make use of a live virtual classroom.
- to make use of PowerPoint slides with pictures, graphics and diagrams.
- to make use of classroom discussions.
- that at the beginning of each course some time is spend on how to work effectively in groups.
- to submit a document in the e-learning environment of how to work effectively in groups.
- that the lecturer stimulates group-work, by showing interest in how the group-work is progressing.
- that halfway trough working in groups in the course, the students fill in a questionnaire about collaboration.

3. Recommendations with respect to feedback

It is advised to answer e-mails or phone calls within 3 business days.

This should give the lecturer enough time to think about the question. The lecturer may be very busy when he gets the e-mail or phone call, but it should be possible to answer the questions within 3 days. For students, 3 business days is not too long. If it takes more than 3 days for the lecturer to answer questions, students may get de-motivated and not want to finish the assignment on time.

It is advised that every student receives personalized feedback on their assignments.

This is important, so students know where they are in their learning process. When they only get general feedback, they would not know these specifics.

After the above recommendations related to feedback are implemented, the next step is to implement the following recommendations. It is advised:

- to mark assignments within 3 weeks.
- that the feedback is constructive.
- that general feedback is submitted on the discussion board.

4. General recommendations

It is advised that the lecturer sends all the students an e-mail at the beginning of the course to check if the students can log-in and if they have problems with this, who they can contact. Students should all respond to this e-mail.

This way the lecturer knows whether or not the students can log-in, and can offer them help if they cannot. If students have problems with log-in during the course, they know who they can contact and do not have to spend a lot of time searching in the universities website for a contact person.

After the above recommendation is implemented, the next step is to implement the following recommendations. It is advised:

- to submit more detailed course information on the universities website.
- to put the buttons in the same order.
- to use the same format for the course outline.
- to deliver the learning material two lessons in advance.

5. Recommendations with respect to assignments

It is advised

- that the written material is more explicit as to what steps need to be taken to complete the assignments.
- that the lecturer submits extra information concerning the assignments on the discussion board.

Critical factors

The success of the recommendations depends on critical factors. One of those factors is the time and effort spent by the lecturers on implementing the suggested recommendations. When lecturers for example want to qualify themselves in making interactive animations, recorded lectures or online practice exercises such as quizzes: they must take the time to really learn. If they need to do a workshop, they should make that effort and do that workshop.
Thinking of an idea for a practice exercise or an interactive animation takes a lot of time, even more when the lecturer is going to create it himself. The lecturer should be realizing that and take that time. Another critical factor is money. When more time must be taken on improving the course, this will cost money particularly if an outside organisation develops interactive animations for the course. Finally, a big risk is that the lecturer begins preparing and organizing the course one or two weeks before the course starts. This is too late for most recommendations. If the lecturer does not take these recommendations into account, does not plan for them in his personal agenda, or just ignore them, then the recommendations will most likely fail to improve the course.

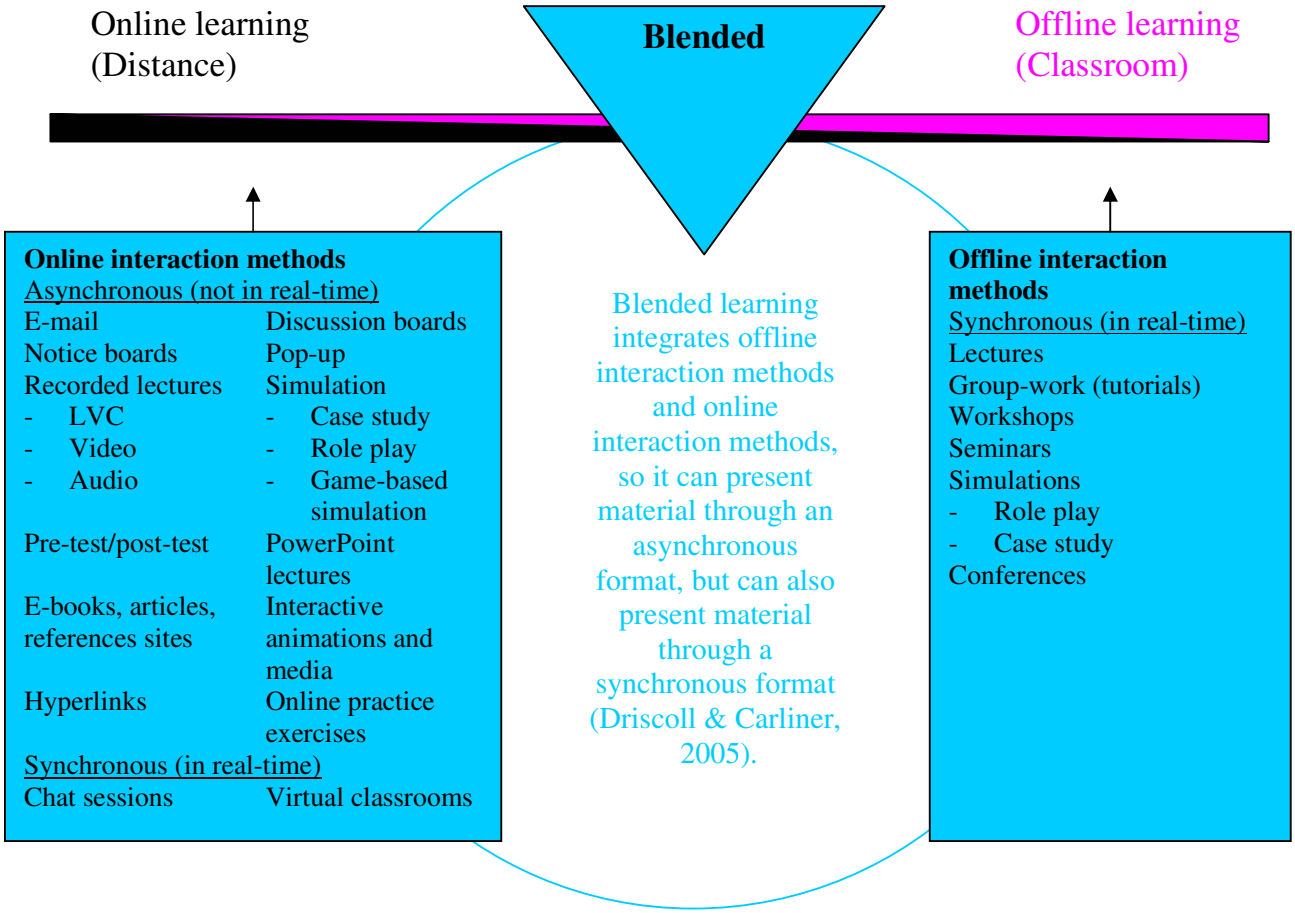

Figure 2. Blended learning model: possibilities to blend

Abstract

The University of South Australia, unit Systems Engineering & Evaluation Centre in Adelaide liked to have proof that the LMEF Masters program was representative of best teaching practice in post graduate education, and, that the program was meeting the needs of the students.
The research of this master project was aimed at writing recommendations to improve the interaction methods that are offered or could be offered to the students in the blended learning environment of the courses 'Research Methods in a Multidisciplinary Environment' and 'Operational Test and Evaluation' of the LMEF Masters now and in the future. The main question of this research project was *'How can the use of interaction methods in the blended learning environment of the courses 'Research Methods in a Multidisciplinary Environment' (RMME) and 'Operational Test and Evaluation' (OTE) of the LMEF Masters Program ensure best teaching practice?'*.
This main question can be answered by looking at the two following sub-questions:

1. What is the quality of the blended learning environment of the RMME and OTE courses of the LMEF Masters program, with respect to the interaction methods?
2. How can the quality of the blended learning environment of the RMME and OTE courses of the LMEF Masters program be improved, with respect to the interaction methods?

There were two phases in this research project: the first phase was an evaluation phase in which sub-question one was answered. To do this, the two courses 'Research Methods in a Multidisciplinary Environment' and 'Operational Test and Evaluation' given in this master program were explored, a document analysis was made, the curriculum was looked at carefully with a focus on interaction methods in a blended learning environment, an interview with the contact person of Defence Science and Technology Organisation, an interview with the coordinator of AITEC, interviews with lecturers and with students were conducted and a questionnaire was developed and send to the students.
The second phase of this research project was a phase towards the recommendations in which sub-questions two was answered. Based on the results of all these activities in the evaluation phase, conclusions and recommendations were written about the interaction methods in a blended learning environment to improve the two courses. In total there were 34 recommendations of which three related to interaction, eighteen about interaction (teaching) methods, five on feedback, two about assignments and six general recommendations. The recommendations were discussed with lecturers and students. This way it was made sure that the recommendations fit with the needs of the students and that they were usable for the lecturers. After that, final conclusions and recommendations were written about dealing with interaction methods in a blended learning environment, to improve the quality of the courses 'Research Methods in a Multidisciplinary Environment' and 'Operational Test and Evaluation' of the LMEF Masters program. This way, research question two was answered. This was written down in an implementation plan. The implementation plan was the answer to the main research question.

Table of content

Foreword

In this report a description is given of a research project that was carried out for the round-off of the master Human Resource Development at the University of Twente, Enschede, the Netherlands. The last few months I have been occupied with interaction methods in a blended learning environment.

There are a lot of people that I have to thank for their big help during this final project. First, I want to thank my supervisor Irene Visscher-Voerman at the University of Twente. I learned a lot from her, even when it was not always easy to communicate via e-mail. I also want to thank David Cropley, my supervisor at the University of South Australia. He was always very busy, but tried to make time for me and of course, thanks to him, I could do my final project in Australia.

I also really want to thank other staff people at unit SEEC. First I want to thank Michael Harris for his cooperation in my research project and for his tips which helped me improve my English. I want to thank Paul Bunnick, Ian Price, Lynn Busschenschut and Melissa Madex, for their help. We could always come in and ask them something, which was great!

Finally, I want to thank my family and friends in the Netherlands. Especially my parents and Rob. Mum and Dad, thanks for making this trip to Australia possible and for all the support during my study period. Rob, thank you for all the support during my study period and the times when I needed a hearing ear. You were always there.

Last, but not least, I want to thank Chantal Scholten for joining me on this trip. I learned a lot from her, for my future work and for me as a person. Sometimes it was hard to see you every day, but it was a great time and experience! I didn't want to miss you on this journey!

Marieke Klink
Enschede, January 2006

1 Introduction

In this report a description is given of a research project that was carried out for the round-off of the master Human Resource Development at the University of Twente, Enschede, the Netherlands. In this research two master courses for the department of Systems Engineering & Evaluation centre (SEEC) of the University of South Australia (UniSA) were evaluated and recommendations for improvement were made. When conducting an evaluation study, one can focus on several perspectives. Because the length of this research project was only a few months and the learning is delivered in a blended learning environment (see for an explanation, chapter 2), this research project focused on the different interaction methods in a blended learning environment that are offered or could be offered to the students.
This chapter is an introduction to this research project. In this chapter the context of this research project will be explained in section 1.1. In section 1.2 the intended curriculum will be explained and in section 1.3 the relevance will be discussed. Finally, in section 1.4 the reading guide for this whole report will be given.

1.1 Context

The department of SEEC is a department of UniSA. It runs a master program for the staff of the Defence Science and Technology Organisation (DSTO). SEEC wants to be sure that the Learning for Masters of Engineering For DSTO staff (LMEF) program is representative of best teaching practice in postgraduate education, and, that the program is meeting the needs of the client. From this perspective, they have asked for an evaluation of two of the LMEF courses. The courses to be evaluated were 'Research Methods in a Multidisciplinary Environment' (RMME) and 'Operational Test and Evaluation' (OTE).

Below, in figure 1, a structure of the several stakeholders involved is presented. This is done to make clear what the relationships between the stakeholders involved are.

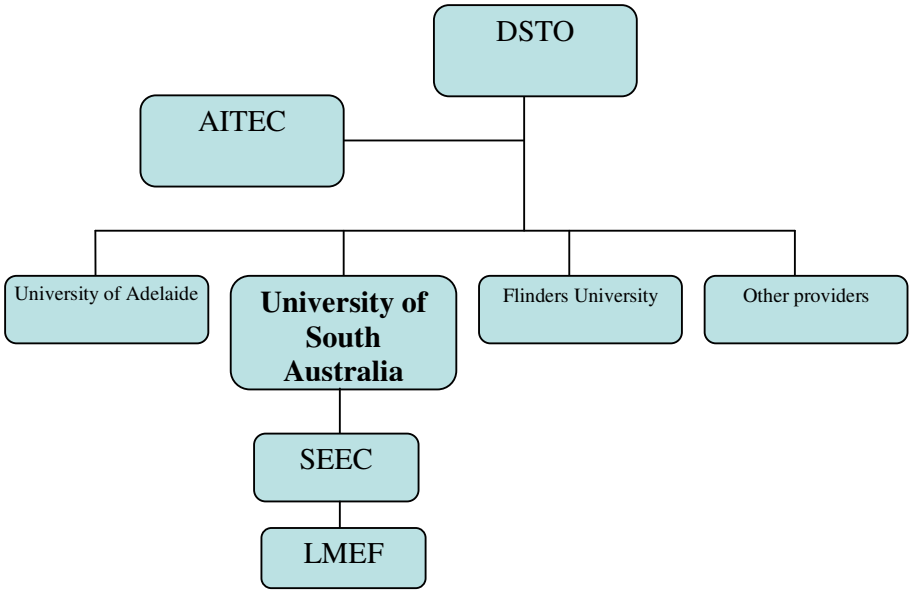

Figure 1. Structure of the organisations

In the following sections the several stakeholders in this research project that are presented in figure 1 are explained. In section 1.2.1 the organisation SEEC will be explained. In section 1.2.2 the organisation DSTO will be explained and in section 1.2.3 the organisation AITEC will be explained.
After these organisations are explained, section 1.2.4 will focus on the LMEF Masters Program. In section 1.2.5 and 1.2.6 the content and the aims/learning objectives of the RMME and OTE course will be discussed. Finally, in section 1.2.7 the curriculum will be discussed.

1.1.1 Defence Science and Technology Organisation

The Defence Science and Technology Organisation (DSTO) is part of Australia's Department of Defence. DSTO's role is to ensure the expert, impartial and innovative application of science and technology to the defence of Australia and its national interests.
DSTO has a yearly budget of approximately $300 million and employs about 2300 staff, predominantly scientists, engineers, IT specialists and technicians.
DSTO has a presence in nearly every state and territory in Australia. It has its corporate office at Defence headquarters in Canberra with research facilities in Melbourne, Edinburgh (near Adelaide), Canberra, Sydney, HMAS Stirling at Rockingham (near Perth), Scottsdale in Tasmania, and Innisfail in northern Queensland.
At all times, DSTO works closely with the industry, science and technology community to enhance its ability to support Australia's defence capabilities and to contribute to national wealth.

1.1.2 AITEC

The Department of Defence has contracted an external organisation, AITEC. AITEC is the organization that provides the liaison and administration between DSTO and UniSA. AITEC is responsible for all aspects of the university enrolment, including payment of fees and graduations, and evaluating the courses and programs.

1.1.3 Systems Engineering and Evaluation Centre

The Systems Engineering and Evaluation Centre is an official research centre within the University of South Australia. The centre was established in 1999 as the successor of the Australian Centre for Test and Evaluation (ACTE). ACTE was founded in 1992 to provide a focus for Test and Evaluation in the Asia-Pacific region.
The centre uses specialised facilities for research and technical staff to work with clients to help them understand their complex systems and improve their practices.
SEEC staff members are experts in understanding and resolving complex problems. SEEC staff represents four key centres of expertise:

- Systems Engineering
- Test and Evaluation
- Capability Development and Acquisition
- Aviation Systems Safety

SEEC offers the following programs:

- Systems Engineering (SE) and Test and Evaluation (T&E) coursework and research degree programs ranging from Graduate Certificate to Doctor of Philosophy (PhD).
- Professional Training Programs, to allow participation of our courses without enrolling in a University of South Australia Program.

One of the tailored programs is for DSTO's 'Continuing Education Initiative Masters program' (CEI), a post-graduate education program for existing employees of DSTO. This part of the program at UniSA is called the LMEF Masters program (a Masters of Engineering).

In total, there are 27 people working at SEEC, including 4 support staff members. Most of these staff members teach and do research. In total 6 staff members of the SEEC staff teach in the LMEF program. Two of them are involved in the courses to be evaluated.

1.1.4 Learning for Masters of Engineering For DSTO staff

To understand the research project, it is important to understand the context. To understand the context one can look at the curriculum. A curriculum can be looked at in different ways. A general distinction can be made between the three levels 'intended', 'implemented' and 'attained' (Van den Akker, 2004). A more detailed overview is given in table 1 (Van den Akker, 2004).
It is important to look at the levels 'intended', 'implemented' and 'attained', because together they can give a clear image of the education offered to the students of the RMME and OTE courses. When looking at these three levels, it can be analysed if the vision, the way the lecturers think and the way the students think are the same about the curriculum.

Table 1
Typology of Curriculum representations

Intended	Ideal	Vision (rationale or basic philosophy underlying a curriculum)
	Formal/Written	Intentions as specified in curriculum documents and/or materials
Implemented	Perceived	Curriculum as interpreted by its users (especially teachers)
	Operational	Actual process of teaching and learning (also: curriculum-in-action)
Attained	Experiential	Learning experiences as perceived by learners
	Learned	Resulting learning outcomes of learners

One of the big challenges for curriculum improvement in general and for this formative evaluation research in particular is creating consistency between the different parts of the curriculum. One way to look at a curriculum is by dividing the curriculum in components. In this research the ten curriculum components of table 2 (Van den Akker, 2004) were used to describe the two courses RMME and OTE of the LMEF Masters program. Each of the components can be subdivided in one of the three levels of the typology of curriculum representations, intended, implemented and attained. The intended curriculum will be explained in section 1.2. The implemented and attained curriculum will be presented in chapter 4 and 5.

Table 2
Curriculum components

Component:	**Description:**
Rationale	Why are they learning?
Aims & Objectives	Toward which goals are they learning?
Content	What are they learning?

Learning activities	How are they learning?
Teacher role	How is the teacher facilitating learning?
Materials & Resources	With what are they learning?
Grouping	With whom are they learning?
Location	Where are they learning?
Time	When are they learning?
Assessment	How far has learning progressed?

The three organisations discussed above played a role in the LMEF Masters program. In this subsection the focus will be on this LMEF Masters program. In figure 2 the streams of the LMEF program are presented. The LMEF Masters includes two compulsory core courses, Systems Engineering for Complex Problem Solving and Research Methods in a Multidisciplinary Environment (RMME), and six elective technical courses. Operational Test and Evaluation (OTE) is one of those elective technical courses. The LMEF Masters program is mainly offered via online learning. There are also some face-to-face sessions. Therefore, there is talked about a blended learning environment. For more detailed explanation about blended learning, see chapter 2.

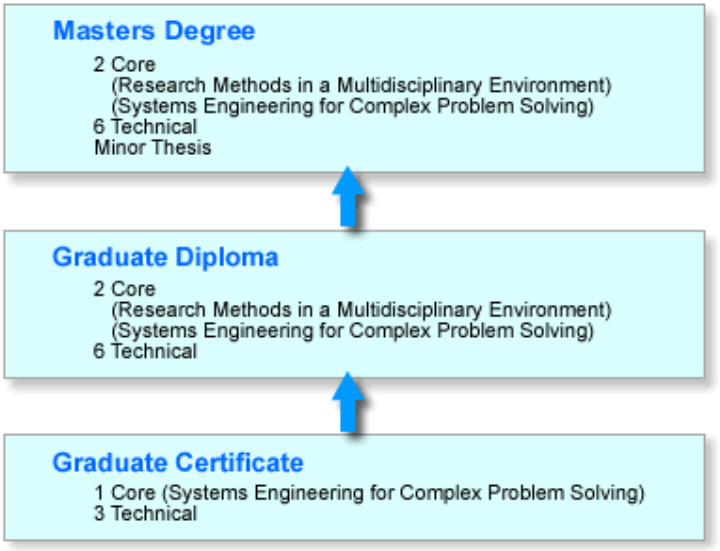

Figure 2. Streams of LMEF Masters program

1.1.5 Course one to be evaluated: Research Methods in a Multidisciplinary Environment

One of the courses that has been evaluated was the RMME course. The content of the RMME course covers:

- The nature of inquiry and the selection of appropriate methods to suit the types of problems encountered by DSTO and the defence sector.
- Research techniques, for example the design of experiments, data validation and interpretation.
- Research design, qualitative and quantitative research, sources of data, data collection procedures, measurement strategies, questionnaire design, interviewing techniques, content analysis, literature surveys, information databases, statistical techniques and evaluation.
- Writing of research reports, papers and theses.

- Development of a research program.

The aims/learning objectives are:
- To provide the student with the fundamental concepts and practice of engineering research in a multidisciplinary environment where no-engineering functions may be present.

On completion of this course students should be able to:
- Describe the key elements in the design of research programs;
- Appreciate the fundamental concepts of qualitative and quantitative research;
- Understand the fundamentals of data collection and research methodology;
- Apply skills in gathering and analysing information; and
- Apply skills and knowledge of the methods for writing effectively for research degrees.

The lecturer of the RMME course provided six traditional classroom meetings and made use of an e-learning environment. Each classroom meeting took a whole day. The RMME course used a text book. Other readings and materials were provided online. The students were learning mainly individual. During the classroom meetings, the course made use of 7 tutorials (not marked group-work).

1.1.6 Course two to be evaluated: Operation Test and Evaluation

The other course that has been evaluated was the RMME course. The content of the OTE course covers:
- The definition of Operational Test and Evaluation.
- Differences from Development and Acceptance Test and Evaluation.
- Human factors.
- Methods of reporting.
- Critical issues.
- Statistical confidence levels.
- Operational test plans.
- Safety and suitability testing.
- Operational test reports.

The aims/learning objectives are:
- To introduce the principles of the specialist discipline of Operational Test and Evaluation.

On completion of this course students should be able to:
- Appreciate the elemental components of an Operational Test and Evaluation program;
- Appreciate the thrust of Operational Test and Evaluation is a systems-level approach to demonstrating usefulness in achieving users' requirements;
- Understand the relationships between the elements of Operational Test and Evaluation;
- Understand the differences between Operational Test and Evaluation and other types of Test and Evaluation; and
- Understand the human factors affecting Operational Test and Evaluation.

The lecturer of the OTE course provided the course mostly online. In this course there were three classroom meetings scheduled. Each classroom meeting took about 2 hours.
The course provided all readings and materials online. In the OTE course the students were learning individual and in groups (tutorials). The course made use of 6 tutorials.

1.2 Intended curriculum

A part of the ideal curriculum is 'to give independent, expert, professional advice on the application of science and technology to the defence of Australia, DSTO provides DSTO-specific postgraduate education programs for staff.' (Defence Science and Technology Organisation, 2005).
The intended curriculum is specified in the official documents Continuing education initiative, Policy statement DSTO (2005) and Procedures and guidelines (2005). The LMEF Masters program is aiming specifically at maintaining and enhancing DSTO's scientific and technology knowledge base and research capability. This is the rationale according to the interview with the contact person of DSTO, the contact person of AITEC (an external organisation, contracted by the Department of Defence) and the interviews with the students. The LMEF Masters program is a program of part-time postgraduate study in a selected range of scientific and technological disciplines that lead to the award of Graduate Certificate, Graduate Diploma or Masters Degree, or DSTO staff may choose for individual courses. DSTO supports the career development of its entire staff, and recognises continuing education and lifelong learning. These are key ingredients for a successful career in DSTO.
DSTO pays the relevant university fees and charges for staff approved to undertake the LMEF Masters program.

1.3 Relevance of the study

DSTO is a very important client of SEEC. SEEC does a lot of work with them, both teaching and research. DSTO invests a lot of money in the unit SEEC, so it is important to keep them satisfied by delivering high quality courses. Another important reason for this research was that the lecturers and the staff know they are giving effective and efficient education; they know that they are doing a good job. By taking part in this research they can get the proof to show this to other people and organisations.

There has never been a research about the way of teaching and the interaction methods that are offered or could be offered in a blended learning environment to the students. The lecturers do not have the proof that they are doing a good job. Through this research they can demonstrate to other people and organisations that they are using interaction methods in their blended learning environment in the best possible way.

Interaction in a learning environment
Because in this research project special attention was given to the use of interaction methods in a blended learning environment, the first question one can ask himself is: Why is the use of interaction important in a blended learning environment?
Interaction is an important item of the learning process (Tu, 2000), and the level of interaction has an impact on the quality of the learning experience (Navarro & Shoemaker, 2000; Vrasidas & McIsaac, 1999, In Driscoll & Carliner, 2005).
Students should be active participants, not passive spectators. It is the job of the instructional designers to make this happen. To make the students active participants cannot be guaranteed entirely. If students are not motivated, the chance on passive spectators is still present, even if the design of the course is perfect.
Interaction shifts the instructional focus from the facilitator and materials to the student, who must actively engage with peers, materials, and the instructor. There are also other reasons for using interactions. It had been shown that the achievement and positive learning attitudes will

be improved if the levels of interaction are higher (Gokhale, 1995; Kekkonen-Moneta & Moneta, 2002, In Driscoll & Carliner, 2005; Althaus, 1997; Fulford & Zhang, 1993).

The blended learning environment of the courses RMME and OTE should make use of interactive methods, to make sure the students can be as active as the environment lets them. In this research the interactivity of the blended learning environment was analysed. There was looked at what were the best interaction methods to use in a blended learning environment that fit with the characteristics of the students of the RMME and OTE courses?

It is relevant to know which interaction methods were used in the blended learning environment of the courses RMME and OTE and which interaction methods in a blended learning environment were best suited for the students of the courses RMME and OTE. This way the use of interaction methods in the blended learning environment of the two courses can ensure best teaching practice. In this research project it was examined how the interaction methods in the blended learning environment of the courses RMME and OTE were already implemented correctly and how the interaction methods in the blended learning environment of the courses RMME and OTE could be improved. This was done by a formative evaluation.

So, the main question that was answered in this research project is as follows:
How can the use of interaction methods in the blended learning environment of the courses 'Research Methods in a Multidisciplinary Environment' (RMME) and 'Operational Test and Evaluation' (OTE) of the LMEF Masters Program ensure best teaching practice?
With 'ensure best teaching practice' the focus will be on the interaction methods in a blended learning environment and not, for example, on how good the lecturer is grounded didactically.

This main question was answered by looking at the two following sub-questions:
1. What is the quality of the blended learning environment of the RMME and OTE courses of the LMEF Masters program, with respect to the interaction methods?
2. How can the quality of the blended learning environment of the RMME and OTE courses of the LMEF Masters program be improved, with respect to the interaction methods?

This research project is combined with the research project of Scholten (2006). She focused on the use of learning styles in adult learning. Both research projects evaluated the courses RMME and OTE of the LMEF Masters program. Each researcher focused on one perspective and at the end of the research project, these perspectives were combined in writing the recommendations.

1.4 Reading guide

This report is built as follows. In chapter 2 the core terms of both sub-questions are described in a literature research which is coupled to the research project. Chapter 3 defines the methods of research for both sub-questions; chapter 4 and 5 will present the conclusions of the results concerning sub-question one for the RMME (chapter 4) and OTE (chapter 5) course. Chapter 6 will present the results concerning sub-question two for the RMME and OTE course. The last chapters of this report include the justification of the written implementation plan based on the conclusions and recommendations to improve the education of the two courses (chapter 7), and finally a number of discussion points and recommendations for closer research will be presented (chapter 8).

2 Theoretical background

In the previous chapter the main question of this research has been formulated:
'How can the use of interaction methods in the blended learning environment of the courses 'Research Methods in a Multidisciplinary Environment' (RMME) and 'Operational Test and Evaluation' (OTE) of the LMEF Masters Program ensure best teaching practice?'

In this chapter a theoretical background will be developed that helps answering the main question. Also, when writing the recommendations to improve the two courses RMME and OTE of the LMEF Masters program, it is important to have more theoretical background. By defining the conceptual framework, the quality of the LMEF Masters program can be determined. To dot that, this literature research will help to answer the following questions:

- What are the different ways to deliver education?
- What are the different types of interaction in a blended learning environment?
- What are different strategies of interacting with students in a blended learning environment?

The questions mentioned above help to answer sub-question 1: 'What is the quality of the blended learning environment of the RMME and OTE courses of the LMEF Masters program, with respect to the interaction methods?'

In this chapter the core terms are delineated. These core terms are delineated, because these terms are used in this research project. In section 2.1 the different ways to deliver education will be discussed, including the blending learning environment. Section 2.2 addresses the different types of interactions that can be used in a blended learning environment. Section 2.3 concerns the interaction methods that can be used in a blended learning environment.

2.1 Ways to deliver education

There are different ways to deliver education. The two main environments to deliver education in, are (Kasser, Sitnikova, Tran & Yates, 2005):

- Face-to-face learning in a traditional classroom or in a live virtual classroom where the students (adult students that are in fulltime employment) and the instructor gather at the same time and/or place (synchronous);
- Online over the Internet in a non-real-time (asynchronous) environment. This environment has become known as an asynchronous learning environment.

There are a large number of possible environments with various mixes of synchronous and asynchronous delivery and interaction methods. There are many possibilities to expand these environments. These possibilities are shown in figure 3. It is called the spectrum of synchronicity (Kasser, Sitnikova, Tran & Yates, 2005).

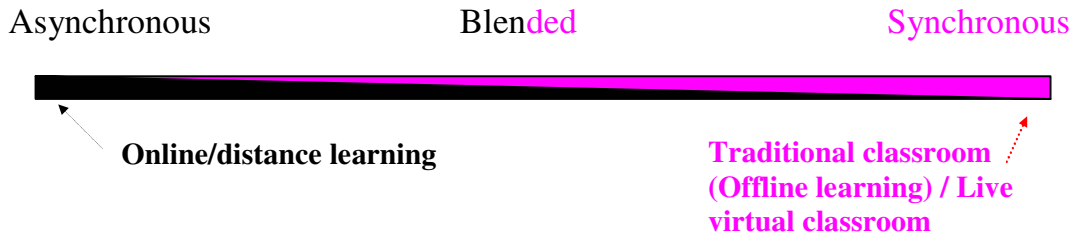

Figure 3. Spectrum of synchronicity

The face-to-face delivery environment, traditional classroom or a live virtual classroom lies at the synchronous end of the spectrum. In a synchronous environment the students are in the same classroom or online at the same (Hanna, Glowacki-Dudka & Conceição-Runlee, 2000). At the other end of the spectrum is the totally asynchronous delivery environment. An asynchronous environment delivers education in non-real-time (Hanna, Glowacki-Dudka & Conceição-Runlee, 2000). This environment represents the self-paced studies, correspondence schools and other techniques in which there is no synchronous contact between anyone in the class' (Kasser, Sitnikova, Tran & Yates, 2005, p.2).
The traditional classroom or a live virtual classroom can be combined with asynchronous methods. When asynchronous methods are also used, the traditional classroom or live virtual classroom moves away from the edge of the synchronous end of the spectrum towards the centre (Kasser, Sitnikova, Tran & Yates, 2005). The delivery environment is no longer purely synchronous; it is called a blended learning environment. In this way the education will be delivered synchronous and asynchronous (Salmon 2004).

As a result of the above it can be concluded that there are three ways to deliver education:
- Synchronous delivery environment
- Asynchronous delivery environment
- Blended learning environment

In the following subsections the three delivery environments will be discussed and the advantages of each delivery environment will be given. Finally, the focus of the delivery environments for this research will be mentioned.

2.1.1 Synchronous environment

In a synchronous environment, the students are in the same classroom or online at the same time (Hanna, Glowacki-Dudka & Conceição-Runlee, 2000; McVay Lynch, 2004). In this environment there is a feeling of coming together and it is similar to being part of a face-to-face classroom.
Synchronous delivery online creates a sense of a virtual community. It means that everyone has to be on the computer at the same time. It requires of the students to coordinate with the instructor and classmates to plan a schedule to be available at a prescribed time (McVay Lynch, 2004).

Advantages
There are four advantages to synchronous environment (McVay Lynch, 2004):
1. Motivation: synchronous systems focus the energy of the group and provide motivation. The face-to-face and online students are motivated to keep up with their peers and continue with their studies.
2. Instantaneous interaction: real-time interaction with its opportunity to convey tone and nuance helps develop group cohesion and the sense of being part of the learning community.
3. Quick feedback: synchronous systems provide quick feedback on ideas and support consensus and decision-making in group activities.

4. Pacing: synchronous events encourage students to keep up-to-date with the course and provide a discipline to learning that helps people prioritize their studies and manage their time more effectively.

2.1.2 Asynchronous environment

An asynchronous environment delivers education in non-real-time. The most common type of interaction in an e-learning environment is the asynchronous. Students participate in an asynchronous activity at convenient times for them (Hanna, Glowacki-Dudka & Conceição-Runlee, 2000) usually within a specified framework, such as one week (McVay Lynch, 2004). In the asynchronous way the information is presented and conveyed, the e-learning materials are accessible at all times. The student can access the e-learning environment easily with the help of the Internet (Achtenhagen & Lempert, 2000, In Kamin & Hagenhoff, 2004; Weller, 2002).

Advantages

There are four advantages to the asynchronous media approach (McVay Lynch, 2004):

1. Flexibility: access to the teaching material, on the Web or in computer conference discussions, can take place at any time and from any location with an Internet/capable computer.
2. Time to reflect: rather than having to react immediately, asynchronous systems allow students time to think over ideas, check references, go back to previous messages and take the amount of time to prepare a comment.
3. Situated learning: because the technology allows access from home and work, students can easily integrate the course concepts and materials into their working environment.
4. Cost/effective technology: text-based asynchronous systems require little bandwidth and low-end computers to operate, thus access, particularly global access, is more equitable.

2.1.3 Blended learning

When a delivery environment is not purely synchronous or asynchronous, it is called a blended learning environment. Blended learning integrates learning programs in different formats to achieve a common goal. Blended learning programs integrate face-to-face programs (classroom) and online programs, so it can present material through an asynchronous format, but can also present material through a synchronous format (Driscoll & Carliner, 2005). According to Rossett, Douglis & Frazee, 2003) blended learning programs blend material presented from the traditional classroom and live virtual classroom (synchronous) and asynchronous instruction.

Advantages

Advantages of blended learning are (Driscoll & Carliner, 2005):

1. Blended learning lets designers split off prerequisite material from the rest of a course. In courses with only classroom sessions, the students also have to follow this material, even if they have mastered it. In blended learning the students who can demonstrate mastery of the prerequisite content can skip the online part and go directly to the classroom section. Those who are not familiar with the content can learn it in their own time, without other students nearby, who already know the material and are expressing their frustration with these beginners.
2. Blended learning lets designers adapt learning content to the needs of different educational levels. ‘A blended curriculum might include a short, live introduction to

the learning system, followed by computer-based modules that teach the different audiences how to use the system in the appropriate way.'

3. Blended learning can help reduce total training time and minimize time away from the job for training (travel time) (Hoffman, 1994-2005).
4. For the instructors who feel threatened by e-learning, the blended learning includes comfort, especially for those who are concerned about a meaningful future role for classroom learning.
5. Blended solutions offer self-study modules, which can be completed by the student whenever he/she chooses to do so instead of having to be present at the instructor-led session (Hoffman, 1994-2005).

Focus of this research

In the subsections 2.1.1, 2.1.2 and 2.1.3 the three delivery environments have been discussed. In this research project the courses RMME and OTE were evaluated. These courses made use of a blended delivery environment. The delivery environment was not purely synchronous or asynchronous. Some students followed the courses only online, but for the online students it is also possible to have a blended learning environment. The teachers can, for example, make use of a live virtual classroom. There are different types of interaction and different interaction methods that can be used in a blended learning environment. In section 2.2 and 2.3 these different possibilities will be discussed.

2.2 Types of interaction in a blended learning environment

In section 2.1 different learning environments were discussed. The courses RMME and OTE made use of a blended learning environment. In a blended learning environment different types of interaction can take place. This section will first discuss what interaction is and why interaction is important in a learning environment. Secondly, this section will discuss the different types of interaction that can be used in a blended learning environment. Finally, the focus of this research on the types of interaction will be mentioned.

Interaction

Interaction is a crucial concept in a learning environment. Interaction makes the environment interactive. The word interactivity is used in a variety of ways. The meaning – interaction between two or more people- is not the only one. It would be useful if the word 'interactivity' were reserved for educational situations in which human responses – either vocal or written – referred to previous human responses. The educational value of any specific interactive session could then be seen in terms of the degree to which each statement built on previous ones (Daniel, 1996).

Different types of interaction in a blended learning environment

When one is designing a course that is delivered in a blended learning environment, there are different types of interaction that can be included. According to Gilbert & Moore (1998) there are three types of interactions:

- Student-content interaction, which occurs when the student reflects on the content and questions the material in order to analyse, synthesize, and evaluate it.
- Student-instructor interaction refers to interaction in which the student and the instructor have exchanges in which the instructor seeks to stimulate interest, clarify questions, guide, motivate, and dialog with the student.
- Student-student interaction refers to the interaction among students.

Hanna, Glowacki-Dudka & Conceição-Runlee (2000) also mention these three types of interaction. They also mention three other types of interaction. As opposed to Gilbert & Moore they divide the types of interaction in human interactions and non-human interaction. Human interactions include interaction between student-teacher, student-student, student-guest expert or student-community member. Non-human interactions are interactions between student-tools, student-content and student-environment. In table 3 the different types of interactions are explained.

Table 3
Types of interactions according to Hanna, Glowacki-Dudka & Conceição-Runlee (2000)

Human interactions	**Types of activities**
Student – teacher	- Self-regulated learning (A web-based conferencing environment may require students to manage their time, process information, plan and manage their resources, and evaluate their own work. Students can seek help when they need it.) - Collaborative problem solving (The teacher posts a problem to be solved by individual students.) - The teacher and the students participate in the collective activities and knowledge sharing. - The teacher observes, monitors, and provides feedback to the students. - The teacher facilitates group processes by responding to questionable situations, such as discussion problems, group dynamics issues, or misunderstandings.
Student – student	- Students complete group-work to improve their social and critical thinking skills. - Students access group knowledge and support through collaborative problem solving. - Students design a website for an instructional program
Student – Guest Expert or Students – community Member	- Students collaborate with guests on projects to gain diverse expertise. - Students discuss real-life situations with practitioners in the community. - Students work together with community members to solve problems and share knowledge
Non-human interactions	**Types of activities**
Student – tools	- Students operate software (text copying and pasting, file transferring, image grabbing, brainstorming, outlining, and flow charting) - Students manipulate software (changing contents, values, and/or parameters to verify, test, and extend understanding). - Students communicate using the software (promoting discourse, sharing ideas, reviewing work, asking questions, and collaborating).
Student – content	- Students work with and make sense of the information available on the web, in books, and in databases.
Student – Environment	- Students work with resources and simulations (web-based searches, image libraries, source documents, and online databases)

Focus of this research
According to the above, this research was focused on a combination of the model of Gilbert & Moore (1998) and Hanna et al. (2000). This way there will be a focus on human interaction and non-human interaction. The focus of the human interaction was on: student-teacher interaction, student-student interaction, student-guest expert or student-community member interaction; and on the non-human interaction: student-content interaction and student-environment interaction. The student-tool interaction was combined with student-environment interaction, because these are very related to each other. Tools are used in the environment, so it is hard to make a distinction between these two types of interactions. In the blended learning environment a combination of these types of interaction should be used to address the different learning styles of the students.
In the next section the different interaction methods will be discussed. These different methods use different types of interaction.

2.3 Strategies of interacting with students in a blended learning environment

In section 2.2 it was explained that different types of interaction should be used in a blended learning environment. This requires different interaction methods. This section will focus on interaction methods in the different ways of blending. In these different ways of blending, different interaction strategies of interaction with students will occur.

There are different activities, which can be carried out in the learning process. These different activities can be implemented by using 'traditional' techniques or by the use of technology. The challenge lies in finding the 'optimum blend' (Lam, Akkerman, Ter Horst, De Laat & Monachesi, 2005). There are no rules available to find the 'optimal blend'. The most important appreciation of blended learning is that the student should be able to get an answer to questions that are important for him/her, independently of time, location, place and learning preferences. The correct blend of blended learning must be aimed so that there is an overlap in the resources, because the student should be able to obtain the same information by means of several formats and manners (Lam, Akkerman, Ter Horst, De Laat & Monachesi, 2005).

As a result of the above, now a number of options to blend will be given. These options could also be used in the courses RMME and OTE.
First, subsection 2.3.1 will discuss how to blend offline learning and online learning. Subsection 2.3.2 will focus on a specific way of blending, namely blending self-paced and live-collaborative learning.
In these two subsections, different interaction methods will be discussed and the focus of this research will be explained. The first focus was mainly on, if the different interaction methods were used in the blended learning environment of the two courses. If the interaction methods were used, it was analysed if the use of the interaction methods could be improved. If interaction methods were not used, it was analysed if it was recommended to make use of the interaction methods. This was done by having a literature research, interviews with the students and lecturers of the two courses and by sending a questionnaire to the students.
After these two subsections are summarized, the different possibilities to blend offline and online learning are summarized in figure 4. In table 4 the different methods that can be used in offline and online learning are summarised.

2.3.1 Blending Offline and Online Learning

At the simplest level, a blended learning experience combines offline and online forms of learning where the online learning usually means 'over the Internet or intranet,' and offline learning happens in a more traditional classroom setting (Singh & Reed, 2001). An example of this type of blending may include a learning program that provides study materials and research resources over the Web while providing instructor-led, classroom training sessions as the main medium of instruction. In the following section, interaction methods of blending offline and online learning will be discussed and the focus of this research will be explained.

Offline learning

Offline meetings are synchronous. The students and instructor are at the same time at the same place. Offline learning is focused on student-teacher, student-student, student-guest lecture and student-content interaction. Examples of offline learning are the use of instructor-led classrooms and lectures, group-work (tutorials), classroom discussions, hands-on labs and workshop, and/or field trips. These interaction methods will be discussed later in this section.

Online learning

Online learning can be an asynchronous activity and a synchronous activity. Online learning is mostly an *asynchronous* activity. The learning program only provides the students study materials and research resources over the Web. In the RMME and OTE courses there are also students who only follow the course online. There are different strategies for online learning. Yacci (2000) and Jonassen and Reeves (1996, In Driscoll & Carliner, 2005) call providing study material and research resources over the Web 'learning through computers'. One can learn without a teacher, and that is what learning through computers is all about. The learning takes place when computers are used as communication devises or as means of providing information. These interactions are student-centred. The student is interacting with raw information and content and the environment.

Learning through computers is about using content and information without an instructor. This strategy is focused on student-content interaction. The resources in learning through computers include articles & e-books (print materials), databases, virtual tours and references sites. This strategy has the nature of self-directed learning and is managed by the student. This kind of strategy is best aligned with the definition of self-directed learning (Candy, 1991, In Driscoll & Carliner, 2005; McVay Lynch, 2004). It stresses learning projects organized, executed, and evaluated by students without the assistance of a facilitator. The successful online student needs to be an independent student (McVay Lynch, 2004)

The study of Internet usage by Pew Foundation (2001, In Driscoll & Carliner, 2005) found that both adults and teens use the Internet to teach themselves new things. The study found that 80 percent of all Internet users have done an Internet search to find the answer to a specific question. So, much self-directed learning takes place, that way it is important in an e-learning environment.

Online learning can also be *synchronous*. Students and/or instructor are then meeting at the same time. Synchronous interaction methods focus on student-teacher, student-student, student-guest lecture and student-content interaction. Examples of synchronous online activities are:

- Live Virtual Classrooms
- Web Seminars and Broadcasts
- Coaching

Live Virtual Classrooms
Live virtual classes (lvc) take place in real time. The virtual classroom is an online learning experience in which the instructor and students work together in real time. Working together, the instructor and students have live audio dialog while sharing slides, viewing a software application, surfing the Internet, working in virtual rooms, asking questions and making assessments (Driscoll & Carliner, 2005). They also call this video-conferencing. It allows the student to see the instructor and the classmates and talk to them while sitting at his (home) computer. Many desktop videoconferencing products have been introduced that have the ability to project an image of the person who was called onto a small window on the computer screen (McVay Lynch, 2004).

What are reasons for making use of a live virtual classroom program? There are three reasons for making use of a live virtual classroom. The first reason is that the content is faster and less expensive to develop than self-paced instruction. The majority of live virtual classrooms programs are simply PowerPoint presentations with a lecture. A second reason to use live virtual classroom programs is that they can provide group learning without the travel and expense of traditional classroom programs. The last reason to make use of these programs is that many of the virtual classroom programs offer the option of recording a session and editing it for later viewing (Driscoll & Carliner, 2005).

Focus of this research
In this research it was analysed in what way the courses RMME and OTE made use of asynchronous and synchronous online interaction methods.
If the courses made use of asynchronous online interaction methods, the following criteria were used to evaluate these interaction methods. These criteria are based upon the above literature:
- The course make use of online articles & e-books (print materials)? Yes or no.
- The course make use of databases? Yes or no.
- The course make use of virtual tours? Yes or no.
- The course make use of references sites? Yes or no.

If the courses did not make use of asynchronous online interaction methods, it was analysed if it was recommended to make use of these interaction methods.

If the courses made use of synchronous online interaction methods, the following criteria were used to evaluate the use of a live virtual classroom. These criteria are based upon the above literature:
- The live virtual classroom make use of working together, yes or no
- The live virtual classroom make use of live audio dialog while:
    - sharing slides? Yes or no.
    - viewing a software application? Yes or no.
    - surfing the Internet? Yes or no.
    - working in virtual rooms? Yes or no.
    - Asking questions and making assessments? Yes or no.

If the courses did not make use of synchronous online interaction methods, it was analysed if it was recommended to make use of these interaction methods.

2.3.2 Blending Self-Paced and Live, Collaborative Learning
In subsection 2.3.2 blending offline and online learning is been discussed. Another way to blend is blending self-paced and live, collaborative learning. Self-paced learning implies

solitary, on-demand learning at a place that is managed or controlled by the student. Collaborative learning on the other hand implies a more dynamic communication among many students that brings about knowledge sharing. The blending of self-paced and collaborative learning may include review of important literature on a regulatory change or new product followed by a moderated; live online, peer-to-peer discussion of the materials application to the student's job and customers. In the following section interaction methods of self-paced and live, collaborative learning will be discussed.

Self-paced learning

Self-paced learning is an asynchronous format. Driscoll & Carliner (2005) also call this learning from computers. The students interact with the computer. This strategy is related to using the computer as a guide, tutor, teacher and facilitator. Within this strategy there are possibilities to interact with peers and the instructor, but most of the lesson's structure and feedback are delivered via the computer. The strategies are focused on student-content interaction and student-environment interaction. The students work most of the time alone and work at their own pace. So, self-pace learning is also offline learning. The goal of the learning is to master the predefined skills and knowledge.

The goal of programs that are using the strategies for learning from the computer is that students are able to learn 24/7, at their own speed (Driscoll & Carliner, 2005).

The philosophy behind this design is behaviourism. To teach lower-level skills, such as knowledge (such as define, order, name, recall, stage, and list), comprehension (such as classify, describe, report, select, and discuss), and application (such as demonstration, solve, use, write, and apply) this strategy of learning from computers is the best to use.

The computer acts as a teacher and a guide. The computer provides structure and reinforcement in lessons through making use of pre-test, post-test, exercised, personalized feedback, and other tactics (Driscoll & Carliner, 2005).

Self-paced learning can be divided in three major categories (Driscoll & Carliner, 2005; (Singh & Reed, 2001):

- self-paced instruction
- simulations
- recorded lectures

Instructional designers often mix these three categories. In the next section the three categories will be explained. After each category the focus of this research will be mentioned.

<u>Self-paced instruction</u>

Self-paced instructional programs range from simple text-based programs to complicated multimedia programs featuring complex branching. The text-based programs are similar to online workbooks. The self-paced instruction programs rely on the printed word to deliver the content and feature questions that help the students master his command of the content. The more complicated multimedia programs use rich media and branching strategies based on pre-tests, student's preferences, and responses to exercises to present a personalized learning experience. The more complicated multimedia programs can offer opportunities to contact the instructor or peers for example by email, instant messaging, discussion board or telephone (Driscoll & Carliner, 2005).

The following interactions methods are possible in self-paced instruction.

Pre-test/post-test

Testing is an interaction method that is used in a traditional face-to-face classroom, but can also be used in an e-learning environment. Pre-test and post-test can be an important tool in

self-paced instruction. Pre-test can be used to determine what the students already know or not know. It can save the students a lot of time covering material they already know. This prevents boredom and frustration. The pre-test/post-test should cover the content of the course (Driscoll & Carliner, 2005; Office for Domestic Preparedness, 2003).

Practice exercises

Research has shown that practice of what is being taught moves skills and knowledge from short-term to long-term memory. Designing practice exercises in an e-learning environment is one of the most challenging interaction types to build. This method should develop practice exercises that allow students to practice the behaviour specified in the lesson objectives. Mostly the objectives are at a higher level than the practice exercises.
Practice exercises should be delivered by using a variety of techniques. The practice exercises are constrained by what the authoring software is capable of and the budget available. The more complex the answer, the more costly, and time-consuming is it to develop exercises. Some practice exercises include the following (Driscoll & Carliner, 2005):

- Drag and drop is used when one wants students to practise building, assembling physical items, or arranging conceptual information.
- Fill in the box is used to develop the student's ability to recall and apply information.
- Multiple-choice questions are used where well-written, multiple-choice questions can provide students with practice of higher-level skills than simple recall.
- Application simulations are used to allow students to practice using software in a safe environment.

Students are presented with one opportunity to complete a Practice Exercise. After students complete the Practice Exercise, they should be provided with feedback. For correct responses, the students will be told that their response is correct, and given the reason why. For incorrect responses, the students will be told that their response is incorrect and given the correct response and a reason why (Office for Domestic Preparedness, 2003).

Hyperlinks

An inexpensive method to enable the student to interact with the content is to provide hyperlinks (McVay Lynch, 2004). Using a hyperlink, an image or piece of text can link to another website. When clicked on a hyperlink, a new screen pops-up. This interaction method must be carried out with care and consideration for the experience level of the students and the complexity of the content. For example, if students are new to a content area, save the links for the end of the page or unit. Those who are new to a content area would expect the lesson to be self-reliant and would probably not benefit from links for enrichment. The developer would also want to make sure that the links do not take the new student to another website or lose the leaner. Methods for the advanced students may be different. Advanced students may need links embedded in the text to allow them autonomy to pursue some topics in greater detail to verify the source of a recommendation in the text (Driscoll & Carliner, 2005).

Interactive animation and media

The use of animated segments and/or video clips to show a process is a powerful interactive method. A highly instructive method for teaching procedures is allowing the student to play, replay, or slow down the playback of a process captured in on video or illustrated in an animation (Driscoll & Carliner, 2005).

Pop-ups
Pop-up boxes on the screen allow students to scroll down to see additional information. When students move their mouse over the hot spots on the screen, additional information will be revealed. The students interact with the content in the way they want. The environment should not make use of too many pop-ups, because that is user unfriendly (Driscoll & Carliner, 2005).

Online discussion
Online discussion (sometimes known as a notice board, discussion list or forum) is used for 'asynchronous' communication between lecturers and students. Asynchronous communication means a message is posted and a response is given at a later time - in a similar way to email. Messages can be viewed by all participants, which mean everyone has the benefit of seeing questions and answers.
Sometimes discussion is used for course administration. At other times, online discussion might be a part of the learning process. It is useful to remember that online discussion - like chat - provides an 'anywhere, anytime' learning environment which facilitates communication (University of South Australia, 2005).
When online discussion boards or notice board are used, the users should mention the topic that is talked about. Good grammar, spelling, content, and punctuation are important. Well-written message board postings will invite others to correspond. After posting a message to a board, the users should check it often for a reply. Some boards will automatically email when someone replies, but some do not (Cottrill, 2000). It is advised that the users automatically receive an e-mail when something new is submitted. To make the use of online discussion automatic, the users should regularly submit something on, for instance the discussion board.

Focus of this research
In this research it was analysed in what way the courses RMME and OTE made use of the following interaction methods in self-paced instruction:

1. Pre-test/post-test
2. Practice exercises
3. Hyperlinks
4. Interactive animation and media
5. Pop-ups
6. Online discussions

If the courses made use of these interaction methods, the following criteria were used to evaluate the use of self-paced learning. These criteria are based upon the above literature:

1. Pre-test/post-test:
   - Pre-test /post-test covers the content of the course

2. Practice exercises:
   - Different technique are used to deliver practice exercises
   - Meaningful feedback is given after students complete the practice exercise

3. Hyperlinks:
   - Pop-up of a new screen, when clicked on a hyperlink.

4. Interactive animation and media:
   - Possibility to play, replay and slow down the playback options

5. Pop-ups:
   - No too many pop-ups are used, that is user unfriendly

6. Online discussions:
   - The topic is mentioned.
   - Good grammar, spelling, content, and punctuation are used.
   - Automatically receive of e-mail when something new is submitted.
   - Something is regular submitted on the discussion board.

If the courses did not make use of these interaction methods, it was analysed if it was recommended to make use of these interaction methods in self-paced instruction.

Simulations

Simulations are another strategy of learning from computers. In simulations the computer acts as a teacher and strategies focus on accomplishing defined goals. Simulations are generally less analogous to textbooks and classrooms. Simulations place the learner in a role. Simulations are representations of the real world. Simulations can help the students explore ideas, processes, concepts, and principles in a controlled environment. In many e-learning programs, students read and respond to multiple-choice questions and hardly ever reflect on their answers. Simulations can be a strategy to encourage reflective thinking by allowing students to try alternative choices and observe the outcomes of their decisions.
Simulations are in different variants. Simulations can range from simple text-based programs to complicated media-rich programs that are very expensive. A course should make use of different variants, to meet the different needs of the students.
Simulations should give feedback to the students. The challenge is to design feedback that is meaningful. The student's solution must be evaluated by the system, which means that designers must either anticipate a very large range of solutions or find a way to provide feedback that is less specific but still valuable (Driscoll & Carliner, 2005).

Focus of this research

In this research it was analysed in what way the courses RMME and OTE made use of simulations. If they made use of simulations, the following criteria were used to evaluate the use of simulations. These criteria are based upon the above literature:
   - Different variants of simulations are used. Yes or no.
   - The students should receive timely and individual feedback.

If the courses did not make use of simulations, it was analysed if it was recommended to make use of simulations.

Recorded lectures

The last of the three categories in self-paced learning is recorded lectures. Recorded programs are becoming a common form. A popular method is the use of a live virtual classroom. Live virtual classroom programs can be recorded and then made available for viewing as recorded lectures. It is like watching a video of a live traditional classroom program (Driscoll & Carliner, 2005).
These lectures may have had interaction when they were first delivered in real time, such as live question and answer (Q&A), real-time polling, application sharing, and dialogue among students, breakout rooms, and text chat. Recorded or playback versions of these programs do not offer much interaction. To make them effective, the playback version can offer pre-test and post-test, tools for navigating the lecture via a table of contents, and links to additional resources and threaded discussions (Driscoll & Carliner, 2005).

Focus of this research
In this research it was analysed in what way the courses RMME and OTE made use of recorded lectures. If they made use of recorded lectures, the following criteria were used to evaluate the use of recorded lectures. These criteria are based upon the above literature. Recorded lectures should:

- use the possibilities to playback, play forward.
- make use of breakout rooms.
- make use of live questions and answer.
- make use of text chat.
- make use of real-time polling.
- make use of pre-test / post-test.
- make use of application sharing.
- make use of tools for navigating.
- make use of dialogue among students.
- make use of links to additional resources.

If the courses do not make use of recorded lectures, it will be analysed if it is recommended to make use of recorded lectures.

Live, Collaborative learning
The opposite of self-paced learning is live, collaborative learning. Live, collaborative learning is a synchronous format, some offline learning and online learning. The students learn from and/or with each other. The students work most of the time together. Live, collaborative learning is focused on student-student, student-teacher and student-content interaction. Live, collaborative learning can be divided in three categories:

- Classroom discussion
- Group-work
- Online chat

In the next section the three categories will be explained. After the three categories are explained, the focus of this research will be mentioned.

<u>Group-work</u>
The first category is group-work. Any time that two or more students are working together, other than when the lecturer is using whole-class instruction, it can be said as using group-work. All approaches to group-work have the distinguishing feature that students are working together without direct intervention by the teacher (for at least some of the time). Group-work has different variant and the different variants should be used. This does not mean that students are left to their own devices to learn whatever they like from discussion. It means that the lecturer has to structure the learning environment so that the students can interact productively under his indirect guidance and the lecturer gives the students feedback (Killen, 1998).

<u>Classroom discussion</u>
The second category in live, collaborative learning is classroom discussion. Classroom discussion provide an opportunity for students to discuss open ended topics; to voice an opinion; to be heard; to respond thoughtfully to the ideas of others; and to solve problems through thoughtful discussion. Classroom discussions differ from normal conversations. They have a specific form and they usually have a specific goal, such as the development of communication skills, or to encourage thinking/debating skills. Although class discussions have a specific form they are not formal meetings. Class discussions do not have a

chairperson or a secretary, and they also do not have an agenda or minutes (Dempster & Raff, 1992).

Barton, Heilker & Rutkowski are saying the following about classroom discussion:
'Classroom discussion functions best when students are talking to students. The goal is to get as many students involved in talking to one another as possible and for the teacher to fade into the background. Students are well practiced in how to talk to and listen to teachers, in how to address and look to authority figures for answers. But they are not well versed in how to talk to and listen to each other, in how to navigate and negotiate and discuss issues of serious consequence and work toward answers among equals.'

Online chat
The last category is online chat. Online chat is similar to discussion in that it enables communication between lecturers and students. Again, this online tool can be used for administration or learning.
The main difference is that chat is 'synchronous'. Like speaking on the phone, chatting online happens in 'real time' at a time predetermined by your lecturer. Online chatting can be private (one to one) or public (open to all students) depending on what arrangements a lecturer makes.
Online chat might occur when students are unable to attend campus during working hours. The lecturer may choose to set up an online consultation time where students can drop in to a chat room to ask their questions (University of South Australia, 2005).

Focus of this research
In this research it was analysed in what way the courses RMME and OTE made use of live, collaborative learning: group-work, online chat, classroom discussion. If the courses made use of live, collaborative learning, the following criteria were used to evaluate the use of live, collaborative learning. These criteria are based upon the above literature:

Group-work:
- Group-work should make use of different variants.
- The students should receive timely and individual feedback.

Classroom discussion:
- Classroom discussions should make use of open ended topics.
- Classroom discussions should make use of problem-solving.
- The teacher should fade into the background.
- As many students are involved in the discussion as possible. Yes or no.

Online chat:
- Online chat should make use of private chat session or public chat sessions.

If the courses did not make use of these interaction methods, it was analysed if it was recommended to make use of live, collaborative learning: group-work, classroom discussion and online chat.

2.4 Conclusion

In this chapter the different ways to deliver education, interaction in a blended learning environment and strategies of interacting with students in a blended learning environment have been discussed. It is clear that there many different possibilities of blending. There are no rules available to find the correct blend. The only thing that can be said is that the correct blend of blended learning must be aimed so that there is an overlap in the resources. The students should be able to obtain the same information by means of several formats and manners and the students should be able to get an answer to questions that are important for them, independently of time, location, place and learning preferences.
In this chapter evaluation criteria have been written down for the different interaction methods that can be used in a blended learning environment. In this research it was analysed what interaction methods were used in the courses RMME and OTE. It was analysed if these interaction methods could be improved and in what way, based on the evaluation criteria mentioned in this chapter and the results from the different activities in the evaluation phase (chapter 4 and 5). If the courses did not make use of these interaction methods, it was analysed if it is recommended to make use of these interaction methods.

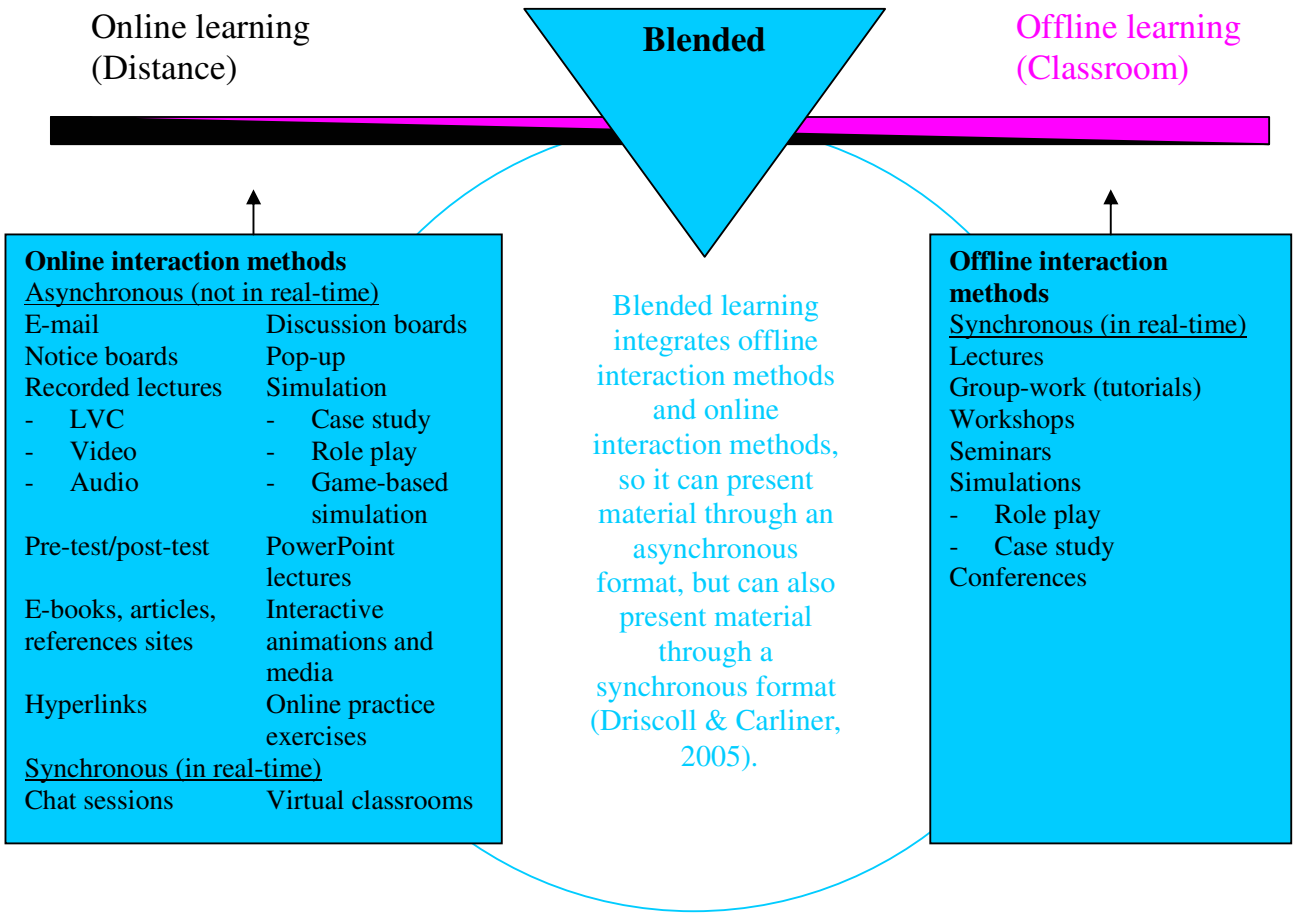

Figure 4. Blended learning model: possibilities to blend

Table 4

Different methods that can be used in offline and online learning

	Technology-based techniques/Online	**Non-technology based techniques/ Offline**
Announcement	Email Learning management system (LMC)	Flyer Regular post Phone
Overview session	Email Webinar	Traditional classroom
Forms of community	Online community	Study groups
Self-paced learning	Web-based tutorial Links to online resources E-books Video and audio cd/dvd Simulations	Articles Books Job-aids On-the-job training
Answering questions/solving problems	Email FAQ Instant messenger	Face-to-face meetings
Demonstrations	Web meetings Simulations	Traditional classroom
Practice	Simulation Discussion forum Email	Workbook assignments Role play Face-to-face meetings Workshops
Assessment	Simulation	Print test
Collaborative session	Chat	Role play with peers
Feedback	Email	Traditional classroom
Discussion	Discussion forum Chat	Face-to-face meetings Workshop Phone

3 Research design

In the previous chapter the theoretical framework for this research project was determined. There was looked at different ways to deliver education, different types of interaction in a blended learning environment and strategies of interacting with students in a blended learning environment. Chapter two resulted in a lot of evaluation criteria for these subjects. On grounds of these evaluation criteria the quality of the two courses will be evaluated and where necessary improved. In the several activities undertaken to determine the quality, these evaluation criteria will be used.

In this research project there were two phases, an evaluation phase and phase which lead towards the recommendations. Both phases will help to answer the main question of this project: 'How can the use of interaction methods in the blended learning environment of the courses 'Research Methods in a Multidisciplinary Environment' (RMME) and 'Operational Test and Evaluation' (OTE) of the LMEF Masters Program ensure best teaching practice?'

In the evaluation phase several research methods were conducted, including a course exploration, a document analysis, a questionnaire was sent to the students of the two courses and interviews were undertaken with students and lecturers about the education and the use of interaction methods in the blended learning environment. There was looked what delivery environment was used, what types of interaction were used and what kinds of interaction methods were used in the blended learning environment and how the two courses could be improved. There was also looked at the preferences of the students and lecturers recording to the delivery environment, types of interaction, the interaction methods that were used in the course, or could be used in the course.

After that, in the phase towards the recommendations, a formative evaluation was carried out with the lecturers and students. Conclusions and recommendations to improve the blended learning environment, with respect to the interaction methods were discussed with the lecturers and students of the RMME and OTE course, to see what they thought of the suggested improvements. These conclusions and recommendations were based upon the results of the evaluation phase.
After that formative evaluation the final conclusions and recommendations were adjusted. Finally, an implementation plan was written based on the conclusions and final recommendations to improve to improve the blended learning environment, with respect to the interaction methods.

In section 3.1 the first phase, the evaluation phase, will be discussed. In section 3.2 the second phase, the evaluation of the recommendations, will be discussed. In both sections the research questions and the activities will be discussed. Each activity will be explained, the selected respondents will be mentioned and the way of processing and analyzing the retrieved information will be explained.

3.1 Phase 1: Evaluation phase

The first phase of this research was the evaluation phase. In this evaluation phase an answer to research question 1 was given. This evaluation phase was a formative evaluation of the education offered to the students at this moment. Different activities were undertaken: a

course exploration, a document analysis, a questionnaire and interviews with the lectures and students.

Formative evaluation
The primary goal of the overall formative evaluation was to improve the quality of the blended learning environment of the RMME and OTE courses of the LMEF Masters program by looking at the interaction methods that are offered to the students.

One of the overall goals of this formative evaluation was effectiveness (Tessmer, 2001): will the adult students learn what the university wants them to learn? Is the learning environment offered in such a way that the students could use their own learning styles?
Another goal was efficiency (Tessmer, 2001): would they learn in a time or cost-effective manner? Did the way the interaction methods in the blended learning environment were delivered fit with the characteristics of the students?
Interest and motivation could determine the level of sustained attention (Tessmer, 2001): Will the students want to learn and attend to the learning? When the used interaction methods aligned with the characteristics of the students, the learning would be more interesting and attractive. That way the students would be more willing to learn.
A fourth goal is about the usability (Tessmer, 2001): Could the students easily use the interaction methods in the blended learning environment? When it would take the students too much time to use the interaction methods, they would not use it.
A fifth goal was acceptability (Tessmer, 2001): Would the lecturers or students use the recommendations the way it was intended or would they use it at all?

Formative evaluating occurs during the planning and operation of a program. The purpose of formative evaluations is to provide information that may result in the improvement of the product or program (Tessmer, 2001; Vockell & Asher, 1995; Worthen & Sanders, 1987).
A formative evaluation is applied to materials that are being developed (Tessmer, 2001). In this research project, the developed materials are the recommendations about the use of interaction methods in the blended learning environment, combined with the recommendations about the degree in which the courses serve adults with several learning styles that Scholten (2006) had written.
The overall questions that were asked in the formative evaluation were about the students´ and lecturers´ expectations related to the following questions: (1) What is working? (2) What needs to be improved? and (3) How can it be improved? (Worthen & Sanders, 1987). The focus in these questions was on improving the blended learning environment, with respect to the interaction methods.

3.1.1 Research questions 1

In this phase research question 1 was examined:

1. What is the quality of the blended learning environment of the RMME and OTE courses of the LMEF Masters program, with respect to the interaction methods?
    a. Which interaction methods are being used in the RMME and OTE courses of the LMEF Masters program?
    b. Which of the interaction methods in a blended learning environment are already implemented correctly in the RMME and OTE courses?
    c. What is the satisfaction of the students and lectures about the blended learning environment of the RMME and OTE course of the LMEF Masters program, with respect to the interaction methods?

3.1.2 Activities

To answer the question above several activities were undertaken. Each activity will be explained, the selected respondents will be mentioned and the way of processing and analyzing the retrieved information will be discussed.
One of the most important concepts in qualitative research is triangulation (Slavin, 1992). Different data collection methods provide information from different points of view on the same topic, and thereby provide more reliable data than for example interviews alone. Triangulations was used, when answering research question 1.

To examine research question 1, first the profile of the LMEF Master program had to be determined. Attention had to be paid to what interaction methods were used or could be used in the blended learning environment of the courses RMME and OTE. To analyse what interaction methods were used or could be used in the blended learning environment, the course website had to be analysed, the AITEC questionnaire of the last 2 years and the questionnaire used for the course evaluation of the University of South Australia of the last two years had to be analysed and lecturers and students of the courses needed to be interviewed. In total there were 2 lecturers and 34 students. Because of the timeframe for this research project it was not possible to interview all the 34 RMME and OTE students. A questionnaire was a good alternative to get as much information as possible.
Also to examine research question 1, one need to get more information about which of the interaction methods in a blended learning environment were best suited for the students of the RMME and OTE courses of the LMEF Masters program. To get this information the lecturers and the students of the two courses were interviewed and a questionnaire was sent to all the students.

Course exploration
To analyse what interaction methods were used in the blended learning environment, the course website was analysed. The evaluation criteria mentioned in chapter 2 were used during this analysis. During the analysis of the course website, the focus was on the different interaction methods that are offered to the students.

Analysis of questionnaires 2003 and 2004
To analyse what interaction methods were used or could be used in the blended learning environment, the AITEC questionnaire of 2003 and 2004 was analysed. The AITEC questionnaire made use of a 5-point scale: strongly disagree- disagree- undecided- agree- strongly agree.
These evaluations were conducted after completion of the semester in 2003 and 2004. It focused on areas such as course content, delivery mode and lecturing. The course evaluation of the University of South Australia was not analysed, because the course evaluations were not available.

The questionnaire could not be analysed with the statistical software program, Statistical Package for the Social Science (SPSS), because the individual responses were not available, only the conclusions of these individual responses were available. That is why there is chosen to analyse the conclusion by calculating percentages of these conclusions. These conclusions were used to analyse if there were differences in given answers between the various years and between the two groups face-to-face and online? Was there coherence between the given answers and the various groups? All of this was done to look if there could be found any suggestions for improvements of the blended learning environment, with respect to the interaction methods.

Interviews
To analyse what interaction methods were used or could be used in the blended learning environment and which of the interaction methods in a blended learning environment were best suited for the students of the RMME and OTE courses of the LMEF Masters program, interviews with the lecturers and students were undertaken. The focus was on the delivery environment used, the types of interaction that were used and the kinds of interaction methods that were used. The focus was also on the preferences of the students and lecturer recording to the delivery environment, types of interaction, and the interaction methods that were used in the course, or could be used in the course.
To ensure that all the questions were answered during the interview and that the interviewer understands the responses supplied by the participant, there was chosen for a structured interview. A structured interview is much like a questionnaire. Specific questions were asked with little room to deviate from the desired responses (Phillips, 1997)
To make sure that the respondent could not influence each other while giving the answers, there was chosen to use individual interviews. The interviewer had the possibility to keep on asking and there was direct contact with the respondent, what cooperation supports. Students as a source also give a very important and unique view, because they are the ones receiving the education (Braskamp, Brandenburg & Ory, 1986).

The interview questions for the *lecturers* can be found in appendix 1 and the interview questions for the students can be found in appendix 2. In total there were interviews with two groups. The first group consisted of the two lecturers of the RMME and OTE course, the second interview-group were the students of the RMME and OTE course.
The RMME and OTE course have their own lecturer who is responsible for the education of that course. The two interviewed lecturers were the only lecturers teaching these courses.

There were 20 mostly *part-time students* who were following the RMME course and 14 students who followed the OTE course. The interviewed students followed the program face-to-face in Adelaide as well as out of Adelaide. These students followed the courses online. The selection was made in such a way that both groups, online and face-to-face students, were represented for each course. In total there were interviews with eight students. From the RMME course three face-to-face and one online student were interviewed. From the OTE course two online and two face-to-face students were interviewed. It was not possible to randomly select the student, because there was a low response rate.

During the interviews, it is possible that the interviewer would like to hear what fits with the research project. Therefore it is possible that he influences the student or the lecturer to say specific conforming things. Also when analysing the results of the interviews, it is possible that the interviewer interpreted answers in a different manner than intended by the student. To make sure all answers were interpreted correct, the researchers did a member check in which the results of the interviews were sent to all students and the lecturers, asking if the answers were interpreted correctly. According to Russell & Gregory (2003) member checking was done to inquire whether participants' viewpoints were realistically interpreted, to determine whether there are errors of fact.

Questionnaire
To analyse what interaction methods were used or could be used in the blended learning environment and which of the interaction methods in a blended learning environment were

best suited for the students of the RMME and OTE courses of the LMEF Masters program, a questionnaire was send to all the students of the two courses.
The aim of a questionnaire is collecting and analyzing information for solving problems (Swanborn, 1994). A questionnaire is a good method to do research about motives, attitudes, opinions and future plans of the students (Swanborn, 1994). Another reason for using a questionnaire is that in a short time one can send a large amount of questionnaires (Swanborn, 1994). So, in a short time one can get a lot of data, this was time saving. Also the received information could be analyzed in a shorter time than by analyzing the information obtained in interviews. There was chosen to use a questionnaire and send it to all of the students, because this way all the students could participate in the research. Some of the students lived in other cities than Adelaide and the students had very busy work schedules. By sending the students an e-mail with the questionnaire attached, they could fill it in whenever they felt like doing it. The send questionnaire can be found in appendix 3. The questionnaire consists of questions relevant for this research project and the questions relevant to the research project of Scholten (2006). This was done because of the time limits of the respondents. It was more likely that they fill in one questionnaire instead of two. This way it was expected to get more responses. All of the students of both the RMME and OTE course received an e-mail. That means there could be in total 34 responses (20 RMME students: 16 face-to-face, 4 online; and 14 OTE students: 9 face-to-face, 5 online). The students were asked to fill it in and reply the questionnaire as soon as possible.
In total there were 18 responses (10 RMME students: 8 face-to-face and 2 online; and 8 OTE students: 4 face-to-face and 4 online).

The questionnaire was analyzed by using the statistical software program SPSS. SPSS was used to look at the given answers and how many times these answers were given. Special attention was given to the two groups face-to-face and online students. Were there differences in given answers between the two groups face-to-face and online? The students could choose from the answers: strongly disagree, disagree, agree and strongly agree. These answers were given a number: strongly disagree = 1, disagree = 2, agree = 3 and strongly agree = 4. In the questionnaire the students had to put an ‘x’ in the box of their answer. After that the mean of each question was calculated. All mean responses between 1 – 1.49 meant strongly disagree; 1.50 – 2.49 meant disagree; 2.50 – 3.49 meant agree and 3.50 – 4.00 meant strongly agree. The questionnaire contained also 2 open questions: major strengths and suggestions for improvements.

Before using the results of the developed questionnaire to answer research question 1, a reliability analysis had to be conducted to make sure that the results of the questionnaire was reliable. After the Cronbach alpha was determined, a pronouncement could be made about the reliability of the questionnaire as a whole. In this research project the questionnaire would be reliable, when a Cronbach alpha of at least .80 was achieved. The Cronbach alpha of the developed questionnaire was .932. One could conclude from this alpha that the developed questionnaire was reliable. A factor analysis was conducted to analyse if some items should be removed for the results, because they had a negative influence on the Cronbach alpha. This was not the case, so all questionnaire items have been taken for further analysis. All of this is done to look if there can be found any suggestions for improvements of the use of interaction in the blended learning environment.

Validity
The sample size of the interviews was small. Because each course had one lecturer, the information they gave could not be compared. Also for each course; four students were

interviewed. The selected students were not randomly selected, because the response rate was low. Every student volunteering to be interviewed had to be included in the sample. As a result of this there may be a selection bias; causing a low internal validity (Slavin, 1992). Special attention was given to the content validity of the developed questionnaire, to make sure the validity was high. The questions asked in the questionnaire were selected carefully, to make sure that the delivery environment, types of interaction and different interaction methods were present in the questionnaire. This way the chosen questions related to the aim of the developed questionnaire (Slavin, 1992). Also special attention was given to the wording used in the questions, to make sure that respondents all understood the questions in the same way.

3.2 Phase 2: Towards the recommendations

The second phase of this research project was the evaluation of the written recommendations. In this phase an answer to research question 2 was given. Different activities were undertaken to answer research question 2: conclusions and recommendations were written and a formative evaluation was undertaken by interviewing the lecturers of the two courses and the students.

3.2.1 Research question 2

In this phase research question 2 was answered:

2. How can the quality of the blended learning environment of the RMME and OTE courses of the LMEF Masters program be improved, with respect to the interaction methods?
    a. Which of the interaction methods in a blended learning environment can be improved or added in the RMME and OTE courses?

3.2.2 Activities

To answer the question above different activities were undertaken. Each activity will be explained, the selected respondents will be mentioned and the way of processing and analyzing the retrieved information will be explained.

Writing conclusions and recommendations

To answer research question 2, conclusion and recommendations had to be written, based upon the results of the evaluation phase. The following reasons were used to decide when a recommendation was adopted:

- The suggested improvements of the AITEC questionnaire 2003 were not taken into consideration in the rest of the research, when the suggested improvements in the AITEC questionnaire were only mentioned in 2003 and did not come back in the questionnaire of 2004, the developed questionnaire or in the interviews with the students and the lecturer. They were not relevant anymore and had most likely been improved in the last two years.
- A recommendation was adopted when according to the different activities undertaken, the education would be improved.
- A recommendation was also adopted when it was very important according to the literature (see chapter 2), even if according to the interviews/developed questionnaire, the lecturer or most students did not like the recommendation. There was analysed how significant a comment of the student or lecturers was.
- Some recommendations were adjusted, based on the results of the formative evaluation of the recommendations. Recommendations were adjusted, when some words had to be

added to the recommendation to make it more specific, so textual changes. Recommendations were also adjusted when the idea behind the recommendation was good, but the recommendation was not usable the way it was, because it took too much time for the students or lecturer the way it was suggested.
- The actual evaluation criteria can be read in chapter 2.

In this phase conclusions and recommendations were written to ensure best teaching practice of the RMME and OTE course of the LMEF Masters. Recommendations were given concerning the improvement of the blended learning environment, with respect to the interaction methods. The written recommendations are combined with the results of the evaluation phase of Scholten (2006).

The recommendations covered different topics:
- Interaction
- Interaction (teaching) methods
- Feedback
- Assignments
- General recommendations

Formative evaluation
After drawing conclusions and writing recommendations based upon the results of phase 1, a formative evaluation was undertaken with the lecturers and students to hear their opinion about the recommendations.
A formative evaluation is applied to materials that are being developed (Tessmer, 2001). In this research project, the developed materials are the recommendations about the use of interaction methods in the blended learning environment, combined with the recommendations about the degree in which the courses serve adults with several learning styles that Scholten (2006) had written.
The formative evaluation of the recommendations was undertaken with 2 lecturers and 11 students (6 RMME: 5 face-to-face, 1 online student; and 5 OTE students: 2 face-to-face, 3 online students).

Interviews lecturers
In the second round of interviews a formative evaluation was undertaken to evaluate what the lecturers thought of the found conclusions and suggested improvements. The emphasis was – from their courses point of view – on the underlying idea if the suggested improvements for their course were practical. Did they have more suggestions for improvement concerning interaction in a blended learning environment? After that round of interviews, the suggested improvements were adjusted one more time, to make sure it were practical improvements that could be used in real time.
The RMME and OTE course had their own lecturer who was responsible for the education of that course. The two interviewed lecturers were the only lecturers teaching this course.

Interviews students
In the second round of interviews a formative evaluation was undertaken to evaluate what the students thought of the found conclusions and recommendations for improvement. The emphasis was – from the students point of view – on the underlying idea if the suggested improvements were practical. Did they have more suggestions for improvement concerning interaction in a blended learning environment? After this round of interviews, the suggested

improvements were adjusted one more time, to make sure it were practical improvements that could be used in real time.

The choice was made to also use the same students that were interviewed in the evaluation phase (n=8), because these students were more involved in the research project and that way they would give more detailed information. They knew what the research project was about and what the purpose of the project was.
To get more additional information about the students opinion of the recommendations, all students of the RMME and OTE course were sent an e-mail with the question to react on the recommendations. Even after sending a reminder, only two face-to-face students of the RMME course and one online students of the OTE course responded.

After the formative evaluation the conclusions and recommendations were adjusted.

Finally, an implementation plan was written based on the conclusions and recommendations to improve the blended learning environment, with respect to the interaction methods. This implementation plan gave an answer to the main question: 'How can the use of interaction methods in the blended learning environment of the courses 'Research Methods in a Multidisciplinary Environment' (RMME) and 'Operational Test and Evaluation' (OTE) of the LMEF Masters Program ensure best teaching practice?'. The implementation plan can be found in appendix 9.

Validity
For the formative evaluation of the recommendations, the same students were interviewed as during the interviews in the evaluation phase to answer research question one. To improve the internal validity, the recommendations were sent to all the students, with the request to respond to it within 3 weeks. This was done because the more responses received, the higher the internal validity. A high internal validity is important when one wants to be sure that the right meaning to the results was given and that the right conclusions were drawn (Van Berkel & Starren, 1993). Even after sending a reminder, only two students of the RMME course and one student of the OTE course responded. One cannot speculate what the students who did not respond would say about the suggested recommendations.

4 Results research question 1 RMME

In this chapter the results of the evaluation phase for the RMME course will be presented that answers the question: 'What is the quality of the blended learning environment of the RMME course of the LMEF Masters program, with respect to the interaction methods?'
This chapter also answers the following underlying questions:

a. Which interaction methods are being used in the RMME course of the LMEF Masters program?
b. Which of the interaction methods in a blended learning environment are already implemented correctly in the RMME course?
c. What is the satisfaction of the students and lectures about the blended learning environment of the RMME course of the LMEF Masters program, with respect to the interaction methods?

First the results of each activity will be presented. Finally, in section 4.5 answers to the above questions will be given.

In this chapter also the implemented and attained curriculum for the RMME course of Van den Akker's (2004) Typology of Curriculum representations will be explained. In the different activities of the evaluation phase this is made clear in the opinions given by the lecturer and the students.

In section 4.1 a summary of the results of the course website will be presented. In section 4.2 a summary of the results of the AITEC questionnaires in 2003 and 2004 will be presented. In section 4.3 a summary of the results of the developed questionnaire will be presented and in section 4.4 a summary of the results of the interviews with students and the lecturer of the course are presented. Finally, in section 4.5 the conclusions of the results for this course are summarized by research question.

The results of each activity can be found in appendix 4.
When there is talked about 'students' it means face-to-face and online students. When this is not the case, it will be mentioned otherwise. When there is spoken about some students, this means that this could be 2 students or less. When there is spoken about most students, this means 3 students or more.

4.1 Results from the analysis of the course website

One of the first activities that took place was the analysis of the course website. The focus was on the evaluation criteria mentioned in chapter 2. Below, a summary of the results will be presented. The conclusions are subdivided into delivery environments, types of interaction and the course website (e-learning environment).

Delivery environment
The face-to-face students made use of a blended learning environment. There were face-to-face classroom meetings (synchronous interaction), and the materials and information for the course could be found on the course website (online, asynchronous interaction).
The online students made only use of the e-learning environment. The online students did not have face-to-face classroom meetings. For them the e-learning environment was an

asynchronous environment. Students anticipate in asynchronous activities at convenient times for them.

Types of interaction
The course website made use of the human interaction: student-teacher interaction, student-student interaction and for the face-to-face students, student-guest expert or learners-community member interaction and the non-human interaction: student-tools interaction and student-environment interaction. The student-students interaction was low for the online students, because they do not have the possibility to go to the classroom sessions.
The different types of interaction could be used more, because in most of the cases they were used one or two times in the course.

Course website (e-learning environment)
The course website used PowerPoint lectures, E-books/articles, references sites and e-mail. The discussion board was not used very much. The notice board was used ones in the two/three weeks. The discussion board and the notice board should be used more on a regular basis. Hyperlinks were only used a few times. The course website could make use of more hyperlinks. When clicked on a hyperlink a new screen pop-ups.
The course website did not make use of pre-test/post-test, practice exercises, interactive animations and media, pop-ups, different types of simulations: game-bases simulations, physical simulations, process (step) simulations, role play, software simulations etc., recorded lectures, live virtual classroom and chat sessions. Because of this there was not a lot of variation in interaction methods that were used in the course website. To make sure the students can use their own learning styles, the course website should make use of more variation in the way of presenting the material.

Compared to the OTE course website the buttons of the courses websites and the format of the course outline were different. This can be confusing for the students, so it is advised to use the same buttons and format of the course outline.

4.2 Results from the AITEC questionnaire

One of the activities of the evaluation phase was analysing the AITEC questionnaires of 2003 and 2004. This was done to determine the profile of the RMME course the LMEF Masters at SEEC at that moment. The focus was on the criteria mentioned in chapter 2.
In sub-sections 4.2.1 and 4.2.2 a summary of the results of the AITEC questionnaire of 2003 and 2004 will be presented.

In appendix 4 the results of the AITEC questionnaire 2003 and 2004 are presented in percentages.

4.2.1 Summary of the results from the AITEC questionnaire RMME 2003

A large majority of students felt that the course encouraged and facilitated opportunities to interact with DSTO colleagues
Most students felt that academic support outside the face-to-face teaching was available.
A mixed response was received from the students about the statement that the students had ready access to online materials and text books. Another mixed response was received with regards that the online learning materials and study guides were effective. Mixed responses were also received about the statements that the online mode was an effective method of

learning, that the lecturer provided suitable support for the learning process and that there were opportunities for group/class interaction and collaboration available.

The students want to have more ready access to online materials and text books. The online learning materials and study guides could be more effective. According to the students, the additional online resources were also minimal. Not all students thought the online mode was an effective method of learning. The students mentioned that the lecturer did not provide suitable support for the learning process for every student and there were not enough opportunities for group/class interaction and collaboration available for all students. The course PowerPoint presentations were available for download, however, there was no recorded voice attached to the presentations, so in some cases it was difficult to interpret the material. Finally, the online students mentioned that there was little opportunity to ask a simple clarifying question (e-mail takes too long).

Most students felt that there was a lack of feedback. This needs to be improved; the lecturer should give feedback on a regular basis. Also the interaction from the lecturer and other students with the online students could be improved. Finally, the course was not well oriented for online students. This also needs to be improved. The course should make use of more variation in the way the material is presented to the students.

4.2.2 Summary of the results from the AITEC questionnaire RMME 2004

A large majority of students felt that the course materials/resources enhanced their learning. The students felt that the course delivery mode was effective and that the university facilities and equipment were suitable. The lecturer created an environment conductive to learning
A mix response was received with regards to students receiving adequate feedback on their work.

According to the students there was too little feedback. The feedback on the students' work needs to be improved, by giving more feedback, on a regular basis.

4.3 Results of the questionnaire developed by researchers

In section 4.2 a summary of the results of the AITEC questionnaire were presented. To get additional and more recent information about interaction methods in a blended learning environment, a new questionnaire was developed. In this section a summary is provided of the results retrieved form this questionnaire.

The responses on the developed questionnaire can be found in appendix 4.

Summary of the results of the developed questionnaire

According to the online students there were no major strengths. The face-to-face students are more positive about their learning environment. According to the face-to-face students, major strengths were well thought and presented lectures, because of this the students enjoyed the course. Tutorial and group aspects were presented in the lectures.
The face-to-face students would like to receive more feedback on their assignment results. It was hard for them to keep concentration for a whole day of lectures. Also, they would like to have more variety in the way the topics are presented during the classroom sessions.

According to the online students, the PowerPoint slides must be comprehensive. The online students cannot attend the classroom sessions, so they need more explanation. The learning environment is not attractive for them, because there are only PowerPoint slides. Online students had the feeling that they were neglected in comparison to the face-to-face students. This is something that the lecturer has to work on; he should pay more attention to the online students and make the learning environment more attractive for them. This can be done by offering more variation in interaction (teaching) methods. The students prefer the use of a discussion board, a notice board, online practice exercises, use of hyperlinks and recorded lectures. The face-to-face students also prefer simulations, interactive animations and media. The students prefer to read information, working with graphics or diagrams, physical, 'hands-on' activities, working with others and reflection. The face-to-face students also prefer to hear material being presented.

According to the online student the use of e-mail, the discussion board and the notice board in the course was not effective. According to the face-to-face students these were effectively used. Because these interaction methods are methods that online students mostly have to rely on, the use of these interaction methods needs to be improved.

All students would like to receive feedback on assignments. The online students would also like to receive more timely and personalized feedback from the lecturer.

4.4 Results from the interview with students and the lecturer of the RMME course

Besides analysing course website, analysing the questionnaire of AITEC and analysing the developed questionnaire, also interviews with students of the RMME course and the lecturer were undertaken. In chapter 2 the focus for this research was explained. Evaluation criteria were determined. In the interviews with the students and professor the focus was on these evaluation criteria. So, the focus was on the delivery environment used, the types of interaction that were used and the kinds of interaction methods that were used. The focus was also on the preferences of the students and lecturer recording to the delivery environment, types of interaction, and the interaction methods that were used in the course, or could be used in the course.
In this section a summary of the responses of the students and the lecturer will be given. The summary is provided in table 5 and made clear with a distinction in - -, -, +/-, + and ++.
The results of the interviews with students and the lecturer can be found in appendix 4.

Delivery environment, types of interaction and blended learning environment of the RMME course according to the students:
++ = All questioned students were satisfied.
+ = Most questioned students (3 students or more) were satisfied.
+/- = Some questioned students (2 students or less) were satisfied.
- = Most questioned students were not satisfied.
- - = All questioned students were not satisfied.

Delivery environment, types of interaction and blended learning environment of the RMME course according to the lecturer:
++ = The questioned lecturer was really satisfied.
+ = The questioned lecturer was satisfied.
+/- = The questioned lecturer was undecided.
- = The lecturer was not satisfied.
- - = The lecturer was really not satisfied.

Table 5
Results interviews with students and the lecturer of the RMME course.

	Students		**Lecturer**
	Face-to-face	**Online**	
Delivery environment			
Preferences			
Synchronous			+
Asynchronous			
Blended	+	+	+ (good option when only synchronous is not possible)
Types of interaction			
Used in RMME course			
Human interaction			
Student-lecturer	--	--	--
Student-student	+/-	--	+/-
Student-guest	+/-	--	+/-
Non-human interaction			
Student-content	+	+	+
Student-environment	+	+	+
Preferences			
Human interaction	+	+	++
Non-human interaction	+	+	+
Blended learning environment			
Positive aspects			
	• On the discussion board/notice board some comments by lecturer • E-learning environment accessible any time • Classroom session good to have interaction other students/ask questions	• On the discussion board/notice board some comments by lecturer • E-learning environment accessible any time	• Notice board useful • E-learning environment accessible any time, materials easy to find • E-learning environment good for catching up.
Aspects that could be improved			
	• Discussion board needs to be more stimulated by the lecturer • Notice board needs to be more stimulated by the lecturer	• Discussion board needs to be more stimulated by the lecturer • Notice board needs to be more stimulated by the	• Discussion board needs to be more stimulated by the lecturer • Notice board needs to be more stimulated by the lecturer

		lecturer	
Preferences			
Discussion board	++	++	++
Notice board	++	++	++
Pre-test / post-test	+/-	+/-	+/-
Practice exercises	++	++	++ (were available)
Hyperlinks	++	++	++
Interactive animations and media	- (perhaps not helpful for RMME course)	- (perhaps not helpful for RMME course)	-
Pop-ups	-	-	-
Simulation	+	+	+
Recorded lecturers	+	+	+
Live Virtual Classroom	+/-	+	+/-
Chat sessions	+/-	+/-	-
E-books	+	+	++
Group-work	++	++	++
Classroom discussion	++	++	++
Lectures	++	++	++

In general, the lecturer and the face-to-face students agreed on the preferred delivery environment, kinds of interaction and interaction methods. The online students disagreed most of the time with the face-to-face students and the lecturer. The major comment of the students and the lecturer was that the course needed more variation in the way it presented the material.

4.5 Conclusions RMME

In section 4.1- 4.4 the summaries of the results of the activities in the evaluation phase for the RMME course were presented. In this section (4.5.) the conclusions of the results are summarized as either general aspects (subsection 4.5.1), positive aspects (subsection 4.5.2), aspects that can be improved (subsection 4.5.3) or preferences of the students and lecturer related to the interaction methods (subsection 4.5.4). Finally, an overall conclusion (section 4.6) will be given. This way an answer to research question 1 'What is the quality of the blended learning environment of the RMME course of the LMEF Masters program, with respect to the interaction methods?' and the underlying questions 'Which interaction methods are being used in the RMME course of the LMEF Masters program?', 'Which of the interaction methods in a blended learning environment are already implemented correctly in the RMME course?' and 'What is the satisfaction of the students and lectures about the blended learning environment of the RMME course of the LMEF Masters program, with respect to the interaction methods?' will be given.
The quality of the RMME course is made clear in the positive aspects and the overall conclusion.

4.5.1 General aspects

The general aspects are based upon the analysis of the course website, and the results of the developed questionnaire. They are divided under two headings: delivery environment and course website. This section answers the question 'Which interaction methods are being used in the RMME and OTE courses of the LMEF Masters program?'.

Delivery environment
- The face-to-face students would take another distance course with the lecturer of the RMME course. The online students would not take another distance course with the lecturer of this course.
- The students would take another distance course.
- The students were very comfortable with using computers: Internet, upload/download of files, Word, Excel, and PowerPoint.

Course website
The course website used the following interaction methods:
- PowerPoint lectures: Some PowerPoint presentations are about a case study.
- Asynchronous methods: E-books/articles and references sites
- E-mail
- Self-paced interaction methods:
    - Discussion board: Something was not regularly submitted
    - Notice board: Something was not regularly submitted, it was used ones in the two/three weeks
    - Hyperlinks: a few, a new screen pop-ups when clicked on a hyperlink

The course website did not make use of:
- Self-paced interaction methods:
    - Pre-test/post-test
    - Practice exercises
    - Interactive animations and media
    - Pop-ups
    - Different types of simulations: game-bases simulations, physical simulations, process (step) simulations, role play, software simulations etc.
    - Recorded lectures
- Synchronous interaction methods:
    - Live virtual classroom
- Live, Collaborative learning methods:
    - Chat sessions

4.5.2 Positive aspects of the RMME course

The positive aspects are based upon the analysis of the course website, the results of the AITEC questionnaire 2003 and 2004, the results of the developed questionnaire and the results of the interviews with the lecturer and students. They are divided under two headings: delivery environment and blended learning environment. This section answers the questions: 'What is the satisfaction of the students and lectures about the blended learning environment of the RMME course of the LMEF Masters program, with respect to the interaction methods?' and 'Which of the interaction methods in a blended learning environment are already implemented correctly in the RMME course?'.

Delivery environment
The course delivery mode was effective.

Blended learning environment
The lecturer created an e-learning environment that was conductive to learning. It was positive that in the face-to-face meetings the students could interact with each other, and ask

questions. The e-learning environment was accessible at any time. The students could catch up if they missed a lesson. Everything was easy to find on the e-learning environment. E-mail was useful for communicating.
The lecturer puts comments on the discussion board and notice board that were worth reading. There were opportunities for groups/class interaction and collaboration available and the university facilities and equipment were suitable (e.g. website functionality).
Finally, the course encouraged and facilitated opportunities to interact with DSTO colleagues and academic support outside of face-to-face teaching was available.

According to the face-to-face students the use of e-mail, the use of the discussion board and notice board was effective. The course was well presented.

4.5.3 Aspects that can be improved the RMME course

The aspects that can be improved are based upon the results of the AITEC questionnaire 2004, the results of the developed questionnaire and the results of the interviews with the lecturer and students. They are divided under the headings: blended learning environment. This section answers the question 'What is the satisfaction of the students and lectures about the blended learning environment of the RMME course of the LMEF Masters program, with respect to the interaction methods?'

The suggested improvements of the AITEC questionnaire 2003 were not taken into consideration in the rest of this research. This was because these improvements were only mentioned in the questionnaire of 2003 and did not come back in the questionnaire of 2004, the developed questionnaire or the interviews with students and lecturers. So they were not relevant anymore and have most likely been improved in the last two years.

Blended learning environment

- The learning environment was not motivating. There was not a lot of variation in the way the lecturer presented the content. The lectures only used PowerPoint slides. The face-to-face lessons made also use of a lot of PowerPoint lectures. It was hard to keep concentration with a lot of lectures.
- The discussion board was not used very much. The use of the notice board was not effectively according to the students. The lecturer thought the notice board was used effectively.
- The information on the e-learning environment was not always up-to-date. The students thought the use of phone calls from the lecturer were not effective. The online students thought the use of e-mail was not effective.
- When the website was down, there was no access. The students did not know what they should do.
- Group-work was not working very well, students found it difficult and the discussions did not contributed to their learning process.
- Feedback on assignments was not always timely. The students did not get any marks back yet, so they did not know how far learning has progressed. Students did not always receive personalized feedback from the professor.
- Finally, the buttons of the courses websites were not in the same order and the course did not make us of the same format for the course outline.

4.5.4 Preferences students and lecturer

Below the preferences of the students and the lecturer to make use of different kinds of interaction methods are presented. Also the preferences of types of interaction and learning

styles are presented. The preferences of the students and the lecturer are based upon the results of the developed questionnaire and the results of the interviews with the lecturer and students. They are divided under three headings: delivery environment, types of interaction, and blended learning environment.
This section answers the question 'What is the satisfaction of the students and lectures about the blended learning environment of the RMME course of the LMEF Masters program, with respect to the interaction methods?'

Delivery environment
The lecturer and the students preferred a blended learning environment.

Types of interaction
The lecturer and the students preferred the use of all human interactions (students-teacher interaction, students-students interaction, students-guest interaction) and non-human interactions (students-content interaction and students-environment interaction).

Blended learning environment
The lecturer and students preferred the use of online practice exercises and the use of hyperlinks in an e-learning environment. The lecturer and the students thought interactive animations could be useful. They doubt if it would be useful for the RMME course. The lecturer and the students preferred simulations, especially role-play and case studies and the use of recorded lectures in an e-learning environment. The lecturer and the online students preferred the use of a live virtual classroom, because it would improve the e-learning environment. They also preferred the use of a discussion board and a notice board. The students preferred chat sessions in an e-learning environment, and classroom discussions.

The students prefer to read information, working with graphics or diagrams to represent information, physical, 'hands-on' activity, working with others and reflection.
The face-to-face students prefer to hear material being presented.

4.6 Overall conclusion

The results of the evaluation phase for the RMME course answers the question: 'What is the quality of the blended learning environment of the RMME course of the LMEF Masters program, with respect to the interaction methods?' According to the results, the RMME course is a good, clear course in which the students can learn a lot of things they can use in their work. Especially for face-to-face students who can attend the classroom sessions this course is worthwhile. However, the online students are very unsatisfied. They can only read the lecture notes and provided articles. They do not have interaction with other students or with the lecturer. For them, there is no variety in interaction methods used. Because the lecturer does not provide adequate and timely feedback, the students do not know how far their learning has progressed. The group-work is not going really well, there needs to be more attention for this.
So, this course needs to pay more attention to the online students and there needs to be more variety in teaching methods, so that more learning styles are addressed.

5 Results research question 1 OTE

In this chapter the results of the evaluation phase for the OTE course will be presented that answers the question: 'What is the quality of the blended learning environment of the OTE course of the LMEF Masters program, with respect to the interaction methods?'
This chapter also answers the following underlying questions:

a. Which interaction methods are being used in the OTE courses of the LMEF Masters program?
b. Which of the interaction methods in a blended learning environment are already implemented correctly in the OTE courses?
c. What is the satisfaction of the students and lectures about the blended learning environment of the OTE course of the LMEF Masters program, with respect to the interaction methods?

First the results of each activity will be presented. Finally, in section 5.5 answers to the above questions will be given.

In this chapter also the implemented and attained curriculum for the RMME course of Van den Akker's (2004) Typology of Curriculum representations will be explained. In the different activities of the evaluation phase this is made clear in the opinions given by the lecturer and the students.

In section 5.1 a summary of the results of the course website will be presented. In section 5.2 a summary of the results of the AITEC questionnaires in 2003 and 2004 will be presented. In section 5.3 a summary of the results of the developed questionnaire will be presented and in section 5.4 a summary of the results of the interviews with students and the lecturer of the course are presented. Finally, in section 5.5 the conclusions of the results for this course are summarized.

The results of each activity can be found in appendix 5.
When there is talked about 'students' it means face-to-face and online students. When this is not the case, it will be mentioned otherwise. When there is spoken about some students, this means that this could be 2 students or less. When there is spoken about most students, this means 3 students or more.

5.1 Results from the analysis of the course website

One of the first activities that took place was the analysis of the course website. The focus was on the evaluation criteria mentioned in chapter 2. Below, a summary of the results will be presented. The conclusions are subdivided into delivery environments, types of interaction and the course website (e-learning environment).

Delivery environment
The face-to-face students made use of a blended learning environment. There were face-to-face classroom meetings (synchronous interaction), and the materials and information for the course could be found on the course website (online, asynchronous interaction).
The online students made only use of the e-learning environment. The online students did not have face-to-face classroom meetings. For them the e-learning environment was an

asynchronous environment. Students anticipate in asynchronous activities at convenient times for them.

Types of interaction
The course website made use of the human interaction: student-teacher interaction, student-student interaction. The course website made use of the non-human interaction: student-tools interaction and student-environment interaction.
The different types of interaction could be used more, because in most of the cases they were used one or two times in the course.

Course website (e-learning environment)
The course website used PowerPoint lectures, E-books/articles, references sites and e-mail. The discussion board was not used very much. The discussion board should be used more on a regular basis. The notice board was used ones in the one/two weeks. Hyperlinks were only used a few times. The course website could make use of more hyperlinks. When clicked on a hyperlink a new screen pop-ups.
The course website did not make use of pre-test/post-test, practice exercises, interactive The course website did not make use of pre-test/post-test, practice exercises, interactive animations and media, pop-ups, different types of simulations: game-bases simulations, physical simulations, process (step) simulations, role play, software simulations etc., recorded lectures, live virtual classroom and chat sessions. Because of this there was not a lot of variation in interaction methods that were used in the course website. To make sure the students can use their own learning styles, the course website should make use of more variation in the way of presenting the material.

Compared to the OTE course website the buttons of the courses websites and the format of the course outline were different. This can be confusing for the students, so it is advised to use the same buttons and format of the course outline.

5.2 Results from the AITEC questionnaire

One of the activities of the evaluation phase was analysing the AITEC questionnaires of 2003 and 2004. This was done to determine the profile of the RMME course the LMEF Masters at SEEC at that moment. The focus was on the criteria mentioned in chapter 2.
In sub-sections 5.2.1 and 5.2.2 a summary of the results of the AITEC questionnaire of 2003 and 2004 will be presented.

In appendix 5 the results of the AITEC questionnaire 2003 and 2004 are presented in percentages.

5.2.1 Summary of the results from the AITEC questionnaire OTE 2003

A large majority of students felt that the course encouraged and facilitated opportunities to interact with DSTO colleagues. Academic support outside the face-to-face teaching was available and they had ready access to online materials and text books. The online mode was an effective method of learning.
A mixed response was received from the students about the statement that the online learning materials and study guides were effective.
Undecided were all the students about the statement that the lecturer provided suitable support for the learning process.

Most students disagreed with the statement that there were opportunities for group/class interaction and collaboration available. Most students felt that there should be more opportunities be available for group/class interaction and collaboration.
Some students thought that the online learning materials and study guides could be more effective. Not all students thought that the lecturer provided suitable support for the learning process.

5.2.2 Summary of the results from the AITEC questionnaire OTE 2004

All students gave a positive response on all the statements. A large majority of students who completed this evaluation felt that the course materials/resources enhanced their learning. The course deliver mode was effective and the lecturer created an environment conductive to learning. The university facilities and equipment were suitable. Finally, the students received adequate feedback on their work.

According to the students, working in a group was fine, but it is difficult to deal with the group dynamics.

5.3 Results of the questionnaire developed by researchers

In section 5.2 a summary of the results of the AITEC questionnaire were presented. To get additional and more recent information about interaction methods in a blended learning environment, a new questionnaire was developed. In this section a summary is provided of the results retrieved form this questionnaire.

The responses on the developed questionnaire can be found in appendix 5.

Summary of the results of the developed questionnaire
According to the face-to-face students major strengths were that the course was challenging, the lecture notes were good and there were clear instruction of what was required in the assignments to achieve marks. Also a major strength according to the face-to-face students was that during group-work the groups consisted of local and interstate students.
According to the online students major strengths were that there was simple access to lecture notes, course information, reference material and assessment notes on website and the course was well structured and programmed.
According to the face-to-face students the coordination of teams with distance mode members could be more coordinated and the assignments should be checked earlier by the lecturer

According to the online students all the assignments and coursework should be given to the students at the start of the semester. The online students would like to have face-to-face meetings. According to the online students the tutorials would be of much greater benefit if the lecturer were able to provide more direction to the expected results. They prefer more interaction with professor required to ask questions about material. Some online students would like to see more discussions on examples and some would like to get printed copies of lessons and coursework, because it takes a lot of time to look through everything online and print it off. Finally the online students would like to have workshop session online, so that all participants can conduct.

According to the students the use of the discussion board in this course was not effective, they also think that the amount of online interaction with the lecturer and other students was not

sufficient. According to the students the e-learning environment was not motivating. It can become more motivating, by offering more variation in interaction (teaching) methods.
The students prefer the use of a discussion board, a notice board, online practice exercises, live virtual classroom sessions, interactive animations and media, use of hyperlinks, recorded lectures and chat sessions. The online students also prefer simulations. The face-to-face students also prefer pop-ups in an e-learning environment.
The students prefer to read information, working with graphics or diagrams, hear material being presented, physical, 'hands-on' activities, working with others and reflection.
According to the students, they receive timely, personalized feedback from the lecturer.

5.4 Results from the interview with students and the lecturer of the OTE course

Besides analysing course website, analysing the questionnaire of AITEC and analysing the developed questionnaire, also interviews with students of the RMME course and the lecturer were undertaken. In chapter 2 the focus for this research was explained. Evaluation criteria were determined. In the interviews with the students and professor the focus was on these evaluation criteria. So, the focus was on the delivery environment used, the types of interaction that were used and the kinds of interaction methods that were used. The focus was also on the preferences of the students and lecturer recording to the delivery environment, types of interaction, and the interaction methods that were used in the course, or could be used in the course.
In this section a summary of the responses of the students and the lecturer will be given. The summary is provided in table 6 and made clear with a distinction in - -, -, +/-, = and ++. The results of the interviews with students and the lecturer can be found in appendix 5.

Delivery environment, types of interaction and blended learning environment of the RMME course according to the students:
++ = All questioned students or the lecturer were satisfied.
+ = Most questioned students (3 students or more) or the lecturer were satisfied.
+/- = Some questioned students (2 students or less) or the lecturer were satisfied.
- = Most questioned students or the lecturer were not satisfied.
- - = All questioned students or the lecturer were not satisfied.

Delivery environment, types of interaction and blended learning environment of the RMME course according to the lecturer:
++ = The questioned lecturer was really satisfied.
+ = The questioned lecturer was satisfied.
+/- = The questioned lecturer was undecided.
- = The questioned lecturer was not satisfied.
- - = The questioned lecturer was really not satisfied.

Table 6

Results interviews with students and the lecturer of the OTE course.

	Students		**Lecturer**
	Face-to-face	**Online**	
Delivery environment			
Preferences			
Synchronous			
Asynchronous			
Blended	++	++	++
Types of interaction			
Used in OTE course			
Human interaction			
Student-lecturer	-	-	-
Student-student	+/-	+/-	+/-
Student-guest	-	-	-
Non-human interaction			
Student-content	+	+	+
Student-environment	+	+	+
Preferences			
Human interaction	++	++	++
Non-human interaction	++	++	+
Blended learning environment			
Positive aspects			
	• Website is standardized • Use of course schedule • Face-to-face workshops: good examples	• Website is standardized • Use of course schedule	• Group-exercises build on each other • Notice board effectively used • Ask questions in face-to-face sessions
Aspects that could be improved			
	• Discussion board needs to be more stimulated by the lecturer • Different tools could be explained • Course notes needs to be delivered earlier • Lecturer needs to encourage use notice board • Where students can find help when needed, should be clear	• Discussion board needs to be more stimulated by the lecturer • Different tools could be explained • Course notes needs to delivered earlier • Lecturer needs to encourage use notice board • Where students can find help when needed, should be clear	• Discussion board needs to be more stimulated by the lecturer • Make use of online quizzes • Produce a sense of community • More face-to-face meetings
Preferences			
Discussion board	++	++	++
Notice board	++	++	++

Pre-test / post-test	--	--	
Practice exercises	+	+	+
Hyperlinks	++	++	++
Interactive animations and media	- (perhaps not helpful for OTE course)	- (perhaps not helpful for OTE course)	- (perhaps not helpful for OTE course)
Pop-ups	--	--	--
Simulation	++	++	++
Recorded lecturers	++	++	+
Live Virtual Classroom	+	+	+/-
Chat sessions	+	+	+
E-books	+	+	+
Group-work	+	+	
Classroom discussion	++	++	
Lectures	++	++	

In general, the lecturer and the students agreed on the preferred delivery environment, kinds of interaction and interaction methods. The major comment of the students and was that the course needs more variation in the way it presents the material.
The students were satisfied with the way they received feedback.
Most students could not apply what they have learned in the course, in their work, but they expect that it will be in the future. According to the lecturer this was one of the primary objectives of this course and students have no problems with applying what they have learned in their work.

5.5 Conclusions OTE

In section 5.1- 5.4 the summaries of the results of the activities in the evaluation phase for the OTE course were presented. In this section (5.5.) the conclusions of the results are summarized as either general aspects (subsection 5.5.1), positive aspects (subsection 5.5.2), aspects that can be improved (subsection 5.5.3) or preferences of the students and lecturer related to the interaction methods (subsection 5.5.4). Finally, an overall conclusion (section 5.6) will be given. This way an answer to research question 1 ‘What is the quality of the blended learning environment of the OTE course of the LMEF Masters program, with respect to the interaction methods?’ and the underlying questions ‘Which interaction methods are being used in the OTE courses of the LMEF Masters program?’, ‘Which of the interaction methods in a blended learning environment are already implemented correctly in the OTE courses?’ and ‘What is the satisfaction of the students and lectures about the blended learning environment of the OTE course of the LMEF Masters program, with respect to the interaction methods?’ will be given.
The quality of the OTE course is made clear in the positive aspects and the overall conclusion.

5.5.1 General aspects

The general aspects are based upon the analysis of the course website, and the results of the developed questionnaire. They are divided under two headings: delivery environment and course website. This section answers the question ‘Which interaction methods are being used in the OTE course of the LMEF Masters program?’.

Delivery environment
- The face-to-face students would take another distance course with the lecturer of the RMME course. The online students would not take another distance course with the lecturer of this course.
- The student would take another distance course.
- The students are very comfortable with using computers: Internet, upload/download of files, Word, Excel, and PowerPoint.

Course website
The course website used the following interaction methods:
- PowerPoint lectures: Some PowerPoint presentations are about a case study.
- Asynchronous methods: E-books/articles and references sites
- E-mail
- Self-paced interaction methods:
    - Discussion board: it was hardly used
    - Notice board: used ones in the one/two weeks
    - Hyperlinks: a few, a new screen pop-ups when clicked on a hyperlink

The course website did not make use of:
- Self-paced interaction methods:
    - Pre-test/post-test
    - Practice exercises
    - Interactive animations and media
    - Pop-ups
    - Different types of simulations: game-bases simulations, physical simulations, process (step) simulations, role play, software simulations etc.
    - Recorded lectures
- Synchronous interaction methods:
    - Live virtual classroom
- Live, Collaborative learning methods:
    - Chat sessions

5.5.2 Positive aspects of the OTE course

The positive aspects are based upon the analysis of the course website, the results of the AITEC questionnaire 2003 and 2004, the results of the developed questionnaire and the results of the interviews with the lecturer and students. They are divided under three headings: delivery environment blended learning environment and Kirkpatrick's level 3: Behaviour. This section answers the questions: 'What is the satisfaction of the students and lectures about the blended learning environment of the OTE course of the LMEF Masters program, with respect to the interaction methods?' and 'Which of the interaction methods in a blended learning environment are already implemented correctly in the OTE courses?'.

Delivery environment
The course delivery mode was an effective mode.
The lecturer created an environment conductive to learning.

Blended learning environment
The use of the notice board, e-mail, phone calls of the lecturer and the overview of the course schedule on the e-learning environment were effective. The students had ready access to online materials and text books. The lecturer provided suitable support for the learning

process and the students received adequate, personalized and timely feedback on their work. The course encouraged and facilitated opportunities to interact with DSTO colleagues. The website was a standardized one; every course used the same outlook. Because of this the e-learning environment was easy to use. Also was positive according to the students that the e-learning environment was accessible at any time. The lecturer used good examples, related to their work. Finally, the university facilities and equipment were suitable and academic support outside of face-to-face teaching was available

According to the face-to-face student the group-work with distance students was positive. The course was challenging, had clear instructions of what was required in the assignments to achieve marks and the lecture notes were good.
According to the online students it was easy to access the website and the program was well structured and programmed.

5.5.3 Aspects that can be improved in the OTE course

The aspects that can be improved are based upon the results of the AITEC questionnaire 2004, the results of the developed questionnaire and the results of the interviews with the lecturer and students. They are divided under the heading: blended learning environment. This section answers the question 'What is the satisfaction of the students and lectures about the blended learning environment of the OTE course of the LMEF Masters program, with respect to the interaction methods?'

The suggested improvements of the AITEC questionnaire 2003 were not taken into consideration in the rest of this research. This was because these improvements were only mentioned in the questionnaire of 2003 and did not come back in the questionnaire of 2004, the developed questionnaire or the interviews with students and lecturers. So they were not relevant anymore and have most likely been improved in the last two years.

Blended learning environment

- Most students did not like the group-work, they did not learn from fellow students. Also the course did not encourage and facilitate opportunities to interact with fellow students; it was up to the students to do that.
- The discussion board was hardly used and the different tools (notice board etc) were never explained. Lectures/resources were delivered a week before the lecture was. That was according to the students too late.
- For some students it was not clear where the students can get help if they could not log-in.
- According to the face-to-face students there must be more coordination of teams with distance mode members and the assignments need to be checked earlier by the lecture.
- According to the online students the course should make use of a video-linked workshop. To benefit more from the tutorials, the lecturer should provide more direction to the expected results.
- Most of the interviewed students and the lecturer preferred to have more workshops, because than they could meet and interact with each other.
- According to the lecturer there were no online quizzes to help understanding better and in shorter steps. According to him he had not produced a sense of community in the class. Little to no opportunities for group/class interaction and collaboration was available. For the online students it was impossible to have class interaction, because they could not go to the face-to-face meetings.
- Finally, the buttons of the courses websites were not in the same order and the course did not make us of the same format for the course outline.

5.5.4 Preferences students and lecturer

Below the preferences of the students and the lecturer to make use of different kinds of interaction methods are presented. Also the preferences of types of interaction and learning styles are presented. The preferences of the students and the lecturer are based upon the results of the developed questionnaire and the results of the interviews with the lecturer and students. They are divided under three headings: delivery environment, types of interaction, and blended learning environment. This section answers the question 'What is the satisfaction of the students and lectures about the blended learning environment of the OTE course of the LMEF Masters program, with respect to the interaction methods?'

Types of interaction

The students found all human interaction (student-teacher interaction, student-student interaction, student-guest interaction) and non-human interaction (student-content interaction and student-environment interaction) very important. The lecturer found the human interaction: student-teacher and student-student interaction the most important.

Blended learning environment

The students and the lecturer preferred a blended learning environment. In this blended learning environment they preferred the use of a discussion board, notice board and chat session. The students preferred online practice exercises in an e-learning environment. The lecturer did not prefer practice exercises that should be marked.
The students preferred live virtual classroom sessions in an e-learning environment. The lecturer did not prefer the use of live virtual classrooms.
The students and the lecturer preferred hyperlinks and simulations in an e-learning environment, especially the use of case studies an role-play. They also preferred interactive animations and media, but they thought interactive animations and media would probably not be possible for the OTE course.
The students and the lecturer did not prefer the use of pop-ups. The students preferred recorded lectures in an e-learning environment. The lecturer preferred recorded lectures that are embedded in a PowerPoint slide.

The students prefer to read information, working with graphics or diagrams to represent information, physical, 'hands-on' activity, working with others, hear the material being presented and reflection.

5.6 Overall conclusion

The results of the evaluation phase for the OTE course answers the questions: 'What is the quality of the blended learning environment of the OTE course of the LMEF Masters program, with respect to the interaction methods?' According to the results, the OTE course is in general a good, clear course. The students were satisfied with the provided materials and received feedback. They liked to work in groups, but group work was not going really well. The face-to-face workshops are very important for the students. The online students miss this in de course. Students would like to have more possibilities to interact with each other; especially online students will benefit if more interaction possibilities are available. There is a variety in teaching methods, but this can be more. So, this course needs to pay more attention to the online students and there needs to be more variety in teaching methods, so that more learning styles are addressed.

6 Results research question 2 RMME and OTE

In this chapter the results of the phase towards the recommendations will be presented that answered the question: 'How can the quality of the blended learning environment of the RMME and OTE courses of the LMEF Masters program be improved, with respect to the interaction methods?'.
This chapter also answered the following underlying question:

a. Which of the interaction methods in a blended learning environment can be improved or added in the RMME and OTE courses?

In this chapter conclusions and recommendations are given to ensure best teaching practice of the RMME and OTE courses of the LMEF Masters. These conclusions and recommendation are based upon the results of the evaluation phase, see chapter 4 and 5.
Recommendations were given concerning the improvement of the blended learning environment, with respect to the interaction methods.
These recommendations covered different topics:

- Interaction
- Interaction (teaching) methods
- Feedback
- Assignments
- General recommendations

In total there were 34 recommendations of which three related to interaction, eighteen about interaction (teaching) methods, five on feedback, two about assignments and six general recommendations. If all recommendations would be mentioned, it would become too much, that is why they can be found in appendix 6.

The written recommendations are combined with the results of the evaluation phase from Scholten (2006). In this chapter also her research question 2 is answered: 'How can the quality of the RMME and OTE courses of the LMEF Masters program be improved, by looking at the degree in which the courses can serve adults with several learning styles?' There is analysed if the interaction methods used in the blended learning environment fit with the characteristics and learning styles of the adult learning of the RMME and OTE courses.

The combination of the two research projects can be explained by giving some examples: One of the characteristics of adult learners is that they would like to have timely and personal feedback. One aspect that belongs to interaction in a blended learning environment is real-human interaction. Especially online students would like to have more feedback and more real-human interaction. Adult learners would also like to have human interaction, so they can learn and benefit from other learners and the lecturer. This way, they are more motivated to learn. The recommendation that was written based on these findings is: 'It is advised that the lecturer calls the online students at least one time during the course. This way the online students have real-human interaction, they can ask questions and get instant feedback. This motivates them.'
A second example that can be given is the recommendation about the discussion board. One of the things that needed to be improved was the use of the discussion board. It was not used very much, but it was easy accessible for students and the lecturer. One of the things that needed to be improved according to Scholten (2006), was that the students did not know each other, most of them were not able to meet each other and most of the students would like to

know more about each other. According to Scholten (2006), adult learners are more comfortable with learning when they know other students. A combination of these findings was made, and the following recommendation was written: 'It is advised that the lecturer creates a place on the discussion board where students have to submit their personal background information (picture and approximately ten sentences).'
A last example will be given about the use of the notice board. This research project showed that the use of the notice board of the RMME course was not optimal. Scholten's research project (2006) showed that adult learners do not want to spent time on other things than learning. A combination of these two findings resulted in the following recommendation: 'It is advised to submit the newest information on top of the notice board.' This way the notice board is used better and adult learners do not have to scroll down every time they want to look at the notice board. This will save them time and it is more likely that they look at the notice board to see if new messages have been submitted.

Formative evaluation of the recommendations
After drawing conclusions and writing recommendations based upon the evaluation phase, a formative evaluation was conducted with the lecturers and students to evaluate what they thought of the recommendations. The recommendations must be effective and/or efficient and/or interesting and motivating and/or practical and usable and/or acceptable (Tessmer, 2001). These criteria were checked with the students and lecturers by doing this formative evaluation.
The primary goal of this formative evaluation of the recommendations was to improve the quality of the blended learning environment of the RMME and OTE courses of the LMEF Masters program, when looking at the interaction methods that are offered to the students.

Below, the results of the evaluation of the recommendations are presented. The results itself can be found in appendix 7 (results RMME course) and 8 (results OTE course). Section 6.1 will present the results of the formative evaluation of the recommendations. In section 6.2 the conclusions of this formative evaluation of the recommendations will be presented.

6.1 Results formative evaluation of the recommendations

The courses that were analysed are the RMME and OTE courses of the LMEF Masters program. In this section the results of the formative evaluation of the recommendations will be presented. This way an answer is given to the sub-question 'Which of the interaction methods in a blended learning environment can be improved or added in the RMME and OTE courses?'.
Subsection 6.1.1 will show the results of the students of both courses, subsection 6.1.2 will show the results of the lecturers. Finally, subsection 6.1.3 the differences between the students and the lecturers will be shown.

6.1.1 Results of the students

Below, the results of this formative evaluation will be presented in table 5. The recommendations all received a number. One can see in appendix 6 which recommendation belongs to each number. The recommendations with respect to feedback are only for the RMME course. This is because the results for the OTE course on research question 1 showed that the way the OTE students received feedback did not need to be improved.
When there is spoken about some students, this means that this could be 2 students or less. When there is spoken about most students, this means 3 students or more.

Each recommendation received a value of ++, +, +/-, - or - - :

++ = All questioned students found the recommendation effective, efficient, interesting and motivating, usable and acceptable.

+ = Most questioned students found the recommendation effective, efficient, interesting and motivating, usable and acceptable.

+/- = Some students found the recommendation effective, efficient, interesting and motivating, usable and acceptable.

- = Most questioned students did not find the recommendation effective, efficient, interesting and motivating, usable and acceptable.

- - = All questioned students did not find the recommendation effective, efficient, interesting and motivating, usable and acceptable.

Table 7

Results of the formative evaluation of the recommendations.

Recommendation number	**Students RMME**	**Students OTE**
Recommendations with respect to interaction		
1	+/-	+
2	++	++
3	+ (Online students: -)	+
Recommendations with respect to interaction (teaching) methods		
4	+	+
5	+ (Online students: -)	++
6	+/- (depends on the frequency)	+
7	+	+
8	++	++
9	+	-
10	++	+
11	+	++
12	+ (Online students: -)	++
13	+	-
14	+	-
15	+	++
16	+	+
17	++	++
18	+	++
19	++	+
20	+	+
21	+/-	++
Recommendations with respect to feedback		
22	++	
23	++	
24	++	
25	++	
26	++	
Recommendations with respect to assignments		
27	++	++
28	++	++

General recommendations		
29	++	++
30	++	++
31	++	++
32	For online students ++	++
33	++	++
34	+	++

6.1.2 Results of the lecturers

The lecturers of the RMME and OTE courses were also asked for their opinion about the recommendations.

Lecturer RMME
The following numbers belong to recommendations that the lecturer found effective and/or efficient and/or interesting and motivating and/or usable and/or acceptable:
1, 2, 3, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34.

Lecturer OTE
The following numbers belong to recommendations that the lecturer found effective and/or efficient and/or interesting and motivating and/or usable and/or acceptable:
1, 2, 3, 4, 5, 6, 9, 12, 13, 17, 18, 20, 21, 28, 30, 31, 32, 33, 34

6.1.3 Differences between students and the lecturer

For the RMME course, there were no big differences between the face-to-face students and the lecturer. However, between the online students and the lecturer, there were some differences. For example about using the students' background information in the material. The online students did not think this would be very helpful to them, but the lecturer and the face-to-face students did think it would be motivating for students. Online RMME students did not think that role-plays would be motivating to them, but face-to-face students and the lecturer did think it would be motivating and practical. These differences were related to the fact that the online students thought that these recommendations were not helpful to them, because they could not go to the workshops.

For the OTE course, the OTE lecturer was saying that he liked a lot of recommendations, but he was wondering if students would use it. That is why he was a bit sceptical about some recommendations, especially because he already did some recommendations, but no student had used the option. All the students and the lecturer agreed on the fact that interactive animations and a chat session would not be helpful for the OTE course. The students and the lecturer disagreed about using a live virtual classroom. The students thought it would be effective, efficient, interesting and motivating, usable and acceptable for online students, not for students who could go to the workshops. The lecturer did not like it very much, because technology was unreliable and it would take a lot of time for the lecturer and the students to prepare a live virtual classroom.

6.2 Conclusion

After the formative evaluation, all answers were analysed. The recommendations that got the approval of most of the students and the lecturer are presented in subsection 6.2.1. There were also recommendations in which the idea was good, but some keywords were missing, or some parts had to be removed or changed. So, some textual adjustments had to be made. These recommendations are presented in subsection 6.2.2. These two sections are the basis for the answer on research question 2 'How can the quality of the blended learning environment of the RMME and OTE courses of the LMEF Masters program be improved, with respect to the interaction methods?' and the underlying sub-question 'Which of the interaction methods in a blended learning environment can be improved or added in the RMME and OTE courses?'. Finally this section ends in sub-section 6.2.3 with recommendations that did not get approval from the students or the lecturer and thus had to be removed.

6.2.1 Recommendations that could stay the same

The following recommendations are recommendations which *the students and the lecturers of the RMME and OTE courses* found effective, efficient, interesting and motivating, practical and usable and acceptable.

- Recommendations about interaction
- Recommendations about the interaction (teaching) methods:
    - It is advised to make use of online practice exercises
    - It is advised to make use of hyperlinks in an e-learning environment.
    - It is advised to make use of simulations, especially role-play and case studies
    - It is advised to make use of recorded lectures in an e-learning environment
    - It is advised to make use of classroom discussions
    - It is advised to make use of group-work
- Recommendations about assignments
    - It is advised that the written material is more explicit as to what steps need to be taken to complete the assignments.
    - It is advised that the lecturer submits extra information concerning the assignments on the discussion board, especially when in the face-to-face classroom sessions there have been several questions about the assignment.
- General recommendations
    - Course explanation
    - E-learning environment
    - Delivery environment
    - Access e-learning environment

The following recommendations are recommendations *which the students and the lecturers of the RMME and OTE courses* found effective, interesting and motivating, practical and usable and acceptable.

- Recommendations about the discussion board:
    - It is advised that the lecturer stimulates the students to use the discussion board
    - It is advised to structure the discussion board by lesson. Questions relevant for lesson 1, should be submitted under folder 'lesson 1'. This way the students will not get 'lost' in the discussion board.
- Recommendations about the lessons:
    - It is advised to make use of a live virtual classroom (the lecturer of the OTE course did not find this recommendation really practical and usable).

The following recommendations are recommendations which *the students and the lecturer of the RMME course* found effective, efficient, interesting and motivating, practical and usable and acceptable.

- Recommendations about the interaction (teaching) methods:
  - It is advised to make us interactive animations and media
  - It is advised to make use of PowerPoint slides with pictures, graphics and diagrams
- Recommendations about feedback
  - It is advised to mark assignments within 3 weeks.
  - It is advised that the feedback is constructive.
  - It is advised that every student receives personalized feedback on their assignments.
  - It is advised that general feedback is submitted on the discussion board.
- Recommendations about the discussion board:
  - It is advised that all students and the lecturer receive an e-mail when something has been submitted on the discussion board

  All the students and the lecturer thought this recommendation was efficient, effective, motivating, usable and acceptable. At this moment students can choose if they want to get an e-mail immediately or not. It is advised that students also have the opportunity to choose if they want to get an e-mail immediately or at the end of the day.
- Recommendation about the notice board
  - It is advised to keep the notice board up-to-date.
  - It is advised to submit the newest information on top of the notice board.

The following recommendations are recommendations which *the students and the lecturer of the OTE course* found effective, efficient, interesting and motivating, practical and usable and acceptable.

- General recommendations
  - Delivery of learning material

6.2.2 Recommendations that needed to be adjusted

Some recommendations would be effective, efficient, interesting and motivating, practical and usable and acceptable to *the students and the lecturers of the RMME and OTE courses*, if some adjustments were made:

- Recommendation about interaction:
  - It is advised that the lecturer creates a place on the discussion board where students have to submit their personal background information (picture and approximately ten sentences).

The students found this recommendation effective, efficient, motivating, usable and acceptable. According to the lecturer, it would especially work at the beginning of the course. At the beginning of the course, students are more willing to do this. To make the recommendation more specific, it is adjusted as follows: *'It is advised that the lecturer makes at the beginning of the course a place on the discussion board where students have to submit their personal background information.'*

- Recommendation about the discussion board:
  - It is advised to structure the discussion board by lesson. Questions relevant for lesson 1 should be submitted under folder 'lesson 1'. This way the students will not get 'lost' in the discussion board.

The results of the formative evaluation showed that the majority of the students and the lecturer thought this recommendation would be efficient, effective, motivating, very usable and acceptable. The recommendation can be shortened by removing the last two sentences; they are an explanation, not the recommendation itself. So, the recommendation was adjusted as followed: '*It is advised to structure the discussion board by lesson.'*

- Recommendation about the notice board

The results of the formative evaluation showed that some students mentioned they would also like to receive an e-mail when something new has been submitted on the notice board. This is an important point, because this way the students get more motivated to use the notice board. That is why a recommendation is added to the recommendations about the notice board: *'If something new is submitted on the notice board, the students receive an email.'*

- Recommendation about writing a reflection paper
    - It is advised that at the end of working in groups in the course, the students write a reflection paper of 2/3 pages about how the group-work went.

The results of the formative evaluation showed that the students and the lecturer mentioned the reflection paper should not be marked. Most students did not really like the idea of writing a reflection paper, because it will cost a lot of time. They did like the idea of reflecting on how the group-work was going. If students fill in a questionnaire halfway through working in groups in the course, they can change their behaviour and benefit more from group-work. Filling in a questionnaire takes less time than writing a reflection paper. So, the recommendation was adjusted into: *'It is advised that halfway through working in groups in the course, the students fill in a questionnaire about collaboration. This questionnaire is provided below.'*

- Recommendation about the delivery environment
    - The students of the OTE course would like to have more face-to-face meetings, because then they can meet and interact with each other.

The results of the formative evaluation showed that this recommendation should be adjusted. The students prefer in general to have more face-to-face sessions and lesser online learning. The OTE students officially have no classroom sessions, but the OTE lecturer offers them in his own time. The OTE students want the course to be delivered with classroom sessions. That is why the recommendation was adjusted to: *'It is advised to have more face-to-face meetings for the OTE course.'*

Some recommendations would be effective, efficient, interesting and motivating, practical and usable and acceptable to *the students and the lecturers of the RMME course*, if some adjustments were made:

- Recommendation about feedback
    - It is advised to answer e-mails or phone calls within 3 days.

All the students and the lecturer found this recommendation effective, efficient, motivating, usable and acceptable. The lecturer mentioned during the formative evaluation that 3 days should be 3 business days. To make the recommendation more specific it was adjusted into: *'It is advised to answer e-mails or phone calls within 3 business days.'*

Some recommendations would be effective, efficient, interesting and motivating, practical and usable and acceptable to *the students and the lecturers of the OTE course*, if some adjustments were made:

- Recommendation about the discussion board:

- It is advised that all students and the lecturer receive an e-mail when something has been submitted on the discussion board

All the students and the lecturer thought this recommendation was efficient, effective, motivating, usable and acceptable. At this moment students can choose if they want to get an e-mail immediately or not. It is advised that students also have the opportunity to choose if they want to get an e-mail immediately or at the end of the day.

6.2.3 The recommendation that needed to be removed

There was one recommendation that would not be effective, efficient, interesting and motivating, practical and usable and acceptable to *the students and the lecturers of the RMME and OTE courses.* That is why this recommendation needed to be removed:

- It is advised to make use of a chat session

The results of the formative evaluation showed that the students would not make use of chat sessions. If they wanted an immediate answer, they would phone that person. If it would be used in group-work, they would make an appointment so everybody was online. They preferred to use the phone, instead of a chat session. They would not use chat. The recommendation was not acceptable, effective, efficient or usable for the students. Because the students will not use it, this recommendation is removed.

There was one recommendation that would not be effective, efficient, interesting and motivating, practical and usable and acceptable to *the students and the lecturers of the OTE courses.* That is why this recommendation needed to be removed:

- Recommendations about the lessons:
  - It is advised to make use of PowerPoint slides with pictures, graphics and diagrams

The results of the formative evaluation showed that the PowerPoint slides in the OTE course were good as it was; they were already effective, interesting and usable. So, they did not need more pictures, graphics and diagrams. That is why this recommendation was removed.

6.3 Overall conclusion

The results of the phase towards the recommendations answers the question: 'How can the quality of the RMME and OTE courses of the LMEF Masters program be improved, with respect to the interaction methods?' The quality of the RMME and OTE course can be improved by implementing the recommendations that can stay the same and by implementing the adjusted recommendations.

7 Implementation plan

After the literature research (chapter 2), the results of the evaluation phase (chapter 4 and 5) and the results of phase which leads towards the recommendations (chapter 6) were combined, an implementation plan was written. The written implementation plan can be found in appendix 9. This implementation plan answers the main question of this project: 'How can the use of interaction methods in the blended learning environment of the courses 'Research Methods in a Multidisciplinary Environment' (RMME) and 'Operational Test and Evaluation' (OTE) of the LMEF Masters Program ensure best teaching practice?'

In this chapter a justification of the recommendations in the implementation plan will be given. In this justification an overview of the recommendations in the implementation plan will be given. The extended version of the recommendations can be found in appendix 9. The recommendations are related to the interaction methods that are offered to the student or could be offered to the students in the blended learning environment of the courses. The recommendations are also related to the research project of Scholten (2006). In section 7.1 the structure of the implementation plan will be given. In section 7.2 justifications about the recommendations related to interaction will be given. In section 7.3 justifications about the recommendations related to the interaction (teaching) methods will be given. After that, justifications about the recommendations related to feedback (section 7.4), assignments (section 7.5) and general recommendations (section 7.6) will be given.

Unless mentioned else, the recommendations are for both courses.

7.1 Structure implementation plan

The implementation plan is structured as follows:
- Introduction
- Recommendations
- Planning
- Costs
- Risks

It is important to have a chapter about the planning in an implementation plan, because it is important that it is clear for the lecturers to see which recommendations will take more time then other recommendations to implement. By providing a planning, lecturers know when to start implement the suggested recommendations. The planning is provided in three levels: a long term planning, a short term planning and a planning while the course is running. Each planning is provided in a table. The table consists of three columns. One column contains the suggested recommendation, one column contains an explanation of this recommendation, why it needs this planning. The last column shows who is responsible for taking care of the suggested recommendation and making sure the recommendation will succeed.
It is important to have a chapter about the costs in an implementation plan, because for a good implementation of the implementation plan the lecturers need to have insight into the linked costs and required staff commitments. This way they can see what the costs are. A distinction is made between non-recurrent costs and structural costs.

Next to a chapter about planning and the costs, it is also important to have a chapter about the risk in an implementation plan, because the lecturers can than see which factors will make the implementation plan succeed, and which factors will make the implementation plan fail.

There was chosen for this structure on basis of other implementation plans. This structure was also used in other implementation plans and is very useful, as explained.

The second chapter of the implementation plan consists of the recommendations. The implementation plan consist of a lot of recommendations. Because of this, the implementation plan is extended. The lecturers can use the plan individually. Every step that is advised to take, is explained in the implementation plan. Below the justifications of these recommendations will be given. They are only explained in short in this section, because otherwise it would become too much. The whole implementation plan can be found in appendix 9.

7.2 Recommendations with respect to interaction

This section will discuss three recommendations about improving interaction between the students and between the students and the lecturer of the RMME and OTE course.

Results evaluation phase and phase towards the recommendations
From the analysis of the evaluation phase and the phase towards the recommendations, it was clear that for
the online students there were not enough possibilities to interact with other students. Online students also missed interaction with the lecturer. This way the online students did not get the guidance they preferred to have. Another result was that students did not feel comfortable with learning, because students did not know each other and they did not know the other students with whom they were working in the groups. The lecturer also did not know the personal backgrounds of the students.
As a result of this, it is advised to use the following recommendations to improve the interaction:

Recommendations

a) ***It is advised that the lecturer makes a place on the discussion board where students have to submit in short their personal background information.***

The personal background information consists of:
- a picture of themselves;
- information about their work situation at this moment;
- their work history;
- their educational background; and
- a short description of their personal life situation, like if they are married, have kids and their hobby's.

In total this information should not be more then a half A4-page.
It is advised to submit this background information in a separate folder on the discussion board (one can read more about using a folder structure in the discussion board paragraph further on in this document). The lecturer should encourage all students to submit this, he should make it compulsory. It is up to the students to read the background information of other students, it is not compulsory. The students, who would like to do this, have the possibility now.

The lecturer can stimulate the students to make more and better use of the discussion board, by making it clear to them at the beginning of the course that they can improve their grade by participating active on the discussion board. When they submit their background information and a picture of themselves on the discussion board, this will be 1% of their grade. By giving the students a grade for their participation they are more willing and motivated to do it.

b) It is advised that the lecturer calls the online students at least one time during the course.

This way the online students have real-human interaction with their lecturer. This allows the students to ask questions and get instant feedback while the lecturer can further motivate them.

c) It is advised that the lecturer uses the students' background information in the material, so that especially the online students can relate to it.

This is something that the online students are lacking right now. The students' background information can be used in the material, by using examples in the lessons that are related to this background or by using for example case studies that are related to the students' background.

The lecturer can stimulate the students to make more and better use of the discussion board, by making it clear to them at the beginning of the course that they can improve their grade by participating active on the discussion board. When they submit their background information and a picture of themselves on the discussion board, this will be 1% of their grade. By giving the students a grade for their participation they are more willing and motivated to do it.

7.3 Recommendations with respect to interaction (teaching) methods

This section will discuss eleven interaction (teaching) methods that will help improve the RMME and OTE course.

According to the students of the RMME course there was not a lot of variation in the way the lecturer presented the content in the face-to-face classroom session and the e-learning environment (blended learning environment). The blended learning environment mainly made use of PowerPoint lectures. Only PowerPoint lectures in the e-learning environment were not motivating. The instructional materials and aids used (transparencies, manuals, videotapes, and the like) were not enhancing the students' learning process. The lecturer did not present the lesson in steps that the students could follow. Because there was not enough variation in interaction methods used, the lecturer did not hold the students' interest.
In the RMME course the same can be said for having a whole day of lectures during the face-to-face classroom sessions. The overall RMME course did not contribute to the online students' knowledge and/or basic skill base.
The lecturer and the students preferred the use of all human interactions (students-teacher interaction, students-students interaction, students-guest interaction) and non-human interactions (students-content interaction and students-environment interaction).

It is recommended to adequately assist the students in learning the material, by meeting the different learning styles of the students.
To meet the different learning style needs of the students, the lecturer has to do something with the preferences of the students:

- The students prefer to read information.
- The students prefer working with graphics or diagrams to represent information.
- The students prefer physical, 'hands-on' activity.
- The students prefer working with others.
- The students prefer reflection.
- The face-to-face students prefer to hear material being presented.

As Sternberg was saying (1997, p. 115, In Brennan, McFadden& Law, 2001) 'The key principle is that in order for students to benefit maximally from instruction and assessment, at least some of each should match their styles of thinking. Different methods of instruction work best for different styles of thought.'

Regardless of which approach or theoretical framework an instructor takes in the issue of learning style, the key is to recognize that differences exist and must be accounted for somehow in an (online) class (Palloff & Pratt, 2003; Moran, 1997). A 'one size fits all' approach will not work. It is a mistake to assume that every (online) student looks and feels the same. That is why the following suggested interaction methods should not be obligatory, but it is advised that they are available. So, the students who want to do them have the possibility. O'Connor (1997, In Palloff & Pratt, 2003) notes that technology actually increases the range of activities that an instructor can use to address varying learning styles.

Meeting the different learning styles of the students can be done in different ways. The students will be able to obtain the same information by means of several formats and manners an the student will be able to get an answer to questions that are important for him/her, independently of time, location, place and learning style preferences.
These different ways will be discussed in subsection 8.2.1 until subsection 8.2.13.

7.3.1 Discussion board in an e-learning environment

Results evaluation phase and phase towards the recommendations
From the analysis of the evaluation phase and the phase towards the recommendations, it was clear that the discussion board was not used very much, but the students and the lecturer preferred the use of a discussion board.

According to the literature, a discussion board is also very important, because it can be used for 'asynchronous' communication between lecturers and students. Online discussion provides an 'anywhere, anytime' learning environment which facilitates communication (University of South Australia, 2005).

The students, the lecturer and the literature results all found the use of a discussion board important. Also the point about responding after a couple of days to the answers given by the students is still advised to do. The lecturer thought this recommendation was not efficient, because it would probably cost him much extra time. It is still advised to respond after a couple of days to answers given by the students, because for the students it is very important that the lecturer responds to given answers. As a result of this, it is advised to use the following recommendations to improve the use of the discussion board:

Recommendations

a) It is advised that the lecturer stimulates the students more to use the discussion board:
- ***Submitting general feedback on the discussion board.***
- ***Submitting relevant questions asked by one student on the discussion board.***

- ***When a student asks a question on the discussion board, it is advised that the lecturer also gives the other students opportunities to answer that question. This way the lecturer lets the students think for them selves.***
- ***It is advised that the lecturer responds after a couple of days (for example at the end of the week) to the answers given by the student.***

When relevant questions asked by one student are submitted on the discussion board, all the students can read the questions and the answers given. Especially for online students who cannot attend to the face-to-face meetings this can be very helpful.
When the lecturer allows the other students opportunities to answer a question, the lecturer lets the students think for themselves first before given or confirming the correct answer.

The lecturer can stimulate the students to make more and better use of the discussion board, by making it clear to them at the beginning of the course that they can improve their grade by participating active on the discussion board. When they submit good and relevant questions and also give good comments on other questions, this will be 2% of their grade. By giving the students a grade for their participation they are more willing and motivated to do it.

b) It is advised to structure the discussion board by lesson.
Questions relevant for lesson 1 should be submitted under folder 'lesson 1'. This way the students will not get 'lost' in the discussion board. They can go directly to the lesson in which they have a question, or for which they want to read an answer. They do not have to read a lot of pages with other questions first.
It is also advised to make the structure in such a way that when a reaction to a question is submitted, this reaction is put under the question. This way it is clear what the questions are and what the reactions to this answer are.

This recommendation is not available yet, but it is possible for the Flexible Learning Centre to do this. The Flexible Learning Centre is located at the Mawson Lake campus of the UniSA. Lecturers do have the possibility to make several discussion boards and name every discussion board differently. So one discussion board can be named 'Background information', one discussion board can be named 'Lesson 1', etc. The lecturers have the possibility to give the students a 'read only' or 'write' permission. The lecturers can also make the several discussion boards active or non-active. This way the students cannot submit questions to the wrong lessons.

c) It is advised that all students and the lecturer receive an e-mail when something has been submitted on the discussion board.
Because some students preferred to have an e-mail immediately when something is submitted, and other students would like to get it at the end of the day, they should get the opportunity to choose for themselves. At this moment students can choose if they want to get an e-mail immediately or not. It is advised that students also have the opportunity to choose if they want to get an e-mail immediately or at the end of the day. This e-mail would say: 'There are five new messages on the discussion board about 'this' and 'this' topic.' This possibility is not available right now, but it can be. This has to be spoken through with Flexible Learning Connection. They can change things in the courses' website.

7.3.2 Notice board in an e-learning environment

Results of the evaluation phase and the phase towards the recommendations of the RMME course

The analysis of the evaluation phase and the phase towards the recommendations showed that the notice board was not up-to-date. The students and the lecturer found the notice board very helpful. They can have a quick look on the notice board if there are updates and/or reminders. It reminds them of what is coming. This will stimulate them.

The students, the lecturer and the literature results all found the use of a notice board important. As a result of above, it is advised to use the following recommendations to improve the use of the notice board:

Recommendations for the RMME course

a) It is advised to keep the notice board up-to-date.

To make sure the notice board is used effectively, it is advised that the lecturer submits information at least once a week. The information put on the notice board can be reminders about assignments, new things that are submitted on the website, changes on the website, etc. It becomes then a weekly routine to look at the notice board. This way the lecturer will not forget to submit important information, and the students will not forget to look at the notice board.

b) It is advised that, when something new is submitted on the notice board, the students receive an email.

This means the students look at the notice board on time. This is possible if the lecturer makes out of a notice board a discussion board. He has to take the same steps as creating a discussion board; he only names it then 'notice board'.

c) It is advised to submit the newest information on top of the notice board.

This way the students do not have to scroll down to read the new information. This will save time and is more motivating.

7.3.3 Online practice exercises

Results evaluation phase and the phase towards the recommendations

From the results of the evaluation phase and the phase towards the recommendations it was clear that the courses did not make use of online practice exercises, but the lecturer and the students preferred the use of online practice exercises.

Research has shown that practice of what is being taught moves skills and knowledge from short-term to long-term memory (Driscoll & Carliner, 2005). This way the use of online practice exercises is very important.

The students, the lecturer and the literature results all found the use of online practice exercises important. As a result of this, it is advised to make use of online practice exercises.

Recommendation

a) It is advised to make use of online practice exercises

7.3.4 Hyperlinks

Results evaluation phase and the phase towards the recommendations

The analysis of the evaluation phase and the phase towards the recommendations showed that the lecturer and the students preferred the use of hyperlinks in an e-learning environment. The

lecturer and the students mentioned that there should not be too many hyperlinks. The usability of hyperlinks will than drop, because the students get lost.

McVay Lynch (2004) mentions that an inexpensive method to enable the student to interact with the content is to provide hyperlinks. By using a hyperlink, an image or piece of text can link to another website.

The students, the lecturer and the literature results all found the use of hyperlinks important. As a result of this, it is advised to make use of hyperlinks, but not too many.

Recommendation
a) It is advised to make use of hyperlinks in an e-learning environment.

7.3.5 Interactive animations and media

Results evaluation phase and phase towards the recommendations of the RMME course
The analysis of the evaluation phase and the phase towards the recommendations showed that the lecturer and the students thought interactive animations could be useful.

The use of animated segments and/or video clips to show a process is a powerful interactive method. A highly instructive method for teaching procedures is allowing the student to play, replay, or slow down the playback of a process captured on video or illustrated in an animation (Driscoll & Carliner, 2005).

The students, the lecturer and the literature results all found the use of interactive animations and media important. For the lecturer of the RMME course it can be difficult to develop interactive animations by himself, because of the time limitations and he has not got the right knowledge. There are different possibilities to develop the interactive animations; these different possibilities are shown in the implementation plan, see appendix 9. As a result of this, it is advised to make use of interactive animations and media.

Recommendation for the RMME course
a) It is advised to make use of interactive animations and media.

7.3.6 Simulations: Role-play & Case-study

Results evaluation phase and phase towards the recommendations
From the analysis of the evaluation phase, it was clear that the courses did not make use of role-play and case studies. The results of the evaluation phase and phase towards the recommendations showed that the lecturer and the students preferred simulations, especially role-play and case studies.

Role-play
According to the literature results, role-play simulation is a learning strategy in which the learners assume the roles of fictional characters in a defined scenario. Role-play strategies are one of the less expensive simulation options because the program can be run in a live virtual classroom environment. This can be done via text in the form of e-mail, instant messaging, or threaded discussions, and in a traditional face-to-face session. Role-plays take advantage of adult learners' life experiences. The students are able to try out different problem-solving strategies in a safe environment. Learners can be asked to do things such as take a point of

view contrary to their beliefs and thus to explore a different point of view. Learners are also able to try approaches and reflect on the outcomes (Driscoll & Carliner, 2005).

Case-study
A case study is a presentation, in narrative form, of an actual event that has occurred inside an organization (Driscoll & Carliner, 2005; Palloff & Pratt, 2005). They are not prescriptive, nor are they used to prove a point; they are designed to develop critical analysis and decision-making skills. Case studies should be used when the goal is to enable participants to: (1) apply previously learned theories to the circumstances in the case, (2) decide what is pertinent, (3) identify the real issues, (4) decide what should have been done, and (5) develop a plan of action (Driscoll & Carliner, 2005).

The students, the lecturer and the literature results all found the use of role-play and case studies important. As a result of this, it is advised to make use of role-play and case studies.

Recommendation
a) It is advised to make use of simulations, especially role-play and case studies.

7.3.7 Recorded lectures

Results evaluation phase and the phase towards the recommendations
From the analysis of the evaluation phase, it was clear that the course did not make use of recorded lectures. The results of evaluation phase and phase towards the recommendations showed that the lecturer and the students preferred recorded lectures in an e-learning environment.
The OTE lecturer preferred recorded lectures that are embedded in a PowerPoint slide.

From the literature research it was made clear that recorded programs are becoming a common form. A popular method is the use of a live virtual classroom. Live virtual classroom programs can be recorded and then made available for viewing as recorded lectures. It is like watching a video of a live traditional classroom program (Driscoll & Carliner, 2005).

As a result of above, it is advised to make use of recorded lectures. The students, the lecturer and the literature results all found the use of recorded lectures important.

Recommendation
a) It is advised to make use of recorded lectures in an e-learning environment.

7.3.8 Live virtual classroom

Results evaluation phase and phase towards the recommendations of the RMME course
From the results of the evaluation phase, it was clear that the course did not make use of live virtual classrooms. The results of the evaluation phase and phase towards the recommendations showed that the lecturer and the online students preferred the use of a live virtual classroom, because it would improve the e-learning environment. The lecturer mentioned that it will be useful to make use of a live virtual classroom two times in the course, especially for the online students. It will be too time-consuming and expensive to use it much more.

Results evaluation phase and phase towards the recommendations of the OTE course

From the results of the evaluation phase, it was clear that the course did not make use of live virtual classrooms. The results of the evaluation phase and the phase towards the recommendations showed that the students preferred the use of a live virtual classroom. According to them it would especially be useful for the online students. The lecturer did not like live virtual classrooms, because of the unreliable technology and because it takes a lot of time to prepare and to use a live virtual classroom.

Live virtual classes take place in real time. The virtual classroom is an online learning experience in which the instructor and students work together in real time. Working together, the instructor and students have live audio dialogue while sharing slides, viewing a software application, surfing the Internet, working in virtual rooms, asking questions and making assessments (Driscoll & Carliner, 2005). They also call this video-conferencing. It allows the student to see the instructor and the classmates and talk to them while sitting at his (home) computer. Many desktop videoconferencing products have been introduced that have the ability to project an image of the person who was called onto a small window on the computer screen (McVay Lynch, 2004).

There are three reasons, according to the literature, to make use of a live virtual classroom. The first reason is that the content is faster and less expensive to develop than self-paced instruction. A second reason to use live virtual classroom programs is that they can provide group learning without the travel and expense of traditional classroom programs. The last reason to make use of a live virtual classroom program is that many of these programs offer the option of recording a session and editing it for later viewing (Driscoll & Carliner, 2005)

The students, the lecturer of the RMME course and the literature results all found the use of a live virtual classroom recommendation important. The lecturer of the OTE course did not like the use of a live virtual classroom. It is still advised to make use of a live virtual classroom for at least two sessions, because for the online students the use of a live virtual classroom is very important. They miss the live interaction and live questioning. For them it is not possible to attend to the classroom session, so to use of the live virtual classroom for at least two times is a good alternative. As a result of this, it is advised to make use of a live virtual classroom.

Recommendation

a) It is advised to make use of a live virtual classroom.

7.3.9 PowerPoint slides with pictures, graphics and diagrams

Results evaluation phase and phase towards the recommendations of the RMME course

The results of the evaluation phase and phase towards the recommendations showed that more pictures, graphics and diagrams would help students understand the content better. This way the lessons would fit better with several learning styles.

According to Driscoll & Carliner (2005) visuals can enhance the (online) learning experience in several ways, from putting a human face on an otherwise anonymous learning experience to more efficiently and effectively communicating technical content than is possible with words alone. Visuals are essential to learning, because according to Stolovitch (2004, In Driscoll & Carliner, 2005) 83% of what is learned is learned through sight. Only 11% of what is learned is learned through hearing.

The students, the lecturer of the RMME course and the literature results all found the use of PowerPoint slides with pictures, graphics and diagrams important. As a result of this, it is advised to make use of PowerPoint slides with pictures, graphics and diagrams.

Recommendation

a) It is advised to make use of PowerPoint slides with pictures, graphics and diagrams.

7.3.10 Classroom Discussions

Results evaluation phase and phase towards the recommendations

The results of the evaluation phase and phase towards the recommendations showed that the students and the lecturer preferred the use of classroom discussion.

Barton, Heilker & Rutkowski (2005) are saying that classroom discussions function best when students are talking to students. The goal is to get as many students involved in talking to one another as possible and for the teacher to fade into the background. Students are well practiced in how to talk to and listen to teachers, and in how to address and look to authority figures for answers. But they are not well versed in how to talk to and listen to each other, in how to navigate and negotiate and discuss issues of serious consequence and work toward answers among equals.

Classroom discussions provide an opportunity for students to discuss open-ended topics, to say an opinion, to be heard, to respond thoughtfully to the ideas of others, and to solve problems through thoughtful discussion. Classroom discussions differ from normal conversations. They have a specific form and they usually have a specific goal, such as the development of communication skills, or to encourage thinking/debating skills. Although class discussions have a specific form they are not formal meetings. Class discussions do not have a chairperson or a secretary, and they also do not have an agenda or minutes (Dempster & Raff, 1992).

Students learn through discussions to explore subjects/matters and to deal with people of different backgrounds (Dreikers, Grumwald & Pepper, 1971, In Dempster & Raff, 1992).

The students, the lecturer and the literature results all found the use of classroom discussions important. As a result of this, it is advised to make use of classroom discussions.

Recommendation

a) It is advised to make use of classroom discussions.

7.3.11 Group-work

Results evaluation phase and phase towards the recommendations

The results of the evaluation phase showed that group-work was not working effective. The students found it difficult and the discussions did not contribute to their learning process. From the results of the evaluation phase and phase towards the recommendations, it was clear that the students did prefer working with other students.

Group-work has several benefits like (Turoff, Discenza & Howard, 2005):

- Due to social pressures, students tend to be more concerned with how other students view their work quality than how the lecturer views it. They are significantly more motivated to participate in a meaningful way when their fellow students can view their contributions.
- When equality of communications is encouraged, students cannot get away with being passive or lazy. The transcript or electronic recording of the discussions on the discussion board shows who is and who is not participating. It is visible to both the lecturer and other students that someone is being lazy.
- It becomes more noticeable what the outstanding students learn.
- The performance of students at the lower end of the distribution is improved. The communication systems permit them to catch up, because they are able to obtain a better understanding of the material with which they are most uncomfortable or have the least background knowledge.

The students, the lecturer and the literature results all found the use of group-work important. As a result of this, it is advised to use the following recommendations to improve the use of group-work:

Recommendations:

a) It is advised that at the beginning of each course some time is spent on how to work effectively in groups.

The students should encourage and stimulate each other in the group to have meaningful discussion. The atmosphere should be one in which the students want to learn from each other and share experiences, not to keep everything for themselves. Students should be made aware of the fact they are expected to have a pro-active attitude and contact each other to discuss topics. They should not wait until the lecturer tells them.
Group-work can be a key factor in making distance courses as good as or better than face-to-face courses (Hiltz & Wellman, 1997, In Turoff et al., 2004).

b) It is advised to submit a document in the e-learning environment of how to work effectively in groups.

Every student should have access to this document. To make sure every student reads this, the lecturer can say in the meetings and write on the website in the schedule 'To improve your grade – download these papers and read them.' This gives the students a reason to read the documents.

c) It is advised that the lecturer stimulates group-work, by showing interest in how the group-work is progressing.

In the meetings the lecturer can walk to each group and ask how the group-work is going, if there are any problems. When working on the tutorials and for the online students, the lecturer can call up different members of the groups and ask them how the group-work is going. By calling up different members in a group, and not always the same person, the lecturer gets a good idea how the group-work is really going.

d) It is advised that halfway trough working in groups in the course, the students fill in a questionnaire about collaboration.

When using this questionnaire, students have to think about how the group-work is going and what their own role is in the process. When necessary they can change things for the rest of the course to make the group-work, work better.
The inclusion of reflection on the application of the collaborative group-work in a (online) class can help to develop skills students need to lead or function in a virtual team in the work

environment (Palloff & Pratt, 2005). Reflection can promote the further development of one's skills or individuality. Mathews and Sayers (1997, In Vos & Vlas, 2000) say: “If you always do what you have always done, you will always get what you always got”. Without reflection, without looking back at your own actions (experiences, activities), ideas (knowledge, insights) or attitude (emotions, feelings), no-one gets easy sight at and insight in his own possibilities, and without that no-one can develop his/her competences further, in the sense of: completing, improving, replacing, fitting or combining with other operations, ideas and attitudes (Vos & Vlas, 2000).

The lecturer can stimulate the students to reflect on the group-work, by making it clear to them at the beginning of the course that they can improve their grade by participating active in group-work and when they fill in the collaboration questionnaire. When they submit a filled in questionnaire in which it is clear that they have really done their best to reflect on how the group-work is going, this will be 2% of their grade. By giving the students a grade for filling in the collaboration questionnaire, they are more willing and motivated to do it. It is recommended that the collaboration questionnaire will not be marked, but that it is compulsory. The Collaboration questionnaire should be printed on one A4, with a front and a backside.

7.4 Recommendations with respect to feedback

This section will discuss recommendations about improving feedback for the RMME course.

Results of the evaluation phase of the phase towards the recommendations of the RMME course

From the results of the evaluation phase, it was clear that feedback on assignments was not always timely. Students did not always receive personalized feedback from the lecturer. The overall course did not contribute to the online students’ knowledge and/or basic skill base. From the results of the evaluation phase and the phase towards the recommendations it can be concluded that the students and the lecturer found feedback in the right way and at the right time really important.

For students it is important that they get a mark back on their work, as soon as possible. Otherwise the effect of the feedback is gone (Desimone, Werner & Harris, 2002). Students need to know how they did it. This keeps them motivated (Desimone et al, 2002). Students also need to know what they did well and why it is good (Palloff & Pratt, 2005). So, the feedback needs to be informational (Desimone et al., 2002). According to Van Dellen (2001, In Kessels & Poell, 2001) good feedback promotes effective learning.

The students, the lecturer and the literature results all found feedback important. As a result of this, it is advised to use the following recommendations to improve feedback:

Recommendations for the RMME course

a) It is advised to answer e-mails or phone calls within 3 business days.

This should give the lecturer enough time to think about the question. The lecturer may be very busy when he gets the e-mail or phone call, but it should be possible to answer the questions within 3 days. For students, 3 business days is not too long. If it takes more than 3 days for the lecturer to answer questions, students may get de-motivated and not want to finish the assignment on time.

b) It is advised to mark assignments within 3 weeks.
Lecturers can be very busy with other things, but they made the schedule of the course, so they know when students deliver something that has to be marked. Marking can take a lot of time, but 3 weeks should be enough. If they do not get a mark back, or only after 2 months, then students do not know what they have submitted and it is not really relevant for them anymore.

c) It is advised that the feedback is constructive.
Feedback should not only be negative, students need to know what can be improved. Here, it is also important that they need to know how it can be improved.

d) It is advised that every student receives personalized feedback on their assignments.
This is important, so students know where they are in their learning process. When they only get general feedback, they cannot do that.

e) It is advised that general feedback is submitted on the discussion board.
This way all students can read it. This is important, because if general feedback is told in class, then the online students and the students who could not attend the meeting did not hear it. When students start working in the next assignment they can read the general feedback again and keep that in mind while they are working on the assignment.

7.5 Recommendations with respect to the assignments

This section will discuss recommendations about improving the assignments for the RMME and OTE course.

Results evaluation phase and phase towards the recommendations
The results of the evaluation phase showed that it is not clear for the students what was expected from the assignments. From the results of the evaluation phase and the phase towards the recommendations it can be concluded that the students and the lecturer found it important that assignments are clear and explicit.

As a result of above, it is advised to use the following recommendations to improve the assignments:

Recommendations

a) It is advised that the written material is more explicit as to what steps need to be taken to complete the assignments.
This way the online students know better what steps they need to complete to finish the assignment. Palloff and Pratt (2005) suggest that when a lecturer submits the question 'Is everyone clear about the assignment task?' on the discussion board, this will free the students up to ask questions that they might otherwise be embarrassed to ask. In this way, bad assignments submitted by students can be prevented.

b) It is advised that the lecturer submits extra information concerning the assignments on the discussion board.
This recommendation is especially important when in the face-to-face classroom sessions there have been several questions about the assignment, or when he receives e-mails or phone calls with the same questions in it. If the lecturer submits this information on the discussion board, it can be accessed by all students and especially for the online students this is useful.

7.6 General recommendations

In this section five general recommendations are discussed, that are usable in both the RMME and OTE course, but usable in other courses as well.

7.6.1 Course explanation

Results evaluation phase and phase towards the recommendations

The results of the evaluation phase and the phase towards the recommendations showed that it was not clear for the students what they should expect of the course, before the course started. Because of this, it is advised to use the following recommendation to make it for the students clearer what they can expect of the course:

Recommendation

a) It is advised to submit more detailed course information on the universities website.

Students have a look at the universities website to find out more about the course. This information helps them make a decision of what courses they wish to enrol. Especially for elective courses this is important. But for compulsory courses it is also important that students know what to expect. This way, students can make a better decision.

Information on the universities website should contain

- Aims and objectives of the course;
- List of lessons and the topics that are going to be discussed in those lessons;
- How many face-to-face meetings there are;
- How many assignments there are in this course;
- A short description of the assignments; and
- The amount of group-work and individual work.

7.6.2 Course website (e-learning environment)

Results evaluation phase and phase towards the recommendations

From the results of the evaluation phase, it was clear that the buttons of the website for each course were not in the same order. The course outlines did not use the same format and this can be confusing for the students. From the results of the evaluation phase and the phase towards the recommendations, it can be concluded that the students and the lecturer thought it was important that every course puts the buttons in the same order and that every course uses the same format.

As a result of this, it is advised to use the following recommendations to improve the course website:

Recommendations

a) It is advised to put the buttons in the same order.

b) It is advised to use the same format for the course outline.

7.6.3 Delivery environment

Results evaluation phase and phase towards the recommendations
The results of the evaluation phase and phase towards the recommendations showed that the students and the OTE lecturer preferred a blended learning environment. The RMME lecturer did not prefer a blended learning environment; he preferred a synchronous face-to-face delivery environment. This is not possible, because there are also students who follow the course only online. Blended learning is than a good alternative.
As a result of this, it is advised to use the following recommendation:

Recommendation
a) It is advised to have more face-to-face meetings for the OTE course.

Students can meet and interact with each other in face-to-face meetings. They think that is very important. Now the OTE course is offered as an online course, but students would really like to have face-to-face meetings. The OTE lecturer offered a couple of workshops in his own time, this is really helping the students; they would like to have them even more.

7.6.4 Access e-learning environment

Results evaluation phase and phase towards the recommendations
The results of the evaluation phases showed that some students have problems with log-in. From the results of the evaluation phase and the phase towards the recommendations it can be concluded that the students and the lecturer found it important that students know who they can contact if that happens. Because of this, it is advised to use the following recommendation to improve the access of the e-learning environment:

Recommendation
a) It is advised that the lecturer send all the students an e-mail at the beginning of the course to check if the students can log-in and if they have problems with this, who they can contact. Students should all respond to this e-mail.
This way the lecturer knows if the students can log-in, and can offer them help if they cannot do this. If students have problems with log-in during the course, they know who they can contact and do not have to spend a lot of time searching in the universities website for a contact person.

7.6.5 Delivery of learning material

Results evaluation phase and phase towards the recommendations
From the results of the evaluation phase, it was clear that the lecture notes/resources get delivered a week before the lessons. According to the students, that was too late. From the results of the phase towards the recommendations, it can also be concluded that the students and the lecturer thought it could be helpful for the students when material is delivered two lessons ahead. As a result of this, it is advised to use the following recommendation to improve the delivery of the learning material.

Recommendations
a) It is advised to deliver the learning material two lessons ahead.
This way the students can schedule their studies better into their work schedule, but cannot work too far ahead.

8 Discussion

In the previous chapter, chapter 7, the main question was answered by presenting an implementation plan with which the quality of the RMME and OTE courses can be improved. In this last chapter, the limitations of this research project will be brought forward. It is however just as important to also formulate the value of the results explicitly. This chapter will discuss strong and weak points of the used methods and the results. The section 8.3, contains a number of recommendations for follow-up studies. The last section, section 8.4 will look back on the main question of this research project.

8.1 Discussion research methods

In this section the validity of the research methods used will be discussed.

8.2.1 Validity

The sample size of the interviews was small. Because each course had one lecturer, the information they gave could not be compared. This could be a threat to the validity, because one can not be sure that the information retrieved from these interviews is reliable. Also for each course; four students were interviewed. The selected students were not randomly selected, because the response rate was low. Every student volunteering to be interviewed, had to be to be included in the sample. As a result of this there may be a selection bias; causing a low internal validity (Slavin, 1992).
For the formative evaluation the same students were interviewed as during the interviews in the evaluation phase to answer research question one. To improve the internal validity, the recommendations were sent to all the students, with the request to respond to it within 3 weeks. Even after sending a reminder, only two students of the RMME course and one student of the OTE course responded. One cannot speculate what the students who did not respond would say about the suggested recommendations.
After the 3 weeks had passed, two more responses were received. These late responses conformed closely with those included in the analysis. Because of the timeframe, the researchers had moved on to the next phase in their project and did no longer take this data into consideration.
It is possible that during the weeks in which the interviews were conducted, the students were very busy at their work or in their personal life situation. If they also had to do a lot of work for the course, it is possible that they were more negative about the course than when they were not busy at work or in their personal life situation. This could be a threat to the internal validity, caused by history (Slavin, 1992).
In the AITEC questionnaire of 2003 and 2004 only percentages could be calculated of the results, because no individual answer were available. Because this was lacking, there was no insight in the ceiling or floor effects. So the extreme answers were unknown. Because of this, instrumentation is a third threat to the internal validity (Slavin, 1992). This internal validity threat was diminished, because the individual responses to the open questions of the questionnaire were available. These responses were taken for further analysis in this research project.

8.2 Discussion results

In the discussion of the results of both research questions the strong and weak points are taken into consideration. In subsection 8.2.1 the reliability/validity of the results will be discussed. In subsection 8.2.2 the implementation of the recommendations will be discussed.

8.2.1 Reliability / Validity

With only eight interviews, of course the question rises: How complete and relevant are the results? For every course there were online and face-to-face students. In the responses of the RMME and OTE students given on the developed questionnaire, there were differences between the responses of the face-to-face students and the online students. Most of the answers given on the interviews were the same. There was however, only one online student interviewed for the RMME course and three face-to-face students. For the OTE course, there were two online students and two face-to-face students. This small sample size is a concern for the reliability and of the external validity, because there can be spoken of nonrepresentativeness (Slavin, 1992).
The results of the developed questionnaire and the first round of interviews corresponded with each other, there were no big differences. There were face-to-face and online students who responded and filled in the questionnaire.
One cannot be sure that the results obtained will be applicable to students who will take the course in the future. The suggested recommendations were based upon the preferences of the students of this semester. Not all preferences of the students and lecturers could be carried out, because some wishes were a threat to the validity of the recommendations. Future students may have other preferences, related to the use of interaction methods and learning styles. This research was based upon the preferences of the students of this year. However, the recommendations were written in such a manner that most interaction methods and all learning styles are covered and generally applicable to future students.

The suggested recommendations require a lot of time and energy from the lecturers. Although the lecturers were really enthusiastic about the recommendations in the formative evaluation, it is possible that they react toward the researchers like the Hawthorne effect (Slavin, 1992). This can be a threat to the external validity. The lecturers may react positive and say that they are willing to improve their course by using the suggested recommendations just because they want to look good in front of the researchers. If the lecturers are busy with other things and the course is coming up, it cannot be said for certain that the lecturers are going to use all the suggested recommendations. The Hawthorne effect might also play a role in the interviews with the students. However, since the results of the other activities did correspond with the results of the interviews of the students. That is why it is not likely that the Hawthorne effect plays a role in this research project.

During the interviews, it is possible that the interviewer would like to hear only what fits with the research project. Therefore it is possible that he influences the student or the lecturer to say specific conforming things. Also when analysing the results of the interviews, it is possible that the interviewer interpreted answers in a different manner than intended by the student. To make sure all answers were interpreted correct, the researchers did a member check in which the results of the interviews were sent to all students and the lecturers, asking if the answers were interpreted correctly. According to Russell & Gregory (2003) member checking was done to inquire whether participants' viewpoints were realistically interpreted, to determine whether there are errors of fact.

By sending the other students of the two courses the recommendations, to get additional information, misinterpretation could have been prevented in the formative evaluation. Since few responses were received, this possibility cannot be completely ignored.

8.2.2 Implementation of the recommendations

Besides the reliability and validity of a research project, a bearing surface with the lecturers is also very important, because they are the ones who have to use and work with the recommendations. When it is assured that during the complete process the people are involved, then the chance for successful implementation is enhanced. In this research project a bearing surface with the lecturers was accomplished by several aspects:
In this research project lecturers were involved from the beginning of the course until writing the recommendations. At the beginning of the course the researchers introduced themselves in the staff meetings and told what they were going to investigate. Also, the lecturers got an e-mail with the request to participate in an interview. In this e-mail the topics for the interview were explained. The lecturers were really involved in the research project; they were interviewed twice. In these interviews they were asked what they would like to see improved and if they had further suggestions. The lecturers could see what happened to the information they gave the first time during the second interview. At the end of the research project, the implementation plan was discussed thoroughly with them, to make sure they understood the implementation plan and knew how to use it.

The recommendations could not be implemented and the actual changes could not be evaluated in this short timeframe of this research project. So it cannot be analysed if the recommendations really improve the quality of the RMME and OTE courses of the LMEF Masters program, by looking at the degree in which the courses can serve adults with several learning styles. Because this was not possible, there was chosen to discuss the recommendations with students and the lecturers of the RMME and OTE course. They were asked if they thought the given recommendations would improve the quality of the RMME and OTE courses of the LMEF Masters, by looking at the degree in which the courses can serve adults with several learning styles. It cannot be said for sure that these recommendations will improve the quality of the two courses, but the students and the lecturers were enthusiastic about the recommendations, and the lecturers said they were really going to use the recommendations. Not only the people involved were enthusiastic, also the used literature in this research project did help improve the quality of the two courses. Several sources were used, and the recommendations were based upon this literature. These were two major reasons to say that the quality of the RMME and OTE course will improve by using the recommendations.

The lecturers are already using some learning styles that fit with adult learning characteristics. For example the courses made use of a discussion board and a notice board. However, the use of these interaction (teaching) methods was not of high quality. For example the discussion board was hardly used. Also it is advised that the lecturers make use of more interaction (teaching) methods. This way more learning styles will be addressed and each student will have more opportunities to learn in his/her preferred learning style. The courses will be more attractive and students will learn better.

8.3 Follow-up studies

In this paragraph a couple of possible subjects and points of interest for follow-up studies are discussed.

8.3.1 Improvement of this research project

There are a number of possibilities to get improved results from this research project. First of all, there can be more interviews with students, especially with online students. If the same information still holds, it is more convincing that it is a good reflection of the education offered. As a result, the reliability of this research project would improve, but conducting interviews is time consuming.
Another possibility, especially for the formative evaluation, would be to extend the time that students could respond to the questionnaire or the recommendations. Adult students, who are employed, may be very busy. They may, therefore, not always have the time to fill in a questionnaire or read the recommendations. That does not mean that they do not want to cooperate. If they get more time, it is conceivable that more responses are forwarded and can be used in the analysis. This will save the researchers time and should be taken into consideration during the planning stage of the research project. However, the more time there is between the course and the filling in of the questionnaire, the more information may be lost. This may reduce the reliability of the retrieved information.
When the recommendations next year are implemented, it is important to evaluate the implemented recommendations. This is important, because one needs to know if the recommendations improve the quality of the education or if the recommendations need to be adjusted even more to improve the quality even more.

In this research project there was only looked at the interaction methods in the blended learning environment that are offered or could be offered to the students and to what extend adults with several learning styles were served in the RMME and OTE courses. The University of South Australia, unit SEEC, would like to have proof that the LMEF Masters program is representative of best teaching practice in postgraduate education, and that the program is meeting the needs of the students. Because the RMME and OTE were the only two courses running, they were investigated. It is possible that there should be other recommendations for other courses of the LMEF Masters program. If the lecturers of those courses are really into blended learning, it is possible that they do not need all the recommendations. It is also possible that those lecturers need other recommendations, for example how to give proper instruction, or how to make the meetings attractive. This is something that should be taken into consideration before adapting the written recommendations as an example for how it should be in the LMEF Masters program.

The LMEF Masters program was set up for students who work at DSTO. This year, there were also a few students who work at Tenix, a locally owned defence and technology contractor. There were only interviews with the contact person of DSTO, and the organization administering the LMEF Masters program for DSTO, AITEC. This was done, because the LMEF Masters program is specifically designed for DSTO. Maybe in the future more students of Tenix will enroll in the course. If this will be the case, in another research project someone also has to communicate with a contact person of Tenix.

8.3.2 Take the use of interaction methods in a blended learning environment along in evaluation

There were no results found covering the last two years for the RMME and OTE course. To make sure that the courses are still representative of best teaching practice, the university should make sure their questionnaires are completed and returned for analysis.
In this questionnaire there were no questions related to which interaction methods in a blended learning environment are offered or could be offered to the students. Questions about this topic should be added to the questionnaire, to evaluate if the courses are representative of best teaching practice. This could be done in another research project to determine what questions should be in the questionnaire. Also in this research it could be evaluated what the best submission time is. The students of the LMEF Masters program are adults, so they have to combine their studies with their busy work schedule. For them it is not possible to fill in the questionnaire any time.

8.4 Main question

In this last section, there will be looked at the main question of this research project: 'How can the use of interaction methods in the blended learning environment of the courses 'Research Methods in a Multidisciplinary Environment' (RMME) and 'Operational Test and Evaluation' (OTE) of the LMEF Masters Program ensure best teaching practice?'. When the lecturers of both courses want to ensure best teaching practice, they have to keep the interaction methods used in this research project in mind, as well as the different types of interaction. When they use these interaction methods and types of interaction in the blended learning environment, they can ensure best teaching practice. The written implementation plan will help to achieve this.

9 References

Akker, J., van den (2004). Curriculum perspectives: an introduction. In J. van den Akker, W.

Althaus, S.L. (1997). Computer-mediated communication in the university classroom: An experiment with online discussions. *Communication Education, 46,* 158-174.

Berkel, H.J.M., van & Starren, J. (1993). Beoordelen met studietoetsen. In H.J.M. van Berkel & A.E. Bax (Eds.), *Beoordelen in het onderwijs. Een handleiding voor het construeren van toetsen en het evalueren van leerdoelen en onderwijsvormen* (pp. 13-19). Houten: Bohn Stafleu Van Loghum.

Cottrill, N. (2000). *Effective Use of Online Message Boards.*
Retrieved September 6, 2005, from: http://www.genealogy.com/78_cottrill.html

Daniel, J.S. (1996). *Mega-universities and knowledge media. Technology strategies for higher education.* London: Kogan Page.

Defence Science and Technology Organisation (last updated 14-10-2005). Retrieved November 16, 2005, from: http://www.dsto.defence.gov.au/.

Defence Science and Technology Organisation (2005). *Continuing education initiative, Policy statement DSTO*. Adelaide: DSTO. Angus Massie.

Defence Science and Technology Organisation (2005). *Continuing education initiative, Procedures and Guidelines.* Adelaide: DSTO. Angus Massie.

Dempster, M., & Raff, D. (1992). *Class discussions: a powerful classroom strategy.* Australia: Hawker Brownlow Education.

Desimone, R.L., Werner, J.M. & Harris, D.M. (2002). *Human Resource Development.* Third edition. Harcourt College Publisher: Orlando.

Driscoll, M & Carliner, S. (2005). *Advanced web-based training strategies.* San Francisco: Pfeiffer.

Fulford, C.P., & Zhang, S. (1993). Perceptions of interaction: The critical predictor in distance education. *American Journal of Distance Education, 9*(3), 8-12.

Gilbert, L., & Moore, D.R. (1998). Building interactivity into web sources: Tools for social and instructional interaction. *Educational Technology, 38*(3), 29-35.

Hanna, D.E., Glowacki-Dudka, M. & Conceição-Runlee, S. (2000). *147 practical tips for teaching online groups. Essentials of web-based education.* Madison: Atwood Publishing.

Hoffman, B. (1994-2005). Blended learning solutions. *Encyclopaedia of educational technology.* Retrieved September 5, 2005, from:
http://coe.sdsu.edu/eet/articles/blendedlearning/index.htm

Kamin, O. & Hagenhoff, S. (2004). Modular web-based teaching and learning environments as a way to improve e-learning. In C. Howard, K. Schenk & R. Discenza (Eds.), *Distance learning and university effectiveness: changing educational paradigms for online learning* (pp. 190-212). Hershey: Information Science Publishing.

Kasser, J.E., Sitnikova, E., Tran, X., & Yates, G. (2005). *Optimising the Content and Delivery of Postgraduate Education in Engineering Management for Government and Industry.* Adelaide: University of South Australia (UniSA).

Kessels, J.W.M. & Poell, R.F. (2001). *Human Resource Development. Organiseren van het leren.* Samsom: Groningen.

Kasser, J.E., Sitnikova, E., Tran, X., & Yates, G. (2005). *Optimising the Content and Delivery of Postgraduate Education in Engineering Management for Government and Industry.* Adelaide: University of South Australia (UniSA).

Killen, R. (1998). *Effective teaching strategies: lessons from research and practice.* Katoomba: Social Science Press.

Lam, I., Akkerman, s., Ter Horst, S., M., De Laat & Monachesi, P. (2005). *Blended beleid voor blended learning (Blended policy for blended learning).* Retrieved September 14, 2005, via University of Utrecht: http://www.surf.nl/download/e_learning_DEEL4.pdf

McVay Lynch, M. (2004). *Learning online: a guide to success in the virtual classroom.* New York: Routledgefalmer.

Office for Domestic Preparedness (last updated 02-10-2003). *ODP Approach for Blended Learning.* Retrieved September 12, 2005, from: http://www.ojp.usdoj.gov/odp/blendedlearning/pdfs/bls.pdf

Palloff, R.M. & Pratt, K. (2003). *The virtual student. A profile and guide to working with online learners*. San Francisco: Jossey-Bass.

Palloff, R.M. & Pratt, K. (2005). *Collaborating Online. Learning together in community.* San Francisco: Jossey-Bass.

Phillips, J.J. (1997). *Handbook of training evaluation and measurement methods.* Houston: Gulf.

Rossett, A., Douglis, F. & Frazee, R.V. (2003). Strategies for building blended learning. *Learning circuits.*
Retrieved September 1, 2005, from: www.learningcircuits.org/2003/jul2003/rossett.htm

Salmon, G. (2004). E-moderating in higher education. In C. Howard, K. Schenk & R. Discenza, *Distance learning and university effectiveness: changing educational paradigms for online learning* (pp. 55-78). Hershey: Information Science Publishing.

Scholten, C. (2006). *The use of learning styles in adult learning.* Enschede: University of Twente.

Sing & Reed, 2001. A white paper: Achieving success with blended learning. Retrieved September 12, 2005, from: http://www.centra.com/download/whitepapers/blendedlearning.pdf

Slavin, R.E. (1992). *Research methods in education*. Needham Heights: Allyn and Bacon.

Russell, C.K., & Gregory, D.M. (2003). Evaluation of qualitative research studies (Electronic version). *Evidence-Based Nursing*, *6,* 36-40.

Tessmer, M. (2001). *Planning and conducting formative evaluations.* Londen: Kogan age.

University of South Australia (last updated 04-08-2005). *Using Online Tools@UniSA* Retrieved August 22, 2005, from: www.unisa.edu.au/learningconnection.

University of South Australia (last updated 14-10-2005). *Systems Engineering & Evaluation Centre.* Retrieved November 16, 2005, from: www.unisa.edu.au/seec.

Vockell, E.L. & Asher, J.W. (1995). *Educational Research.* Englewood Cliffs: Prentice all.

Vos, H. & Vlas, H. (2000). *Reflectie en actie*. Retrieved at October 25, 2005, via University of Twente, DINKEL Instituut / Faculteit der Elektrotechniek: http://www.utwente.nl/itbe/owk/publicaties/onderbouwing/doc00-07.pdf

Weller, M. (2002). *Delivering learning on the net: the why, what & how of online education.* London: Kogan Page.

Worthen, B.R. & Sanders, J.R. (1987). *Educational evaluation: alternative approaches and practical guides.* White Plains: Longman.

Yacci, M. (2000). Interactivity demystified: A structural definition for distance education and intelligent CBT. *Education Technology, 40*(4), 5-16.

Appendixes

Appendix 1: Interview questions lecturers

General questions:

1. What is your general opinion about the course?

Discuss:

- Curriculum level implemented
- 10 Curriculum components

Adult learning

2. Are they obligated to follow the courses, or are they allowed to volunteer?
3. How are you trying to make the learners feel comfortable in a learning situation?
4. Do you think the content of the course fits with the basis knowledge of the learners? Please explain.
5. Does the content of the course fit with the personal work situation and life situation of the learners? Please explain.
6. Do you pay specific attention to the various backgrounds of the learners?
7. What do you think of the workload for this course?
8. How does the course encourage and facilitate opportunities to interact with fellow learners?
9. How do you stimulate group work/discussions?
10. In what way are you helping the learners if they have a problem/question?
11. In what ways is it possible for the learners to collaborate with other learners?
    (discussion board, chats, email, f2f (online, real-time))
12. How are you motivating an encouraging the learners?
13. What kinds of teaching methods do you use in the courses (during meetings and online)? Why?
14. What kind of learning styles do you make use of? In what ways?
15. How are you trying to make variation in your course?
    (PowerPoint, simulations, case studies, group work, self-assessments, reading, video/DVD)

Interaction in blended learning

16. What is your personal opinion about online learning? Why?
17. What kind of delivery environment do you prefer? Why?
    (Synchronous: online at the same time and place; asynchronous: non-real-time; blended: synchronous and asynchronous)
18. What kinds of interaction do you find important? Why?
    (human interaction: learner-teacher, learner-learner, learner-guest expert or learners-community member; non-human interactions: learner-content, learner-environment)
19. What is your overall opinion about the e-learning environment? Why?
20. May you give 2 positive points of the e-learning environment? Why?
21. May you give 2 points that can be improved of the e-learning environment? Why?
22. What kinds of interaction methods do you find important in an e-learning environment? Why?
    (case study, game-based, physical, process (step), role play, software, discussion board, notice board, hyperlinks, interactive animations and media, pop-ups, practice exercises, pre-test/post-test, recorded lectures, (recorded) live virtual classroom, e-books, e-mail, phone, chat)
23. What kinds of interaction methods do you find important in a traditional face to face classroom? Why?
    (group work, classroom discussion, problem solving, student research)

Appendix 2: Interview questions students

General questions:
What is your general opinion about the course?

Discuss
- Curriculum level attained
- 10 Curriculum components

Blended learning
Delivery environment
1. What kind of delivery environment do you prefer? Why?
   (Synchronous: online at the same time and place; asynchronous: non-real-time; blended: synchronous and asynchronous)
2. What's your opinion about the delivery of the courses RMME and OTE?

Kinds of interaction
3. What kinds of interaction are used in the blended learning environment/e-learning environment?
   (human interaction: learner-teacher, learner-learner, learner-guest expert or learners-community member; non-human interactions: learner-content, learner-environment)
4. What do you think of these kinds of interaction?
5. What kinds of interaction do you prefer? Why?

Blended learning environment
6. What is your general opinion about traditional face to face learning? Why?
7. What is your general opinion about online learning? Why?
8. What is your overall opinion about the e-learning environment? Why?
9. What is your overall opinion about the face to face lessons? Why?
10. May you give 2 positive points of the e-learning environment and face to face lessons? Why?
11. May you give 2 points that can be improved of the e-learning environment and face to face lessons? Why?
12. What is your opinion about the use of the discussion board?
13. Learners aren't using the discussion board a lot; can you give a reason(s) for that?
14. What is your opinion about the use of the notice board?
15. What is according to you the best way to corresponded during group work in an online environment?
    (email, telephone, discussion board)

Preferences of interaction methods that can be used in blended learning environment
16. Do you prefer pre-test-post test? Why?
17. Do you prefer Practice Exercises? Why?
18. Do you prefer the use of hyperlinks? Why?
    (an image or piece of text that can link to another web page)
19. Do you prefer Interactive animations and media? Why?
20. Do you prefer covert questions? Why?
    (questions that learners answer or consider in their minds rather than respond to in an overt way such as selecting a multiple-choice distracter, filling in a box, or dragging items across the screen?
21. Do you prefer pop-ups? Why?

22. Do you prefer simulations? Why? (case study, game-based, physical, process (step), role play, software)
23. Which kind of simulation do you prefer the most? Why?
24. Do you prefer recorded lectures? Why?
25. Do you prefer a (recorded) Live Virtual Classroom? Why?
26. Do you prefer chat sessions? Why?
27. Do you prefer e-books, visiting sites?
28. What kinds of interaction methods do you prefer in a face to face classroom? Why? (group work, classroom discussion, problem solving, student research)

Adult learning questions:

29. Why are you doing this course?
30. What is your goal for doing this course?
31. Is it important for you to pass for this course? Why/why not?
32. Do you find it difficult to motivate yourself to do something for this course? Can you explain your answer?
33. Do you think the content of the course fits with your basic knowledge? Please explain.
34. Does the content of the course fit your personal work situation and life situation? Please explain.
35. Is the course material relevant for your work? In what way?
36. Is it clear what is expected from the assessment/assignments?
37. What do you think of the workload for this course?
38. Does the course encourage and facilitate opportunities to interact with fellow students?
39. Are your fellow students helping you to learn more? In what way? (maybe by literature discussion, discussing the assignments, learning from other experiences).
40. Do you need more time and possibilities for discussing and interacting with fellow students? Please explain.
41. What do you think of the workshops/meetings for this course? Are they helping you, or do you feel it is a waist of time?
42. Do you think you have enough time between classes/workshops to think about the discussed topics or make the assignments?
43. Could you reach the materials for this course easily? (literature on the website/library, getting to assignments).

Questions about the professor:

44. Do you think the professor has sufficient knowledge of the subject matters discussed in this course?
45. Do you think there is enough guidance from the professor to help you when you have a problem, or a question?
46. Can the professor motivate and encourage you? Why/ why not?
47. Do you think the professor knows what kind of background you have (work experience, interests, diploma's/prior education).
48. Do you think it is important for you that the professor knows this?
49. Can you relate to the topics the professor uses when explaining something?
50. Do you think there's enough variation in the way the professor presents the content of the course (is he using PowerPoint, simulations, case studies, group work, self-assessments, reading, video/DVD).
51. Do you think there are enough possibilities for you to enhance your learning process?

Questions about learning styles/ teaching methods:

52. May you describe types of teaching methods you learn most from? Please explain.
53. May you describe teaching methods you learn least from? Please explain.

For the RMME course:

54. What do you think of spending a whole day in class?
55. What do you prefer: one whole day, or 2 different day-parts? Please explain.

For the OTE course:

56. Would you prefer more meetings, or longer workshops? Please explain.

Appendix 3: Developed questionnaire

Course evaluation RMME and OTE

Please put an 'x' in the box that is most suitable for you. With some questions there is an extra box, you can put a cross there if you are following this course face-to-face.

Course I followed:

RMME	
OTE	

Type of student:

Face-to-face	
Online	

1 = Strongly disagree **3 = Agree**
2 = Disagree **4 = Strongly agree**

Course content and process:	**1**	**2**	**3**	**4**
1. The overall course contributes to my knowledge and/or basic skill base.				
2. There is an adequate amount of time selected for each topic.				
3. The instructional and presentation techniques used are adequately assisting me in learning the material.				
4. I can relate the material to my particular life situation.				
5. The instructional materials and aids used (transparencies, manuals, videotapes, and the like) are enhancing my learning process.				
6. The discussions in group-work contribute to my learning process.				
7. The program schedule is well planned (for example, allowing enough time between sessions).				

Use of interaction in the e-learning environment (course website):	**1**	**2**	**3**	**4**	
8. The use of email in this course is effective.					
9. The use of the discussion board in this course is effective.					
10. The use of the notice board in this course is effective.					
11. Phone calls from the professor are effectively used.					
12. I would take another distance course with this professor.					
13. I would take another distance course.					
14. The amount of online interaction with the professor and other students is sufficient.					
15. Often I feel 'lost' in the e-learning environment (course website).					
16. I am very comfortable with using computers: Internet, upload/download of files, Word, Excel, and PowerPoint.					
17. I would have learned more if I had taken this class on-campus (as opposed to online).					
18. I miss the interaction of a 'live', traditional classroom.					
19. The e-learning environment is motivating.					

Preferences e-learning environment (course website):	1	2	3	4
20. I prefer an asynchronous environment (non-real-time).				
21. I prefer a synchronous environment (same time and place in a traditional classroom).				
22. I prefer a synchronous environment (same time in a Live Virtual Classroom).				
23. I prefer a blended learning environment (non-real-time and same time and place in a traditional classroom).				
24. I prefer a blended learning environment (non-real-time and same time in a Live Virtual Classroom).				
25. I prefer the use of a discussion board.				
26. I prefer the use of a notice board.				
27. I prefer online practice exercises (practice the behaviour specified in the objectives) in an e-learning environment.				
28. I prefer Live Virtual Classroom sessions in an e-learning environment.				
29. I prefer simulations in an e-learning environment.				
30. I prefer interactive animations and media in an e-learning environment.				
31. I prefer the use of hyperlinks in an e-learning environment.				
32. I prefer pop-ups in an e-learning environment.				
33. I prefer recorded lectures in an e-learning environment.				
34. I prefer chat sessions in an e-learning environment.				
35. I prefer pre-test / post-test in an e-learning environment.				

The professor:	1	2	3	4
36. The professor makes an effort to help me feel comfortable.				
37. The professor provides me with adequate assistance in learning the material.				
38. The professor presents the lesson in steps that I can follow.				
39. Feedback from the professor is timely.				
40. I receive personalized feedback from the professor.				
41. The professor communicates well with the participants (for example, attend to diversity of audience).				
42. The professor holds my interest.				
43. The professor makes me think for myself.				

Learning style preferences:	1	2	3	4
44. I prefer to read information.				
45. I prefer working with graphics or diagrams to represent information.				
46. I prefer to hear material being presented.				
47. I prefer physical, ‘hands-on’ activity.				
48. I prefer working with others.				
49. I prefer reflection.				

Overall program:	1	2	3	4
50. I am challenged by the content of the course.				
51. I am challenged by the way the material is taught.				

Open questions:
Please comment on the major strengths of the program and changes you would recommend.
Major strengths (Please explain):

Suggestions for improvement (Please explain):

Other comments:

Appendix 4: Results research question 1 RMME

In this appendix the following results of research question 1 for the RMME course will be presented:

- The results of the analysis of the course website.
- The results from the analyses of the AITEC questionnaires in 2003 and 2004.
- The results of the developed questionnaire.
- The results of the interviews with students and the lecturer of the course.

After each section a sub-conclusion will be given.

When there is talked about 'students' it means face-to-face and online students. When this is not the case, it will be mentioned otherwise. When there is spoken about some students, this means that this could be 2 students or less. When there is spoken about most students, this means 3 students or more.

Results from the analysis of the course website

One of the first activities that took place was the analysis of the course website. The focus was on the evaluation criteria mentioned in chapter 2. Below the results of this analysis will be presented. The results are subdivided into delivery environments, types of interaction and the course website (e-learning environment). Finally, a conclusion is provided.

Delivery environments

- Face-to-face students:
  For the face-to-face student the learning environment is focused on blended learning. There are face-to-face classroom meetings (synchronous interaction), and the materials and information for the course are online (asynchronous interaction).
- Online students:
  The online students do not have face-to-face classroom meetings. For them the e-learning environment is focused on asynchronous interaction. Students anticipate in asynchronous activities at convenient times for them.

Types of interaction

Human interaction

Student - teacher:

- The students could manage their time, process information, plan and manage their resources, and evaluate their own work. Students could seek help when they need it. The lecturer provided feedback to the students by using the notice board and the discussion board (not used often)

Student - student:

- The students had during the classroom tutorials (group-work).

Student -guest expert or learners-community member:

- The students did not talk with guest. In the face-to-face classroom session the students had a guest lecture, by audio and see the PowerPoint slides. On the environment only the PowerPoint slides were available.

Non-human interaction

Student - content:

- The students work with and make sense of the information available on the web.

Student - environment:

- The students worked with and make sense of the information available on the web, in books, and in databases. PowerPoint slides, discussion board, books. The students worked with resources (web-based searches, image libraries, source documents and online databases). The students did not work with simulations; the learning environment did not make use of simulations.

Course website (e-learning environment)

The course website made use of the following interaction methods:

- PowerPoint lectures: Some PowerPoint presentations are about a case study.
- Asynchronous methods: E-books/articles and references sites
- E-mail
- Self-paced interaction methods:
    - Discussion board: Something was not regular submitted
    - Notice board: Something was not regular submitted, it was used ones in the two/three weeks
    - Hyperlinks: a few, a new screen pop-ups when clicked on a hyperlink

The course website did not make use of:

- Self-paced interaction methods:
    - Pre-test/post-test
    - Practice exercises
    - Interactive animations and media
    - Pop-ups
    - Different types of simulations: game-bases simulations, physical simulations, process (step) simulations, role play, software simulations etc.
    - Recorded lectures
- Synchronous interaction methods:
    - Live virtual classroom
- Live, Collaborative learning methods:
    - Chat sessions

Compared to the OTE course website:

1. The buttons of the courses websites were in a different order.
2. The format for the course outline was different.

<u>Sub-conclusion</u>

Delivery environment

The face-to-face students made use of a blended learning environment. The online students made use of the e-learning environment.

Types of interaction

The course website made use of the human interaction: student-teacher interaction, student-student interaction and for the face-to-face students, student-guest expert or learners-community member interaction and the non-human interaction: student-tools interaction and student-environment interaction.

Course website (e-learning environment)
The course website used PowerPoint lectures, E-books/articles, references sites and e-mail. The discussion board was not used very much. The notice board was used ones in the two/three weeks. Hyperlinks were only used a few times.
The course website did not make use of pre-test/post-test, practice exercises, interactive animations and media, pop-ups, different types of simulations: game-bases simulations, physical simulations, process (step) simulations, role play, software simulations etc., recorded lectures, live virtual classroom and chat sessions

Compared to the OTE course website the buttons of the courses websites and the format of the course outline were different.

Results from the AITEC questionnaire

Another activities of the evaluation phase was an analysis of the AITEC questionnaire of 2003 and 2004 to determine the profile of the RMME course of the LMEF Masters at SEEC at that moment. The focus was on the criteria mentioned in chapter 2.
In following subsections the results of the AITEC questionnaire will be presented. The results are shown in percentages. Each subsection starts with a summary and ends with a sub-conclusion.

Results from the AITEC questionnaire RMME 2003

Total number of students: 47
Total number of responses: 29

Of the 29 students who responded, 23 students completed the questions relating to the face-to-face delivery and 18 students completed the questions relating to the online environment. Some students did experience both delivery modes. That is why the number of students ranges per question.

Summary
A large majority of students who completed this evaluation felt that the course encouraged and facilitated opportunities to interact with DSTO colleagues

Most students felt that academic support outside the face-to-face teaching was available.

A mixed response was received from the students about the statement that that the students had ready access to online materials and text books. Another mixed response was received with regards that the online learning materials and study guides were effective. Mixed responses were also received about the statements that the online mode was an effective method of learning, that the lecturer provided suitable support for the learning process and that there were opportunities for group/class interaction and collaboration available.

Below, in table 8 the results of the AITEC questionnaire 2003 will be presented in percentages.

Table 8
Results AITEC questionnaire 2003

Question	Agree	Disagree	Undecided
Responses were received from 62% of the students who studied this course.			
The course encouraged and facilitated opportunities to interact with DSTO colleagues.	55%	17%	28%
Responses were received from 49% of the students who studied this course.			
Academic support outside of face-to-face teaching was available.	48%	26%	26%
Responses were received from 49% of the students who studied this course.			
I had ready access to online materials and text books.	28%	34%	38%
Online learning materials and study guides were effective.	22%	33%	45%
The online mode was an effective method of learning.	28%	33%	39%
The lecturer provided suitable support for the learning process.	28%	39%	33%
Opportunities for group/class interaction and collaboration were available.	39%	28%	33%

Comments made by students who filled in the AITEC questionnaire 2003:
A major comment a lot of students made was the lack of feedback. According to the students the additional online resources were minimal. According to the online students there was little interaction from the lecturer and other students and the course was not too well oriented for online students. The course PowerPoint presentations were available for download, however, there were no talking points attached to the presentations so in some cases it was difficult to interpret the material. Finally, the online students mentioned that there was little opportunity to ask a simple clarifying question (e-mail takes too long).

Sub-conclusion
The students want to have more ready access to online materials and text books. The online learning materials and study guides could be more effective. Not all students thought the online mode was an effective method of learning. The student that the lecturer did not provided suitable support for the learning process for every student and there were not enough opportunities for group/class interaction and collaboration available for all students.

Most students felt that there was a lack of feedback. This needs to be improved. Also the interaction from the lecturer and other students with the online students could be improved. Finally, the course was not well oriented for online students. This also needs to be improved.

Results from the AITEC questionnaire RMME 2004

Total number of students: 29
Total number of responses: 25

Summary
A large majority of students who completed this evaluation felt that the:
- The course materials/resources enhanced their learning
- The course deliver mode was effective
- The university facilities and equipment were suitable
- The lecturer created an environment conductive to learning

A mix response was received with regards to students receiving adequate feedback on their work.

Below, in table 9 the results of the AITEC questionnaire 2004 will be presented in percentages.

Table 9
Results AITEC questionnaire 2004

Question	Agree	Disagree	Undecided
Responses were received from 86% of the students who studied this course.			
Did the course materials/resources enhance your learning?	88%	4%	8%
Was the course delivery mode effective?	76%	8%	16%
Did you receive adequate feedback on your work?	40%	36%	24%
Were the university facilities and equipment suitable (e.g. website functionality)?	72%	0%	28%
Did the lecturer create an environment conductive to learning?	72%	0%	28%

Comments made by students who filled in the AITEC questionnaire 2004:
According to the students there was too little feedback.

Sub-conclusion
The feedback on the students' work needs to be improved, by giving more feedback.

Results of the questionnaire developed by researchers

In section above the results of the AITEC questionnaire were presented. To get additional and more recent information about interaction methods in a blended learning environment, a new questionnaire was developed. The responses on the developed questionnaire can be found in table 10. After this table, the responses on the open questions are presented. Finally, a sub-conclusion is provided.

Total number of students: 20
Total number of responses: 10 (8 face-to-face, 2 online students)

Table 10
Results of the developed questionnaire RMME.

Questions	Answer face-to-face students	Answer online students
The use of e-mail in this course is effective.	Strongly agree	Disagree
The use of the discussion forum in this course is effective.	Agree	Strongly disagree
The use of the notice board in this course is effective.	Agree	Strongly disagree
Phone calls from the lecturer are effectively used.	Disagree	Disagree
I would take another distance course with this lecturer.	Agree	Disagree
I would take another distance course.	Agree	Agree
The amount of online interaction with the lecturer and other students is sufficient.	Agree	Strongly disagree
Often I feel 'lost' in the e-learning environment (course website).	Agree	Disagree
I am very comfortable with using computers: Internet, upload/download of files, Word, Excel, and PowerPoint.	Strongly agree	Strongly agree
I would have learned more if I had taken this class on-campus (as opposed to online).	Disagree	Strongly agree
I miss the interaction of a 'live', traditional classroom.	Disagree	Agree
The e-learning environment is motivating.	Disagree	Strongly disagree
The discussion in group-work contributed to my learning process.	Agree	Strongly disagree
I prefer an asynchronous environment (non-real-time).	Disagree	Disagree
I prefer a synchronous environment (same time and place in a traditional classroom).	Agree	Agree
I prefer a synchronous environment (same time in a Live Virtual Classroom).	Disagree	Disagree
I prefer a blended learning environment (non-real-time and same time and place in a traditional classroom).	Agree	Disagree
I prefer a blended learning environment (non-real-time and same time in a Live Virtual Classroom).	Disagree	Disagree
I prefer the use of a discussion board	Agree	Agree
I prefer the use of a notice board	Agree	Agree
I prefer online practice exercises (practice the behaviour specified in the objectives) in an e-learning environment.	Agree	Strongly agree
I prefer Live Virtual Classroom sessions in an e-learning environment.	Disagree	Strongly disagree
I prefer simulations in an e-learning environment.	Agree	Disagree
I prefer interactive animations and media in an e-learning environment.	Agree	Disagree
I prefer the use of hyperlinks in an e-learning	Agree	Agree

environment.		
I prefer pop-ups in an e-learning environment.	Disagree	Strongly disagree
I prefer recorded lectures in an e-learning environment.	Agree	Agree
I prefer chat sessions in an e-learning environment.	Disagree	Agree
I prefer pre-test / post-test in an e-learning environment.	Disagree	Disagree
Feedback from the lecturer is timely.	Agree	Strongly disagree
I receive personalized feedback from the lecturer.	Agree	Disagree
I prefer to read information.	Agree	Strongly agree
I prefer working with graphics or diagrams to represent information.	Agree	Agree
I prefer to hear material being presented.	Agree	Disagree
I prefer physical, 'hands-on' activity.	Agree	Agree
I prefer working with others.	Agree	Agree
I prefer reflection.	Agree	Agree

Open questions questionnaire
According to the face-to-face students, major strengths were well thought and presented lectures, because of this the students enjoyed the course. Tutorial and group aspects were presented in the lectures.

According to the face-to-face students, they would like to receive more feedback on their assignment results. It was hard for them to keep concentration for a whole day of lectures. Also, they would like to have more variety in the way the topics are presented during the classroom sessions.

According to the online students, the PowerPoint slides must be comprehensive. The online students cannot attend tot the classroom sessions, so they need more explanation. The learning environment is not attractive for them, because there are only PowerPoint slides. Online students would like to receive timely and personalised feedback on assignments, so that they get a feel for where their understanding of the subject matter is weak and where it is strong. Online students have the feeling that they are neglected in comparison to the face-to-face students.

Sub-conclusion
According to the online students there are no major strengths. The face-to-face are more positive about their learning environment. There need to be more variation in teaching methods for the students. Also, all students would like to receive more feedback.

Results from the interview with students and the lecturer of the RMME course

Besides analysing the questionnaire of AITEC and analysing the developed questionnaire, also interviews with students of the RMME course and the lecturer were undertaken. In chapter 2 the focus for this research was explained. Evaluation criteria were determined. In

the interviews with the students and professor the focus was on these evaluation criteria. So, the focus was on the delivery environment used, the types of interaction that were used and the kinds of interaction methods that were used. The focus was also on the preferences of the students and lecturer recording to the delivery environment, types of interaction, and the interaction methods that were used in the course, or could be used in the course.

In this section an overview of the responses of the students and the lecturer will be given.

Delivery environment
Most questioned students preferred a blended learning environment, because when they missed a lesson they could look everything up. Another reason why they preferred a blended learning environment is that they could find all the information they needed for the course in the e-learning environment. Students found the combination with classroom meetings useful for the face-to-face interaction and asking questions.
The questioned lecturer preferred to have synchronous, face-to-face as delivery environment. This was not possible, because there were also online student. Blended learning was a good option. Blended learning was good for students, because sometimes they missed a class. The website functioned like a back-up.

Types of interaction
Preferences
Most questioned students found all human interaction (student-teacher interaction, student-student interaction, student-guest interaction) and non-human interaction (student-content interaction and student-environment interaction) very important. One questioned student did not find student-student interactions important. They found student-teacher interaction important because, they could ask the lecturer questions and it is important for feedback. Face-to-face interaction is easier for student-teacher interaction.
Reasons they gave for student-student interaction were that it would be very useful to hear somebody else's opinion. Reasons they gave for student-guest interaction were that is would be good to hear an expert opinion, or experience (case study). Reasons they gave for student-content interaction were that is would be important as long as it would have examples in it. This interaction would be very important to understand the material. Reasons they gave for student-environment interaction were that an environment would be important to find their resources On the website the students could find the material and have quick access.

According to the lecturer the student-teacher interaction is the most relevant one. The lecturer would like to have more student-student interaction. The lecturer thought it would be important to use more (live) guest lectures, because then the students get more interaction with other people.

Kinds of interaction used in the RMME course according to questioned students and lecturer
In this paragraph the responses of students and the lecturer are combined, because the responses given were similar to each other.

Student-teacher:	Face-to-face students had interaction with the lecturer. Online students had little to no interaction with the lecturer. The feedback was not so good. The students did not get any marks back yet, so they did not know how far learning has progressed. Some general feedback was on the discussion board, so everyone knows this. The students thought feedback is

	important, because they learn a lot from it. They preferred to have more (individual) feedback.
Student-student:	Face-to-face students had tutorials, so according to the face-to-face students and the lecturer the course did encourage and facilitate opportunities to interact with fellow students. The online students thought there was not enough facilities to interact with other students. Besides to the meetings the lecturer leaved it up to the students, but he did make suggestions for having interaction with each other out of the meetings.
Student-guest:	According to the face-to-face students and the lecturer there were PowerPoint slides of case studies from guest speaker. Face-to-face students also heard audio with these slides; online student did not hear audio with the slides.
Student-content:	There is an e-learning environment where the students could find all the material. The students had to read it for themselves/think about it, so there is a lot of interaction.
Student-environment:	The face-to-face and online students worked both with the online environment.

Blended learning environment

Positive aspects

According to the questioned students, positive aspects of the e-learning environment were that on the discussion board and notice board there were some comments put there by the lecturer. The questioned lecturer found the notice board useful. The e-learning environment was accessible at any time and materials were easy to find in one place. According to the questioned lecturer the e-learning environment was good for students who wanted to catch up, because to were unable to come to the classroom session. The classroom sessions were according to the questioned students and the lecturer good to have interaction with other students (discuss) and ask questions.

Aspects that could be improved

According to the questioned students, aspects that could be improved of the e-learning environment were that the lectures only used PowerPoint slides and the discussion board was not used very often. When the website was down, there was no access. According to the questioned students and lecturer the information should be up-to-date; this was not always the case and there was not a lot of variation in the way the lecturer presented the content. According to the questioned students and the lecturer the classroom sessions had a lot of lectures, this way it was hard to keep concentration. The lecturer did not get feedback on most of the assignments.

Discussion board

The questioned students found the discussion board on the e-learning environment very important, because they could ask questions there and students/lecturer could answer their questions. According to the questioned students and lecturer, the students were not using the discussion board a lot, because the content of the course was not difficult and it takes more time to ask a question on the discussion board, than using the phone to call the lecturer. The use of the discussion board was very important for the online students, because they did not have contact hours to ask their question in.

Notice board
All questioned students and the lecturer found the notice board very helpful. They could have a quick look on the notice board if there were updates and/or reminders. According to the questioned online student, the notice board was not up-to-date.

Preferences of interaction methods that can be used in a blended learning environment
Pre-test / post-test
Some questioned students and the lecturer preferred to have pre test-post test, because the lecturer could spend more time on things that students do not know instead of information they already know.
Some questioned students did not prefer to have a pre test-post test, because according to them a refreshment of the material was good.

Practice Exercises
The questioned students found the use of practice exercises important; because it would make sure that they understand the content before they rush into the next subject. The questioned students found it important that the exercise should give feedback if the answer is incorrect. According to the lecturer practice exercises were available in the course; they were built in the discussion forum.

Hyperlinks
The questioned students and lecturer preferred the use of hyperlinks, because with the use of hyperlinks it would be easy to find information. The hyperlinks should be part of the information structure and there should not be too much hyperlinks, because the students could get lost.

Interactive animations and media
The questioned student and the lecturer thought interactive animations and media could be useful, but according to the questioned students they are perhaps not helpful for RMME course. The lecturer wanted to use them if they already existed, he did not have time or resources to make them.

Pop-ups
Most questioned students did not prefer pop-ups, because they would be annoying. The lecturer does not know how to use pop-ups it in his course.

Simulation
Most questioned students thought simulations would be effective, because the use of case studies is very important. Another reason according to these students was that in simulations (role play) they can act the different types of research out.
According to the questioned lecturer, game-based simulations would be potentially very useful, but it would take time and effort to create something. The lecturer would not have time for that. According to the lecturer the use of case studies in this course would be very useful. The lecturer put only the slides about somebody's case study on the website, not the voice, because that takes to much downloading time.

Recorded lectures
Most questioned students preferred recorded lectures, because it helps hearing someone talking when they are reading the PowerPoint slides and they would be very useful when the student missed a lecture. The recorded lectures should be short, to prevent boredom.

The lecturer thought recorded lectures could be useful for the online students. The lecturer was wondering what the best way is to create and store the online recorded lectures.

Live Virtual Classroom
Some questioned students did not prefer live virtual classrooms, because it would be hard to communicate in this classroom. The students and the lecturer thought it could be very helpful for the interstate students, but everyone should be online at the same time.
The online students thought the use of live virtual classroom would improve the e-learning environment like it was now, because the students are than able to ask question in real-time and get an answer right away.

Chat sessions
Most questioned students preferred the use of chat sessions, especially for group-work. Some students and the lecturer did not prefer chat sessions, because it would be time consuming and difficult to get all student online at the same time. .

E-books
According to the students and the lecturer E-books were used effective in this course. They were easy to find on the course website.

Group-work
All students found group-work difficult. This was because some people had a very strong opinion, communication within the group was not going right, or group members were not doing their work. They all found group-work in general good, because they could hear somebody else's opinion and they could have discussion with each other.
According to the lecturer, the students were used to working together.
The online students could use the discussion board, but it was very difficult for the lecturer to get them to use it.

Classroom discussion
The questioned students and the lecturer preferred classroom discussions, because they would hear other people's opinion.

Lectures
According to the questioned students lectures were important in a classroom, but there should not be too many. That would be boring.

Sub-conclusion
In general, the lecturer and the face-to-face students agreed. The online students disagreed most of the time with the face-to-face students and the lecturer. The major comment of the students and the lecturer was that the course needs more variation in the way it presents the material.

Appendix 5: Results research question 1 OTE

In this appendix the following results of research question 1 for the OTE course will be presented:

- The results of the analysis of the course website.
- The results from the analyses of the AITEC questionnaires in 2003 and 2004.
- The results of the developed questionnaire.
- The results of the interviews with students and the lecturer of the course.

After each section a sub-conclusion will be given.

When there is talked about 'students' it means face-to-face and online students. When this is not the case, it will be mentioned otherwise. When there is spoken about some students, this means that this could be 2 students or less. When there is spoken about most students, this means 3 students or more.

Results from the analysis of the course website

Delivery environments

- Face-to-face students:
  For the face-to-face student the learning environment was focused on blended learning. There were three workshops, where the students could ask questions about their assignments etc. (synchronous interaction), and the materials and information for the course were online (asynchronous interaction).
- Online students:
  The online students did not have face-to-face classroom meetings. For them the e-learning environment was focused on asynchronous interaction. Students anticipated in asynchronous activities at convenient times for them.

Types of interaction

Human interaction

Student - teacher:

- The students could manage their time, process information, plan and manage their resources, and evaluate their own work. Learners could seek help when they needed it. The lecturer provided feedback to the students by using the notice board and by using e-mail.

Student - student:

- The students had to finish four group assignments. This way they had to interact with each other.

Student -guest expert or learners-community member:

- The students did not talk with guest.

Non-human interaction

Student - content:

- The students work with and make sense of the information available on the web.

Student - environment:

- The students worked with and make sense of the information available on the web, in books, in databases PowerPoint slides, discussion forum, and books. The students

worked with resources (web-based searches, image libraries, source documents and online databases). The students did not work with simulations; the learning environment did not make use of simulations.

Course website (e-learning environment)
The course website used the following interaction methods:
- PowerPoint lectures: Some PowerPoint presentations are about a case study.
- Asynchronous methods: E-books/articles and references sites
- E-mail
- Self-paced interaction methods:
    - Discussion board: Something was not regular submitted
    - Notice board: Something was not regular submitted, it was used ones in the one/two weeks
    - Hyperlinks: a few, a new screen pop-ups when clicked on a hyperlink

The course website did not make use of:
- Self-paced interaction methods:
    - Pre-test/post-test
    - Practice exercises
    - Interactive animations and media
    - Pop-ups
    - Different types of simulations: game-bases simulations, physical simulations, process (step) simulations, role play, software simulations etc.
    - Recorded lectures
- Synchronous interaction methods:
    - Live virtual classroom
- Live, Collaborative learning methods:
    - Chat sessions

Compared to the RMME course website:
1. The buttons of the courses websites were in a different order.
2. The format for the course outline was different.

Sub-conclusion
Delivery environment
The face-to-face students made use of a blended learning environment. The online students made use of the e-learning environment.

Types of interaction
The course website made use of the human interaction: student-teacher interaction and student-student interaction. The course website made use of the non-human interaction: student-tools interaction and student-environment interaction.

Course website (e-learning environment)
The course website used PowerPoint lectures, E-books/articles, references sites and e-mail. The discussion board was not used very much. The notice board was used ones in the one/two weeks. Hyperlinks were only used a few times.
The course website did not make use of pre-test/post-test, practice exercises, interactive animations and media, pop-ups, different types of simulations: game-bases simulations,

physical simulations, process (step) simulations, role play, software simulations etc., recorded lectures, live virtual classroom and chat sessions

Compared to the OTE course website the buttons of the courses websites and the format of the course outline were different.

Results from the AITEC questionnaire

Another activities of the evaluation phase was an analysis of the AITEC questionnaire of 2003 and 2004 to determine the profile of the RMME course of the LMEF Masters at SEEC at that moment. The focus was on the criteria mentioned in chapter 2.
In the following subsections the results of the AITEC questionnaire will be presented. The results are shown in percentages. Each subsection starts with a summary and ends with a sub-conclusion.

Results from the AITEC questionnaire OTE 2003

Total number of students: 13
Total number of responses: 7

Summary
A large majority of students who completed this evaluation felt that:
- The course encouraged and facilitated opportunities to interact with DSTO colleagues.
- Academic support outside the face-to-face teaching was available.
- They had ready access to online materials and text books.
- The online mode was an effective method of learning.

A mixed response was received from the students about the statement that the online learning materials and study guides were effective.
Undecided were all the students about the statement that the lecturer provided suitable support for the learning process.
Most students disagree with the statement that there were opportunities for group/class interaction and collaboration available.

Below, in table 11 the results of the AITEC questionnaire 2003 will be presented in percentages.

Table 11
Results AITEC questionnaire 2003

Question	Agree	Disagree	Undecided
Responses were received from 54% of the students who studied this course.			
The course encouraged and facilitated opportunities to interact with DSTO colleagues.	86%	0%	14%
Responses were received from 69% of the students who studied this course.			
Academic support outside of face-to-face teaching was available.	49.5%	16.5%	33%

Responses were received from 23% of the students who studied this course.			
I had ready access to online materials and text books.	67%	33%	0%
Online learning materials and study guides were effective.	34%	33%	33%
The online mode was an effective method of learning.	67%	33%	0%
The lecturer provided suitable support for the learning process.	0%	0%	100%
Opportunities for group/class interaction and collaboration were available.	33%	67%	0%

Sub-conclusion

Some students thought that the online learning materials and study guides could be more effective. Not all students thought that the lecturer provided suitable support for the learning process. Most students felt that there should be more opportunities be available for group/class interaction and collaboration.

Results from the AITEC questionnaire OTE 2004

Total number of students: 11
Total number of responses: 6

A large majority of students who completed this evaluation felt that the:
- The course materials/resources enhanced their learning.
- The course deliver mode was effective.
- They received adequate feedback on their work.
- The university facilities and equipment were suitable
- The lecturer created an environment conductive to learning.

Below, in table 12 the results of the AITEC questionnaire 2004 will be presented in percentages.

Table 12
Results AITEC questionnaire 2004

Question	**Agree**	**Disagree**	**Undecided**
Responses were received from 55% of the students who studied this course.			
Did the course materials/resources enhance your learning?	83%	17%	0%
Was the course delivery mode effective?	66%	33%	0%
Did you receive adequate feedback on your work?	100%	0%	0%
Were the university facilities and equipment suitable (e.g. website functionality)?	100%	0%	0%
Did the lecturer create an environment conducive to learning?	100%	0%	0%

Comments made by students who filled in the AITEC questionnaire 2004:
Working in a group is fine, but it is difficult to deal with the group dynamics.

Sub-conclusion
All students gave a positive response on all the statements.

Results of the questionnaire developed by researchers

In the section above the results of the AITEC questionnaire were presented. To get additional and more recent information about interaction methods in a blended learning environment, a new questionnaire was developed. The responses on the developed questionnaire can be found in table 13. After this table, the responses on the open questions are presented. Finally, a sub-conclusion is provided.

Total number of students: 14
Total number of responses: 8 (4 face-to-face, 4 online students)

Table 13
Results of the developed questionnaire OTE.

Questions	**Answer face-to-face students**	**Answer online students**
The use of e-mail in this course is effective.	Agree	Agree
The use of the discussion forum in this course is effective.	Disagree	Disagree
The use of the notice board in this course is effective.	Agree	Agree
Phone calls from the lecturer are effectively used.	Agree	Agree
I would take another distance course with this lecturer.	Agree	Disagree
I would take another distance course.	Agree	Agree
The amount of online interaction with the lecturer and other students is sufficient.	Disagree	Disagree
Often I feel 'lost' in the e-learning environment (course website).	Disagree	Agree
I am very comfortable with using computers: Internet, upload/download of files, Word, Excel, and PowerPoint.	Strongly agree	Strongly agree
I would have learned more if I had taken this class on-campus (as opposed to online).	Strongly agree	Strongly agree
I miss the interaction of a 'live', traditional classroom.	Disagree	Disagree
The e-learning environment is motivating.	Disagree	Disagree
The discussion in group-work contributed to my learning process.	Agree	Agree
I preferred an asynchronous environment (non-real-time).	Agree	Disagree

I preferred a synchronous environment (same time and place in a traditional classroom).	Agree	Agree
I preferred a synchronous environment (same time in a Live Virtual Classroom).	Disagree	Agree
I preferred a blended learning environment (non-real-time and same time and place in a traditional classroom).	Agree	Agree
I preferred a blended learning environment (non-real-time and same time in a Live Virtual Classroom).	Agree	Agree
I preferred the use of a discussion board	Agree	Agree
I preferred the use of a notice board	Agree	Agree
I preferred online practice exercises (practice the behaviour specified in the objectives) in an e-learning environment.	Agree	Agree
I preferred Live Virtual Classroom sessions in an e-learning environment.	Agree	Agree
I preferred simulations in an e-learning environment.	Disagree	Agree
I preferred interactive animations and media in an e-learning environment.	Agree	Agree
I preferred the use of hyperlinks in an e-learning environment.	Agree	Agree
I preferred pop-ups in an e-learning environment.	Agree	Disagree
I preferred recorded lectures in an e-learning environment.	Agree	Agree
I preferred chat sessions in an e-learning environment.	Agree	Agree
I preferred pre test-post test in an e-learning environment.	Disagree	Disagree
Feedback from the lecturer is timely.	Agree	Agree
I receive personalized feedback from the lecturer.	Agree	Agree
I preferred to read information.	Agree	Agree
I preferred working with graphics or diagrams to represent information.	Agree	Agree
I preferred to hear material being presented.	Agree	Agree
I preferred physical, 'hands-on' activity.	Agree	Strongly agree
I preferred working with others.	Agree	Agree
I preferred reflection.	Agree	Agree

Open questions questionnaire

According to the face-to-face students major strengths were that the course was challenging, the lecture notes were good and there were clear instruction of what was required in the assignments to achieve marks. Also a major strength according to the face-to-face students was that during group-work the groups consisted of local and interstate students.

According to the online students major strengths were that there was Simple access to lecture notes, course information, reference material and assessment notes on website and the course was well structured and programmed.

According to the face-to-face students the coordination of teams with distance mode members could be more coordinated and the assignments should be checked earlier by the lecturer

According to the online students all the assignments and coursework should given to the students at the start of the semester. The online students would like to have face-to-face meetings. According to the online students the tutorials would be of much greater benefit if the lecturer were able to provide more direction to the expected results. They prefer more interaction with professor required to ask questions about material. Some online students would like to see more discussions on examples and some would like to get printed copies of lessons and coursework, because it takes a lot of time to look through everything online and print it off. Finally the online students would like to have workshop session online, so that all participants can conduct.

Sub- conclusion

According to the students the use of the discussion board in this course was not effective, they also think that the amount of online interaction with the lecturer and other students was not sufficient. According to the students the e-learning environment was not motivating. It can become more motivating, by offering more variation in interaction (teaching) methods.
The students prefer the use of a discussion board, a notice board, online practice exercises, live virtual classroom sessions, interactive animations and media, use of hyperlinks, recorded lectures and chat sessions. The online students also prefer simulations. The face-to-face students also prefer pop-ups in an e-learning environment.
The students prefer to read information, working with graphics or diagrams, hear material being presented, physical, 'hands-on' activities, working with others and reflection.
According to the students, they receive timely, personalized feedback from the lecturer.

Results from the interview with students and the lecturer of the OTE course

Besides analysing the questionnaire of AITEC and analysing the developed questionnaire, also interviews with students of the OTE course and the lecturer were undertaken. In chapter 2 the focus for this research was explained. Evaluation criteria were determined. In the interviews with the students and professor the focus was on these evaluation criteria. So, the focus was on the delivery environment used, the types of interaction that were used and the kinds of interaction methods that were used. The focus was also on the preferences of the students and lecturer recording to the delivery environment, types of interaction, and the interaction methods that were used in the course, or could be used in the course.

In this section an overview of the responses of the students and the lecturer will be given.

Delivery environment

All the students and the lecturer preferred a blended learning environment, because in a blended learning environment there would be a combination of online and offline learning. The online part could they access any time they wanted to. According to the questioned students the face-to-face meetings would be needed to fill the gabs that appear in the online environment. The students and the lecturer did not prefer only an online learning environment.

All the questioned students of the OTE course preferred more face-to-face lectures, to ask questions, discuss the topics.

Types of interaction

Preferences

All the questioned students found all human interaction (student-teacher interaction, student-student interaction, student-guest interaction) and non-human interaction (student-content interaction and student-environment interaction) very important. Several reasons were given why they found these kinds of interactions important.

Reasons they gave for student-teacher interaction were that the lecturer could clarify points the students do not understand and answer questions. Reasons they gave for student-student interaction and student-guest interaction were that they learn from other people's opinions. Reasons they give for student-content interaction were that his interaction is important for background reading and the students said they learn more from the content by reading it and thinking about it.

The questioned lecturer found student- student interaction and student-teacher interaction most important. He also found student-environment important and he found student-guest important for hearing others opinion/views.

Kinds of interaction used in the OTE course according to questioned students and lecturer

In this paragraph the responses of students and the lecturer are combined, because the responses given were similar to each other.

Student-teacher:	There was little interaction with lecturer, because most of the course was delivered online. Feedback on assignments was clear and mostly timely. The students would like to have the feedback before they submit the next assignment.
Student-student:	Some students said the course did not encourage and facilitate opportunities to interact with fellow students. There was also no real introduction to each other, so that was not helping with interacting. One student said the course did encourage and facilitate opportunities to interact with fellow students by the way it has been planned in tutorial groups. Interaction was mainly by e-mail and/or phone.
Student-guest:	Did not happen in OTE course, but the lecturer is from the work floor.
Student-content:	The course made use of the e-learning environment; here the students could find all the material. They read it for themselves/think about it, so lot of interaction.
Student-environment:	The face-to-face and online students worked both with the online environment.

Blended learning environment

Positive aspects

According to the questioned students, positive aspects of the e-learning environment were that the website is a standardized one; every course uses the same outlook and that it is accessible any time. The overview of the course schedule is positive on the e-learning environment.'

According to the face-to-face students it was good that there were some face-to-face workshops and the lecturer used good examples, related to their work.

According to the questioned lecturer, positive aspect of the e-learning environment were that the small-group exercises were built on each other. Then notice board was used effectively. A positive aspect of the face-to-face lessons was that the students could ask questions face-to-face.

Aspects that can be improved

According to the questioned students, aspects that could be improved in the e-learning environment were that the different tools (notice board etc) were never explained and the students did not know the audience when they used for instance the discussion board, which the questioned students found uncomfortable. The course delivery notes should be delivered earlier (not one week before the lecture) and also the lecturer should encourage the use of the notice board more. Finally, the students did not know where they could get help if they could not log-in.

According to the questioned lecturer, aspects that could be improved in the e-learning environment and face-to-face lessons were that there were no online quizzes to help understanding better and in shorter steps, he did not produced a sense of community in the class, and there were too little face-to-face meetings.

Discussion board

All the questioned students and the lecturer said that the discussion board could be very helpful. It would save time, because they can read other students' questions and answers and see if they had the same question.

Although according to the student the discussion board is very helpful, the students were not using the discussion board a lot. According to the questioned students reasons for this were that the discussion board took more time than using the phone and they did not know the other students.

According to all of the questioned students the discussion board should be there, so they would have the possibility to use it.

Notice board

According to all the questioned students and the lecturer the notice board was effectively used and very important. The students could see if there were changes on the website or if there were reminders. According to them it was good that the notice board was the first thing that opens when they went to the e-learning environment.

Preferences of interaction methods that can be used in a blended learning environment

Pre-test/post-test

All the questioned student did not preferred pre-test/post-test, because according to them it would not useful. If they already know the material and they could skip the material, they would not do that; 'refreshment is never a waste of time.'

Practice Exercises

Most questioned students prefer using practice exercises, because it would help them to understand what has been lectured. After doing the practice exercises they could see what they understood and what not. Another reason that has been given is that practice exercises are informal. One comment that has been given is that the exercise should give feedback if the answer is incorrect or say where the students can find answers or extra readings about the topic.

The lecturer did not use practice exercises anymore. According to the lecturer the majority of the students would not makes use of practice exercises. There were no practice exercises at this moment; maybe the lecturer would add a quiz that he would not have to mark.

Hyperlinks

All of the questioned students and the lecturer preferred hyperlinks, because it would make it easier to find things and saves time. Also hyperlinks could be traced back easily; the students would know where to find them. One comment was that there should not be too many.

Interactive animations and media

Most questioned students thought interactive animations and media would not be helpful for this course, because OTE is not a technical course. According to the questioned students and the lecturer interactive animations and media could be important, but they should be short and really support the subject. The lecturer also mentioned that not every student had a good computer available to use interactive animations.

Pop-ups

Nobody of the questioned students preferred pop-ups, because they would be annoying,
The lecturer did not know how to use pop-ups, so he did not know if these would be helpful.

Simulations

All the questioned students and the lecturer preferred simulations, especially case studies and role play. They preferred these because they would relate to real-life situations.
The questioned students thought they could learn more if these simulations were in a face-to-face classroom instead of on the e-learning environment.

Recorded lectures

The questioned students preferred recorded lectures, because when it would be impossible to attend to a lesson, they could watch the lecture afterwards. They mentioned that recorded lectures should not be too long, because than it would become boring. A good option according to them would be to lift out the key points of the course.
The lecturer was using one audio recorded lecture and he wants to put in more.
He thought for the interstate students it could be boring to watch recorded lessons.

Live Virtual Classroom

The questioned students only preferred the use of a live virtual classroom when there is no other option. Comments that the questioned students gave was that the use of a live virtual classroom would be very expensive and that there should be facilities available for the use of live virtual classroom.
According to the lecturer live virtual classrooms would be difficult to coordinate. He would not use it, because the technology is not right and it would be expensive.

Chat sessions

According to the questioned students and the lecturer chat sessions could be useful for group-work. According to the questioned students chat sessions should be organized in advance, because of their work. One of the questioned students said that he preferred to talk over the phone.

E-books

According to the questioned students and lecturer the course website contained a chapter of a book. These were used effective. According to the lecturer the university was allowed to scan one chapter of a book and put that online. According to the lecturer E-books were very important for the interstate students.

Group-work

Most students did not like the group work, they did not learn a lot from fellow students. Some students thought group work was important and they learned a lot from their fellow students. Reasons why they did not like group work were that they thought that their own work was better than the group-work, it was hard to coordinate to come together, and communication was not going right.

Another reason why group-work did not go right was that the group-members were too busy with their work to have good discussions.

The students who did not like group work, liked to do teamwork, but in the culture as it was everyone rather did it individually. Everyone was a bit judgmental to each other.

Classroom discussion

The questioned students liked classroom discussions, because it would be good for discussing together to solve a problem.

Lectures

According to the questioned students lectures were important in a classroom, but there should not be too many. That would be boring.

Sub-conclusion

In general, the lecturer and the students agreed. The major comment of the students and was that the course needs more variation in the way it presents the material.

The students were satisfied with the way they received feedback.

Appendix 6: Recommendations

This appendix will mention the actual recommendations that were used in the evaluation of recommendations-phase. There were recommendations with respect to interaction, with respect to interaction (teaching) methods, with respect to feedback, with respect to assignments and some general recommendations. Each recommendation is numbered.

Recommendations with respect to interaction

This section will discuss three recommendations about improving interaction between the students and between the students and the lecturer.

Recommendations

1. It is advised that the lecturer creates a place on the discussion board where students have to submit their personal background information.
2. It is advised that the lecturer calls the online students at least one time during the course.
3. It is advised that the lecturer uses the students' background information in the material, so that especially the online students can relate to it.

Recommendations with respect to interaction (teaching) methods

This section will discuss eleven interaction (teaching) methods that will help improve the courses.

4. It is advised that the lecturer stimulates the students to use the discussion board by the following ways:
    - Submitting general feedback on the discussion board.
    - Submitting relevant questions asked by one student on the discussion board.
    - When a student asks a question on the discussion board, it is advised that the lecturer also gives the other students opportunities to answer that question. This way the lecturer lets the students think for themselves.
    - It is advised that the lecturer respond to the answers given by the students, this way the students know what answers are good and what not.
5. It is advised to structure the discussion board by lesson. Questions relevant for lesson 1, should be submitted under folder 'lesson 1'. This way the students will not get 'lost' in the discussion board.
6. It is advised that all students and the lecturer receive an e-mail when something has been submitted on the discussion board.
7. It is advised to keep the notice board up-to-date.
8. It is advised to submit the newest information on top of the notice board.
9. It is advised to make use of online practice exercises
10. It is advised to make use of hyperlinks in an e-learning environment.
11. It is advised to make use of interactive animations and media.
12. It is advised to make use of simulations, especially role-play and case studies.
13. It is advised to make use of recorded lectures in an e-learning environment.
14. It is advised to make use of a live virtual classroom, because it improves the e-learning environment.
15. It is advised to make use of chat sessions in an e-learning environment.
16. It is advised to make use of PowerPoint slides with pictures, graphics and diagrams.
17. It is advised to make use of classroom discussions.

18. It is advised that at the beginning of each course some time is spent on how to work effectively in groups. The students should encourage and stimulate each other in the group to have meaningful discussion. The atmosphere should be one in which the students want to learn from each other and share experiences.
19. It is advised to submit a document in the e-learning environment of how to work effectively in groups. Every student has access to this document.
20. It is advised that the lecturer stimulates group-work, by showing interest in how the group-work is progressing.
21. It is advised that at the end of working in groups in course, the students write a reflection paper of 2/3 pages about how the group-work went:
    - Positive points
    - Negative points
    - How come it was positive or negative (explanation)
    - How can the negative points be improved
    - Learning points

    It is recommended that the reflection paper will not be marked, but it is compulsory. This way the students do not think they are writing a reflection paper for nothing and they will take it serious.

Recommendations with respect to feedback

This section will discuss recommendations about improving feedback for the RMME course.

Recommendations

22. It is advised to answer e-mails or phone calls within 3 days.
23. It is advised to mark assignments within 3 weeks.
24. It is advised that the feedback is constructive.
25. It is advised that every student receives personalized feedback on their assignments.
26. It is advised that general feedback is submitted on the discussion board.

Recommendations with respect to assignments

This section will discuss recommendations about improving the assignments.

Recommendations

27. It is advised that the written material is more explicit as to what steps need to be taken to complete the assignments.
28. It is advised that the lecturer submits extra information concerning the assignments on the discussion board, especially when in the face-to-face classroom sessions there have been several questions about the assignment.

General recommendations

In this section some general recommendations are discussed, that are usable in both the RMME and OTE course, but usable in other courses as well.

A. Course explanation
Recommendations

29. It is advised to submit more detailed course information on the universities website.

B. E-learning environment
Recommendations
30. It is advised to put the buttons in the same order.
31. It is advised to use the same format for the course outline.

C. Delivery environment
Recommendations
32. The students of the OTE course would like to have more face-to-face meetings, because then they can meet and interact with each other.

D. Access e-learning environment
Recommendations
33. It is advised that the lecturer send all the students an e-mail at the beginning of the course to check if the students can log-in and if they have problems with this, who they can contact.

E. Delivery of learning material
Recommendations
34. It is advised to deliver the learning material two lessons ahead. This way the students can plan their learning better into their work schedule, but cannot work too much ahead.

Appendix 7: Results research question 2 RMME

In this appendix the results will be presented that answers the questions: 'How can the quality of the blended learning environment of the RMME course of the LMEF Masters program be improved, with respect to the interaction methods?'

After drawing conclusions and writing recommendations based upon the evaluation phase, a formative evaluation was conducted with the lecturers and students to evaluate what they thought of the recommendations. The recommendations must be effective, efficient, interesting and motivating, practical and usable and acceptable (Tessmer, 2001) (See chapter 3). These criteria were checked with the students and lecturers by doing this formative evaluation.
The primary goal of this formative evaluation was to improve the quality of the blended learning environment of the RMME course of the LMEF Masters program, by looking at the degree in which the courses offer adult learners with different learning styles, different interaction methods.

Below, the result of this formative evaluation will be presented. When there is spoken about some students, this means that this could be 2 students or less. When there is spoken about most students, this means 3 students or more.

The written recommendations are combined with the results of the evaluation phase from Scholten (2006).

Results formative evaluation
The first course that was analysed was the RMME course of the LMEF Masters program.
In this section the results of the formative evaluation will be presented.

Recommendations
As a result of chapter 4, different recommendations were written to improve the quality of the RMME course. The recommendations cover different topics:

- Interaction
- Interaction (teaching) methods
- Feedback
- Assignments
- General recommendations

Recommendations with respect to interaction

This section will discuss three recommendations about improving interaction between the students and between the students and the lecturer of the RMME course.

Recommendations

- It is advised that the lecturer creates a place on the discussion board where students have to submit their personal background information (picture and approximately ten sentences). This is one of the folders in the structure of the discussion board. The lecturer should encourage all students to submit this (he can make it compulsory). It is up to the students to read the background information of other students.

According to some students, the recommendation about submitting personal backgrounds were not efficient; it would costs them more time. According to some students, this recommendation was not acceptable, because some students might be too embarrassed or feel uncomfortable to place their picture on the course website. Some students thought this would be effective, interesting and motivating.
According to the lecturer it would especially work at the beginning of the course.

- It is advised that the lecturer calls the online students at least one time during the course. This way the online students have real-human interaction, they can ask questions and get instant feedback. This motivates them.

All the students and the lecturer thought this recommendation was usable and acceptable.

- It is advised that the lecturer uses the students' background information in the material, so that especially the online students can relate to it.

The online students thought this recommendation was not particularly practical, unless all of the students had very similar backgrounds. The face-to-face students and the lecturer thought this recommendation was motivating and effective.

Recommendations with respect to interaction (teaching) methods

This section will discuss eleven interaction (teaching) methods that will help improve the RMME course.

Discussion board in an e-learning environment

Recommendations

- It is advised that the lecturer stimulates the students to use the discussion board by the following ways:
    - Submitting general feedback on the discussion board.
    - Submitting relevant questions asked by one student on the discussion board.
    - When a student places a question on the discussion board, it is advised that the lecturer gives the other students opportunities to answer that question. This way the lecturer lets the students think for themselves.
    - It is advised that the lecturer respond to the answers given by the students, this way the students know what answers are good and what not.

Some students would not like it if students tell each other what to do. Most students thought this recommendation would be motivating, usable, efficient and acceptable.
According to the lecturer, the points were good, but the last point would probably cost him much extra time, so it would be less efficient for him.

- It is advised to structure the discussion board by lesson. Questions relevant for lesson 1, should be submitted under folder 'lesson 1'. This way the students will not get 'lost' in the discussion board.

According to the online student, the discussion board only had about one page of messages; he could not see how anyone could get 'lost' in that. The face-to-face students and the lecturer thought this recommendation would be acceptable and very usable.

- It is advised that all students and the lecturer receive an e-mail when something has been submitted on the discussion board.

The online student disagreed with this recommendation. 'For a discussion board to be effective, it needs to be part of how the student relates to the course.' The face-to-face

students and the lecturer mentioned that this recommendation was acceptable, but it depended on how much was submitted on the discussion board. They then preferred to receive an e-mail once a day that tells the students there are new topic/questions/answers submitted on the discussion board.

Notice board in an e-learning environment

Recommendations

- It is advised to keep the notice board up-to-date.

Some students mentioned they would also like to receive an email when something new was submitted on the notice board. Most students thought this would be effective, efficient, motivating, usable and acceptable.
According to the lecturer, he wanted to submit something on the notice board every week.

- It is advised to submit the newest information on top of the notice board.

According to all students, it was important to put newest information on top, to make it efficient and that way time saving.
The lecturer said he already did this; he also found this important.

Online practice exercises

- It is advised to make use of online practice exercises

Some students mentioned they would also do the practice exercises when it was voluntary, when they had the time. According to some students, it would help the learning, but it should be marked. Most students and the lecturer thought the use of online practice exercises would be motivating and interesting, effective, efficient, usable and acceptable.

Hyperlinks

- It is advised to make use of hyperlinks in an e-learning environment.

According to all the students and the lecturer, hyperlinks would be effective, motivating, usable and acceptable, as long as there would not be too much.

Interactive animations and media

- It is advised to make use of interactive animations and media can be useful.

Some students could imagine that interactive animations would be used in the RMME course. According to some students, it could be useful for picking samples of a population. Most students thought the recommendation would be effective, efficient, interesting and motivating, usable and acceptable.
According to the lecturer, they could be usable and motivating, but because of the time somebody else should design them for him.

Simulations: Role-play & Case-study

- It is advised to make use of simulations, especially role-play and case studies.

The online student thought the use of simulations would not be efficient and usable. The face-to-face students and the lecturer thought simulations would be effective, efficient, interesting and motivating, usable and acceptable.

Recorded lectures

- It is advised to make use of recorded lectures in an e-learning environment.

Some students mentioned that the recorded lectures should be short. They did not prefer to have recorded lectures of 1 hour. Most students and the lecturer thought this recommendation

would be effective, efficient, interesting and motivating, usable and acceptable. According to the interviewed students, this recommendation would be especially helpful for online students.

Live virtual classroom

- It is advised to make use of a live virtual classroom, because it improves the e-learning environment.

According to some students, the use of a live virtual classroom would be a good option for the online students, but it would be expensive. Most students thought the use of a live virtual classroom would be effective, interesting and motivating, usable and acceptable.
According to the lecturer, live virtual classrooms would be good to use two times in a course, especially for the online students.

Chat session

- It is advised to make use of chat sessions in an e-learning environment.

Most students would not use a chat session; it would not be effective, efficient, interesting or motivating, usable or acceptable. They preferred to use the phone, instead of a chat session. The online student would like the use of a chat session.
According to the lecturer, this would be possible; he could schedule half an hour a week in his personal agenda.

PowerPoint slides with pictures, graphics and diagrams

- It is advised to make use of PowerPoint slides with pictures, graphics and diagrams.

According to some students, the more pictures and the less bullet-points the better.
According to most students, this recommendation would be effective, efficient, interesting and motivating, usable and acceptable.
The lecturer liked to use PowerPoint slides with pictures, graphics and diagrams more often. It would be time consuming to change this, but according to him, it would be worthwhile.

Classroom Discussions

- It is advised to make use of classroom discussions.

It would be effective, efficient, interesting and motivating, usable and acceptable. According to all students and the lecturer, classroom discussions would be very important, because one can hear somebody else's opinion.

Group-work

Recommendations

- It is advised that at the beginning of each course some time is spent on how to work effectively in groups. The students should encourage and stimulate each other in the group to have meaningful discussion. The atmosphere should be one in which the students want to learn from each other and share experiences.

Some students did not prefer this, because the teaching time could be used better. Some students doubt if people follow the 'rules' for group work. They would not like group work to be marked. They would rather work individual. Most students and the lecturer thought this recommendation would be effective, efficient, interesting and motivating, usable and acceptable.

- It is advised to submit a document in the e-learning environment of how to work effectively in groups. Every student has access to this document.

All the students and the lecturer thought this would be effective, efficient, interesting and motivating, usable and acceptable.

- It is advised that the lecturer stimulates group-work, by showing interest in how the group-work is progressing.

According to some students, the lecturer already showed interest in how the group-work was progressing. Most students and the lecturer thought this would be effective, efficient, interesting and motivating, usable and acceptable.

- It is advised that at the end of working in groups in course, the students write a reflection paper of 2/3 pages about how the group-work went:
  - Positive points
  - Negative points
  - How come it was positive or negative (explanation)
  - How can the negative points be improved
  - Learning points

  It is recommended that the reflection paper will not be marked, but it is compulsory. This way the students do not think they are writing a reflection paper for nothing and they will take it serious.

According to some students, reflection would be useful, but should not be marked.
Some interviewed students would only write a reflection paper when it would be marked.
Some students were concerned about the time it would take them to write a reflection paper.
Some students thought this recommendation would be effective, efficient, interesting and motivating, usable and acceptable.
According to the lecturer, reflection would be good, as long as he would not have to mark it. That would cost him too much time and that is not efficient.

Recommendations with respect to feedback

This section will discuss recommendations about improving feedback for the RMME course.

Recommendations

- It is advised to answer e-mails or phone calls within 3 days.
- It is advised to mark assignments within 3 weeks.
- It is advised that the feedback is constructive.
- It is advised that every student receives personalized feedback on their assignments.
- It is advised that general feedback is submitted on the discussion board.

According to all the students and the lecturer, these were good recommendations, because they would be effective, efficient, interesting and motivating, usable and acceptable.
According to some students, it would even be better when the students received feedback on their assignments before the next face-to-face classroom session.
The lecturer mentioned that 3 days should be changed into 3 business days.

Recommendations with respect to assignments

This section will discuss recommendations about improving the assignments for the RMME course.

Recommendations

- It is advised that the written material is more explicit as to what steps need to be taken to complete the assignments.

- It is advised that the lecturer submits extra information concerning the assignments on the discussion board, especially when in the face-to-face classroom sessions there have been several questions about the assignment.

According to all the students and the lecturer, it would be effective, efficient, interesting and motivating, usable and acceptable; these were good recommendations.
Some students mentioned that it would be good to put questions asked in face-to-face classroom session on the discussion board, as long as there is no name attached of the person who asked the question.

General recommendations

In this section some general recommendations are discussed, that are usable in both the RMME and OTE course, but usable in other courses as well.

A. Course explanation
Recommendations
- It is advised to submit more detailed course information on the universities website.

According to all the students and the lecturer, this was a good recommendation; it would be effective, efficient, interesting and motivating, usable and acceptable.

B. E-learning environment
Recommendations
- It is advised to put the buttons in the same order.
- It is advised to use the same format for the course outline.

According to all the students and the lecturer, it would be effective, efficient, interesting and motivating, usable and acceptable; these were good recommendations.

C. Delivery environment
Recommendations
- The students of the OTE course would like to have more face-to-face meetings, because then they can meet and interact with each other.

According to most students and the lecturer, there were enough face-to-face meetings in the RMME course. This recommendation would not be really usable for the face-to-face students. According to the online student, a course should be offered online or offline, not a combination of both.

D. Access e-learning environment
Recommendations
- It is advised that the lecturer send all the students an e-mail at the beginning of the course to check if the students can log-in and if they have problems with this, who they can contact.

According to all the students and the lecturer, it would be effective, efficient, interesting and motivating, usable and acceptable; this was a good recommendation.

E. Delivery of learning material
Recommendations
- It is advised to deliver the learning material two lessons ahead. This way the students can plan their learning better into their work schedule, but cannot work too much ahead.

According to some students, learning materials should not be delivered more than two weeks ahead. According to some students, one lesson ahead would already be good.

According to most students and the lecturer, it would be effective, efficient, interesting and motivating, usable and acceptable; this was a good recommendation.

Preferences for recommendations

In this formative evaluation, the interviewed students and the interviewed lecturer were asked which recommendations they liked the most and which ones they did not like. These results are presented below.

Recommendation the students and lecturer liked the most

During the formative evaluation the students were also asked to mention the recommendations they liked the most. The following recommendations are recommendations that the students and the lecturer liked the most, because they were interesting and motivating, effective, practical and usable and acceptable.

Students:
Recommendations about the interaction (teaching methods):
- More variation in the way the material is delivered; mentioned five times.
- Use of simulations: role-play and case study; mentioned one time
- Group-work:
  - It is advised that the lecturer stimulates group-work, by showing interest in how the group-work is progressing; mentioned one time.
- Discussion board:
  - It is advised that the lecturer stimulates the students to use the discussion board; mentioned two times:
    - Submitting general feedback on the discussion board.
    - Submitting relevant questions asked by one student on the discussion board.
    - When a student places a question on the discussion board, it is advised that the lecturer gives the other students opportunities to answer that question. This way the lecturer lets the students think for them selves.
    - It is advised that the lecturer respond to the answers given by the students, this way the students know what answers are good and what not.

Recommendations about feedback; mentioned three times:
- It is advised to answer e-mails or phone calls within 3 days.
- It is advised to mark assignments within 3 weeks.
- It is advised that the feedback is constructive.
- It is advised that every student receives personalized feedback on their assignments.
- It is advised that general feedback is submitted on the discussion board.

Recommendation about the assignments:
- It is advised that the lecturer submits extra information concerning the assignments on the discussion board, especially when in the face-to-face classroom sessions there have been several questions about the assignment; mentioned one time.
- It is advised that the written material is more explicit as to what steps need to be taken to complete the assignments; mentioned two times.

Lecturer:
Recommendations about the interaction (teaching methods):
- More live, online things. Especially the use of a live virtual classroom for a couple of sessions.

Recommendation the students and lecturer did not like

During the formative evaluation the students were also asked to mention the recommendations they did not like. The following recommendations are ones that the students and the lecturer did not like, because they were not interesting or motivating, effective, practical or usable or acceptable.

Students:
Recommendations about the interaction (teaching) methods:
- Use of chat session: In the workplace is phone better, this is quicker according to the students; mentioned two times.
- If the group-work will be marked, one of the students would not like this.

Recommendations about group-work (reflection paper):
- It is advised that at the end of working in groups in the course, the students write a reflection paper of 2/3 pages about how the group-work went; mentioned one time.

Recommendations about the discussion board:
- It is advised that all students and the lecturer receive an e-mail when something has been submitted on the discussion board; mentioned one time.

Lecturer:
According to the lecturer, all the recommendations would work, but some are harder to do because of time and/or money.

Appendix 8: Results research question 2 OTE

In this appendix the results will be presented that answers the questions: 'How can the quality of the blended learning environment of the OTE course of the LMEF Masters program be improved, with respect to the interaction methods?'

After drawing conclusions and writing recommendations based upon the evaluation phase, a formative evaluation was conducted with the lecturers and students to evaluate what they thought of the recommendations. The recommendations must be effective, efficient, interesting and motivating, practical and usable and acceptable (Tessmer, 2001) (See chapter 3). These criteria were checked with the students and lecturers by doing this formative evaluation.
The primary goal of this formative evaluation was to improve the quality of the blended learning environment of the OTE course of the LMEF Masters program, by looking at the degree in which the courses offer adult learners with different learning styles, different interaction methods.

Below, the result of this formative evaluation will be presented. When there is spoken about some students, this means that this could be 2 students or less. When there is spoken about most students, this means 3 students or more.

The written recommendations are combined with the results of the evaluation phase from Scholten (2006).

Results formative evaluation
The second course that was analysed was the OTE course of the LMEF Masters program.
In this section the results of the formative evaluation will be presented.

Recommendations
As a result of chapter 4, different recommendations were written to improve the quality of the OTE course. The recommendations cover different topics:

- Interaction
- Interaction (teaching) methods
- Feedback
- Assignments
- General recommendations.

Recommendations with respect to interaction

This section will discuss three recommendations about improving interaction between the students and between the students and the lecturer of the OTE course.

Recommendations

- It is advised that the lecturer creates a place on the discussion board where students have to submit their personal background information (picture and approximately ten sentences). This is one of the folders in the structure of the discussion board. The lecturer should encourage all students to submit this (he can make is compulsory). It is up to the students to read the background information of other students.

Most students said this recommendation would be effective, efficient, interesting and motivating, usable and acceptable. Some students said they did not know if it would be very practical. The lecturer was willing to do this. He was wondering if students would do this.

- It is advised that the lecturer calls the online students at least one time during the course. This way the online students have real-human interaction, they can ask questions and get instant feedback. This motivates them.

All the students said this would be effective, efficient, interesting and motivating, usable and acceptable. Some students mentioned that it would not be necessary for all subjects.
The lecturer thought this was important too. According to him, he was doing this already.

- It is advised that the lecturer uses the students' background information in the material, so that especially the online students can relate to it. The lecturer can use this information while explaining and using in examples.

Most students and the lecturer said this would be effective, efficient, interesting and motivating, usable and acceptable. Some students were wondering about the usability of this recommendation. The lecturer was willing to do this.

Recommendations with respect to interaction (teaching) methods

This section will discuss eleven interaction (teaching) methods that will help improve the OTE course.

Discussion board in an e-learning environment

Recommendations

- It is advised that the lecturer stimulates the students to use the discussion board by the following ways:
    - Submitting general feedback on the discussion board.
    - Submitting relevant questions asked by one student on the discussion board.
    - When a student places a question on the discussion board, it is advised that the lecturer gives the other students opportunities to answer that question. This way the lecturer lets the students think for themselves.
    - It is advised that the lecturer respond to the answers given by the students, this way the students know what answers are good and what not.

All the students thought these recommendations would help stimulate the use of the discussion board. It would be effective, interesting and motivating and acceptable. Some students doubt if every student would submit their information, they were not sure about the usability of this recommendation. Some students said that using the discussion board takes a long time; they would rather directly call the lecturer. So, this would not be efficient for them.
The lecturer said he was doing this already. He was afraid it would backfire if he puts questions on the discussion board, students will be afraid to e-mail questions, even when their questions are submitted anonymous on the discussion board. But he thought the recommendation would be effective, efficient, motivating and usable.

- It is advised to structure the discussion board by lesson. Questions relevant for lesson 1 should be submitted under folder 'lesson 1'. This way the students will not get 'lost' in the discussion board.

All the students said this recommendation would be effective, efficient, interesting and motivating, usable and acceptable.

The lecturer thought it was a good idea to structure the discussion board, especially when students use it more. He was not sure how to do that, and if it was possible for him to do that.

- It is advised that all students and the lecturer receive an e-mail when something has been submitted on the discussion board.

All the students would like to receive an e-mail as a reminder to look at the discussion board, which would be motivating, usable and efficient for them. Some students would like to have the opportunity for every student to choose for themselves if they want an e-mail once a day, once a week or immediately. Some students preferred to have the e-mail at the end of the day. Some students also suggested sending an e-mail with a few lines and a direct link to the discussion page. According to the lecturer, each student had to select that option already in the discussion board. They could only choose if they wanted to have an e-mail directly, or getting no e-mail.

Online practice exercises

- It is advised to make use of online practice exercises

Most students and the lecturer thought online practice exercises would effective, efficient, interesting and motivating, usable and acceptable. The exercises have to be short, informal, not marked and they should fit with the content of the course. Some students want to have informal feedback on the exercise, so it would help them with learning.

Hyperlinks

- It is advised to make use of hyperlinks in an e-learning environment.

All the students said this would be effective, efficient, interesting and motivating, usable and acceptable. It should be linked to something relevant for this course.
The lecturer used pdf files. According to him, it was not possible to use hyperlinks in a pdf file. So, to use this pfd files he could make a webpage with hyperlinks to the pdf files.

Interactive animations and media

- It is advised to make use of interactive animations and media can be useful.

Most students did not think interactive animations would be effective in this course; it would not fit with the content. Some students said it depended on what the animations were.
The lecturer could not see where it would fit, so it would not be effective for him. Another concern was the downloading time. Interactive animations could take a lot of downloading time; this would not be efficient and usable.

Simulations: Role-play & Case-study

- It is advised to make use of simulations, especially role-play and case studies.

Most students said case studies would be effective, efficient, interesting and motivating, usable and acceptable. Some students did not think role-plays would be effective for this course. Some students did not like the extra work, and they were wondering about the use for an online student.
The lecturer liked doing the case studies, but he could use them more.

Recorded lectures

- It is advised to make use of recorded lectures in an e-learning environment.

All students said that the lecture notes were good enough, when in the lesson something was added. But, the benefit of recorded lectures is that one can rewind and listen again. It could be hard to listen for an hour, so the recorded lecture should be in pieces of 15/20 minutes.

They all agreed that this would be really effective for online students or students who could not attend the meeting.
The lecturer said he was already using one recorded audio lectures, since the middle of the course.

Live virtual classroom

- It is advised to make use of a live virtual classroom, because it improves the e-learning environment.

All the students said the use of live virtual classrooms would be effective, efficient, interesting and motivating, usable and acceptable for online students, not for students who could go to the workshops. Some students said it would be hard to get everyone online at the same time and having the facilities to do that. Some students mentioned that the technology should be working all right.
The lecturer did not like it very much, because technology is unreliable and it will take a lot of time for the lecturer and the students to prepare a live virtual classroom.

Chat session

- It is advised to make use of chat sessions in an e-learning environment.

Most students said it was not good to use a chat session, they saw some big problems with deciding on what time to do the chat session, and using the phone worked faster.
The lecturer did not see the benefit of putting a chat session in, because the students also did not use the discussion board.

PowerPoint slides with pictures, graphics and diagrams

- It is advised to make use of PowerPoint slides with pictures, graphics and diagrams.

This recommendation was not really effective, because most students said the PowerPoint slides were good as it was. Some students said more graphics could be added, if they were practical.

Classroom Discussions

- It is advised to make use of classroom discussions.

All the students and the lecturer thought it was effective, efficient, interesting and motivating, usable and acceptable; this was a good recommendation.

Group-work

Recommendations

- It is advised that at the beginning of each course some time is spend on how to work effectively in groups. The students should encourage and stimulate each other in the group to have meaningful discussion. The atmosphere should be one in which the students want to learn from each other and share experiences, not to be judged by other students. A sense of community will be produced.

Most students and the lecturer thought it was effective, efficient, interesting and motivating, usable and acceptable; this recommendation was a good idea.

- It is advised to submit a document in the e-learning environment of how to work effectively in groups. Every student has access to this document.

All the students thought this document should be provided in the course website, as part of the course. It would be effective, efficient, interesting and motivating, usable and acceptable.
The lecturer thought that not a lot of students would read this document.

- It is advised that the lecturer stimulates group-work, by showing interest in how the group-work is progressing.

All the students thought this was a good recommendation; it would be effective, efficient, interesting and motivating, usable and acceptable. Some students added to this that it would be important that the lecturer would not always ask the same person in the group how the group-work is going. Some students added that the lecturer should have more attention to the way he puts groups together.
The lecturer thought the recommendation was a good idea.

- It is advised that at the end of working in groups in the course, the students write a reflection paper of 2/3 pages about how the group-work went:
  - Positive points
  - Negative points
  - How come it was positive or negative (explanation)
  - How can the negative points be improved
  - Learning points

  It is recommended that the reflection paper will not be marked, but that it is compulsory. This way the students do not think they are writing a reflection paper for nothing and they will take it serious.

Most students and the lecturer thought a reflection paper was a good idea, as long as it was not marked and when it was short; 2 or 3 pages may be too long. The lecturer also thought this recommendation was a good idea.
Some students did not like writing a reflection paper. They saw it as extra work and 2 or 3 pages will be too much for them.

Recommendations with respect to the assignments

This section will discuss recommendations about improving the assignments for the OTE course.

Recommendations

- It is advised that the written material is more explicit as to what steps need to be taken to complete the assignments.

All the students agreed that the clearer the written material, the better. For some students the assignments were already clear. Some students mentioned that the assignments were already in steps, but people could not see where the assignments were related in the big picture.
The lecturer did not know how to make the assignments clearer.

- It is advised that the lecturer submits extra information concerning the assignments on the discussion board, especially when in the face-to-face classroom sessions there have been several questions about the assignment.

All the students thought this was a good idea. It would be effective, efficient, interesting and motivating, usable and acceptable. The lecturer was willing to do this.

General recommendations

In this section some general recommendations are discussed, that are usable in both the RMME and OTE course, but usable in other courses as well.

A. Course explanation
Recommendations
- It is advised to submit more detailed course information on the universities website.

All the students and the lecturer agreed on this. Some students suggested that a list of the lessons and then the topic of each lesson should be mentioned. This would provide a view of how the course will go.
The lecturer said the university did not want to put more information on.

B. E-learning environment
Recommendations
- It is advised to put the buttons in the same order.
- It is advised to use the same format for the course outline.

All the students agreed that it would be effective, efficient, usable and acceptable if everything was in the same order.
The lecturer used the template from the university. He would like to have a template for the format that everyone within SEEC could use.

C. Delivery environment
Recommendations
- The students of the OTE course would like to have more face-to-face meetings, because then they can meet and interact with each other.

All the students would like to have face-to-face education, so having more meetings was always good for them. The lecturer also liked to give face-to-face education rather than online. But he offered them workshops in his own time already.

D. Access e-learning environment
Recommendations
- It is advised that the lecturer send all the students an e-mail at the beginning of the course to check if the students can log-in and if they have problems with this, who they can contact.

All the students said the lecturer sent them an e-mail at the beginning of the course. But this e-mail could be send a little bit earlier. The lecturer said he was already doing this.

E. Delivery of learning material
Recommendations
- It is advised to deliver the learning material two lessons ahead. This way the students can plan their learning better into their work schedule, but cannot work too much ahead.

All the students agreed that having the material a little bit earlier would be easier sometimes for planning; it would be effective, efficient, usable and acceptable.
The lecturer was willing to do this.

Preferences for recommendations

In this formative evaluation, the interviewed students and the interviewed lecturer were asked which recommendations they liked the most and which ones they did not like. These results are presented below.

Recommendation the students and lecturer liked the most

During the formative evaluation the students were also asked to mention the recommendations they liked the most. The following recommendations are the ones that the

students and the lecturer liked the most, because they were interesting and motivating, effective, practical and usable and acceptable.

Students:
Interaction (teaching) methods
- Recommendations about group-work:
    - It is advised that at the beginning of each course some time is spent on how to work effectively in groups; mentioned three times.
- It is advised to make use of recorded lectures; mentioned one time.
- It is advised to make use of practice exercises; mentioned one time.

General recommendations
Recommendation about the delivery environment
- More face-to-face meetings; mentioned two times.

Recommendations about the delivery of learning materials
- It is advised to deliver the learning material two lessons ahead. This way the students can plan their learning better into their work schedule, but cannot work too much ahead; mentioned two times.

Interaction
- It is advised that the lecturer creates a place on the discussion board where students have to submit their personal background information (a picture and approximately ten sentences); mentioned one time.

Lecturer:
The lecturer mentioned the following recommendations as good recommendations:
- Reflection as a formal activity
- Providing clearer guidance

Recommendation the students and lecturer did not like

During the formative evaluation the students were also asked to mention the recommendations they did not like. The following recommendations are recommendations the students and the lecturer did not like, because they were not interesting and motivating, in-effective, unpractical or unusable and unacceptable.

Students:
Recommendations about the interaction (teaching) methods:
- Use of chat session: In the workplace using the phone works better; this is quicker according to the students; mentioned five times.
- Writing a reflection paper; mentioned one time.
- Using more pictures/diagrams in the PowerPoint slides, because that is already used; mentioned one time.

Lecturer:
The lecturer mentions the following recommendations as bad recommendations:
- Video taping him at a workshop; that is boring.
- Explain/doing more; there is a limit to.

Appendix 9: Implementation plan

Implementation Plan

RMME and OTE

Marieke Klink
Chantal Scholten
Date: November 2005

Table of content

1 Introduction

SEEC has different masters programs. One of them is LMEF (a Masters of Engineering). The Department of Defence, division Defence Science and Technology Organisation (DSTO) is the client for the LMEF Masters. The Department of Defence has contracted an external organisation, AITEC, to administer the LMEF Masters program.
SEEC does a lot of work with them. DSTO invests a lot of money in the unit SEEC, so it is important to keep them satisfied by delivering high-quality courses. SEEC wants to ensure that the LMEF Masters program is representative of best teaching practice in post graduate education, and, that the program is meeting the needs of the client. The two LMEF courses running were 'Research Methods in a Multidisciplinary Environment' (RMME) and 'Operational Test and Evaluation' (OTE). Therefore, these two courses were evaluated.

Goal
This research project was aiming at improving the quality of the blended learning environment of the RMME and OTE courses of the LMEF Masters program by looking at the degree in which the courses offered adult learners with different learning styles, different interaction methods.
Another important reason to conduct this research was that there has never been a research about the way of teaching and cope with the different learning styles of adults, the lecturers do not have the proof that they are doing a good job. Through this research they can demonstrate to other people and organisations that they are taking the different adult learning styles into account and adjust the interaction method in the blended learning environment in the best possible way.

The students from the RMME course were all adults working at DSTO. Students from the OTE course were all adults working for DSTO and Tenix, a locally-owned defence and technology contractor.

In this research project, there were two phases: an evaluation phase and a phase that leads towards the recommendations. In these phases, the focus for the activities was on interaction methods in a blended learning environment and the use of learning styles in adult learning. The different activities undertaken in the evaluation phase are:
- an analysis of the course websites
- an analysis of the results of the AITEC questionnaire 2003 for both courses
- an analysis of the results of the AITEC questionnaire 2004 for both courses
- an analysis of the results of the developed questionnaire for both courses
- interviews with students of the RMME and OTE course
- interviews with the lecturers of the RMME and OTE course

On grounds of the results of both phases, the preceding implementation plan has been written: The results of the evaluation phase led to writing recommendations for improving the RMME and OTE course. In the phase that leaded towards the recommendations, a formative evaluation was conducted, to see what the students and the lecturer thought of the suggested recommendations. After that formative evaluation, recommendations were re-written when necessary.

Reading guide
In chapter two, one can read the conclusions of the research project, immediately followed by the suggested recommendations that were based upon these conclusions. Unless mentioned else, the recommendations are for both courses. In chapter 3 a planning for all the

recommendations is suggested. A distinction is made between a planning while the course is running, a short term planning and a long term planning. In chapter 4 the costs related to implementing the suggested recommendations are presented. Finally, in chapter 5, some risks that can determine the succeeding of the suggested recommendations are presented.

2 Conclusions and recommendations

In this chapter the conclusions drawn from the several activities undertaken in the evaluation phase and the formative evaluation are presented. After these results, the belonging suggested recommendations and an explanation of them are presented. For some recommendations there are further readings provided.
If one wants to see from which activities and literature sources the recommendations are drawn, a reference is made to the associated research reports of Chantal Scholten and Marieke Klink.

In section 2.1 results and recommendations about interaction will be presented, in section 2.2 thirteen interaction (teaching) methods will be presented, and in section 2.3 more general recommendations that could be used to improve other courses than the RMME and OTE course are presented.

2.1 Recommendations with respect to interaction

This section will discuss three recommendations with respect to improving interaction between the students and between the students and the lecturer of the RMME and OTE course.

Results evaluation phase and phase towards the recommendations
For online students there were not enough possibilities to interact with other students. Online students also missed interaction with the lecturer. This way the online students did not get the guidance they preferred to have. Another result was that students did not feel comfortable with learning, because students did not know each other and they did not know the other students with whom they were working in the groups. The lecturer also did not know the personal backgrounds of the students.

Recommendations

*a) **It is advised that the lecturer makes at the beginning of the course a place on the discussion board where students have to submit their personal background information.***

The personal background information can consist of:
- a picture of themselves;
- information about their work situation at this moment;
- their work history;
- their educational background; and
- a short description of their personal life situation, like if they are married, have kids and their hobby's.

In total this information should not be more then a half A4-page.
It is advised to submit this background information in a separate folder on the discussion board (one can read more about using a folder structure in the discussion board paragraph further on in this document). The lecturer should encourage all students to submit this, he should make it compulsory. It is up to the students to read the background information of other students, it is not compulsory. The students, who would like to do this, have the possibility now.

The lecturer can stimulate the students to make more and better use of the discussion board, by making it clear to them at the beginning of the course that they can improve their grade by participating active on the discussion board. When they submit their background information and a picture of themselves on the discussion board, this will be 1% of their grade. By giving the students a grade for their participation they are more willing and motivated to do it.

b) It is advised that the lecturer calls the online students at least one time during the course.

This way the online students have real-human interaction with their lecturer. This allows the students to ask questions and get instant feedback while the lecturer can further motivate them.

c) It is advised that the lecturer uses the students' background information in the material, so that especially the online students can relate to it.

This is something that the online students are lacking right now. The students' background information can be used in the material, by using examples in the lessons that are related to this background or by using for example case studies that are related to the students' background.

2.2 Recommendation with respect to interaction (teaching) methods

This section will discuss eleven interaction (teaching) methods that will help improve the RMME and OTE course.

Meeting the different learning styles of the students can be done in different ways.
The students will be able to obtain the same information by means of several formats and manners an the student will be able to get an answer to questions that are important for him/her, independently of time, location, place and learning style preferences. These different ways will be discussed in section 2.1 until section 2.13.

2.2.1 Discussion board in an e-learning environment

Results evaluation phase and phase towards the recommendations

The RMME and OTE course made use of a discussion board. It was clear that the discussion board was not used very much. Reasons for this were that submitting questions/answers on the discussion board took more time than using for instance the phone. Another reason was that the students did not know the other students, so it was uncomfortable for them to ask questions to a stranger.
The students preferred the use of a discussion board, because they could ask questions there and other students/the lecturer could answer their questions. For the online student the use of the discussion board was very important, because they did not have contact hours to ask their question in.
According to the literature, a discussion board is also very important, because it can be used for 'asynchronous' communication between lecturers and students. Online discussion provides an 'anywhere, anytime' learning environment which facilitates communication (University of South Australia, 2005).

Recommendations

a) It is advised that the lecturer stimulates the students to use the discussion board by:

- ***Submitting general feedback on the discussion board*** (one can read more about feedback in the feedback paragraph further on in this document).
- ***Submitting relevant questions, asked by one student via for example e-mail or in the face-to-face meetings, on the discussion board.***
  This way all students can read the question and the answer given to it. Especially for online students who cannot go to the face-to-face meetings this can be very helpful.
- ***When a student places a question on the discussion board, it is advised that the lecturer gives the other students opportunities to answer that question.***
  This way the lecturer lets the students think for themselves, and not give them all answers straight away without letting them think about the subject.
- ***It is advised that the lecturer respond after a couple of days (for example at the end of the week) to the answers given by the student.***
  This way the students know what answers are good and what not.

The lecturer can stimulate the students to make more and better use of the discussion board, by making it clear to them at the beginning of the course that they can improve their grade by participating active on the discussion board. When they submit good and relevant questions and also give good comments on other questions, this will be 2% of their grade. By giving the students a grade for their participation they are more willing and motivated to do it.

b) It is advised to structure the discussion board by lesson.

Questions relevant for lesson 1 should be submitted under folder 'lesson 1'. This way the students will not get 'lost' in the discussion board. They can go directly to the lesson in which they have a question, or for which they want to read an answer. They do not have to read a lot of pages with other questions first.
It is also advised to make the structure in such a way that when a reaction to a question is submitted, this reaction comes under the question. This way it is clear which the questions are and what the reactions to the answer are.
This recommendation is not available yet, but it is possible for the Flexible Learning Centre to do this. The Flexible Learning Centre is located at the Mawson Lake campus of the UniSA. Lecturers do have the possibility to make several discussion boards and name every discussion board differently. So one discussion board can be named 'Background information', one discussion board can be named 'Lesson 1', etc. The lecturers have the possibility to give the students a 'read only' or 'write' permission. The lecturers can also make the several discussion boards active or non-active. This way the students cannot submit questions to the wrong lessons.

c) It is advised that all students and the lecturer receive an e-mail when something has been submitted on the discussion board.

Because some students prefer to have an e-mail immediately when something is submitted, and other students would like to get it at the end of the day, they should get the opportunity to choose for themselves. At this moment students can choose if they want to get an e-mail immediately or not. It is advised that students also have the opportunity to choose if they want to get an e-mail immediately or at the end of the day. This e-mail would say: 'There are five new messages on the discussion board about 'this' and 'this' topic.' This possibility is not available right now, but it can be. This has to be spoken through with Flexible Learning Connection. They can change things in the courses' website.

2.2.2 Notice board in an e-learning environment

Results evaluation phase and phase towards the recommendations of the RMME course
The RMME and OTE course made use of a notice board. The notice board was not up-to-date. The students found the notice board very helpful. They can have a quick look on the notice board if there are updates and/or reminders. It reminds them of what is coming. This will stimulate them.

Recommendations for the RMME course

a) It is advised to keep the notice board up-to-date.
To make sure the notice board is used effectively, it is advised that the lecturer submit information at least once a week. The information put on the notice board can be reminders about assignments, new things that are submitted on the website, changes on the website, etc. It becomes then a weekly routine to look at the notice board. This way the lecturer will not forget to submit important information, and the students will not forget to look at the notice board.

b) It is advised that, when something new is submitted on the notice board, the students receive an email.
This means that the students look at the notice board on time. This is possible if the lecturer makes out of a notice board a discussion board. He has to take the same steps as creating a discussion board; he only names it then 'notice board'.

c) It is advised to submit the newest information on top of the notice board.
This way the students do not have to scroll down to read the new information. This will save time and is more motivating.

2.2.3 Online practice exercises

Results evaluation phase and phase towards the recommendations
The RMME and OTE course did not make use of online practice exercises. The lecturers and the students preferred online practice exercises in an e-learning environment.

Recommendations

a) It is advised to make use of online practice exercises

Tactics for developing online practice exercises
The University of South Australia (UniSA) has a link on their website to a UniSanet author help. This author help has been written to assist the lecturer with building the course website. It provides information on using the UniSanet authoring tools. The link to this site is: http://www.unisa.edu.au/unisanethelp/default.asp

On this site information is provided on how to create online practice exercises. This can be found on the left-hand side of the site, under the button quizzes (this are online practice exercises). The link to this button is: http://www.unisa.edu.au/unisanethelp/quiz/default.asp
The lecturer can find instructional guides on how to create various practice exercises styles. The instructional guides are available in PDF format.
The following instructional guides can be found under this button:

- How to create an Enter Text UniSAnet quiz

- How to create a Fill in the Blanks UniSAnet quiz
- How to create a Match Label Items UniSAnet quiz
- How to create a Multiple Choice UniSAnet quiz
- How to create a Multiple Response UniSAnet quiz
- How to create an Order Text UniSAnet quiz
- How to create a True or False UniSAnet quiz

Once a quiz has been created the lecturer can add the quiz to his website. Under the button Quiz, there are two links about how to add a quiz and how to delete a quiz. These links contain an instruction how to do this.

Marking
It is advised to not mark the practice exercises. It is for the students' own learning, they can make use of the practice exercises if they want to, but it is not compulsory. Another reason for not marking the practice exercises is that it will cost the lecturer a lot of time.

Feedback
It is advised to give feedback on the incorrect answer: Why this answer is incorrect and what do the students have to read/look up to give the correct answer on the question. The UniSAnet author helps the lecturer how to submit feedback to the answers given.

2.2.4 Hyperlinks

Results evaluation phase and phase towards the recommendations
The lecturer and the students preferred the use of hyperlinks in an e-learning environment. With the use of hyperlinks it is easy to find information. The lecturer and the students mentioned that there should not be too many hyperlinks, because the usability of hyperlinks will drop, because the students get lost.

Recommendations
a) It is advised to make use of hyperlinks in an e-learning environment.

Principles of using hyperlinks
Hyperlinks should be clear and explicit, to make the students feel confident in the use of hyperlinks. To make this happen it is advised to keep the following principles in mind, when designing hyperlinks (Scratch media, 2005):

1. Text hyperlinks should be clearly distinguishable from normal text.
2. Hyperlink content should be as short as possible, yet long enough to identify either:
    - Where you will go
    - What you will get
    - What you want to happen
3. Hyperlinks with different targets should be clearly distinguishable.
4. Hyperlinks should give an indication of any unanticipated consequences, e.g.:
    - Links to files
    - Links that open or close windows

Other things a designer of hyperlinks should keep in mind are:
- Expressing size in hyperlinks. The user would like to know roughly how long the download of a file will take: will it be a few seconds, or minutes?

Example: *PDF (46.764 bytes)* (Scratch media, 2005):

- Users should not have the guess where the hyperlinks are, that's why a hyperlink should be coloured and/or underlined (Nielsen, 2004; Scratch media, 2005). The most readable way to render most text is black on a white background, and making text hyperlinks blue (#00f) works very well on white (Scratch media, 2005).
- Assuming the link text is coloured, it is not always a necessary to underline it (Nielsen, 2004).
    - There are two main cases in which one does not have to use underlines: navigation menus and other lists of links. This is true only when the page design clearly indicates the area's function. Users understand a left-hand navigation rail with a list of links on a coloured background, assuming it looks a lot like the navigation areas on most other sites.
    - Exception: underlining is essential if the link colours are red or green. This can cause problems for users with colour-blindness.
    - Exception: underlined links are important for low-vision users' accessibility.
- Do not underline any text that is not a link, even if the hyperlinks are not underlined. This is confusing for the users (Nielsen, 2004).
- Do not colour any text that is not a link (Nielsen, 2004).
- Do not place links so close together that users with reduced motor skills will have difficulty selecting them. These guidelines are particularly important to ensure usability for older users (Nielsen, 2004).

2.2.5 Interactive animations and media

Results evaluation phase and phase towards the recommendations

The RMME and OTE course did not make use of interactive animations and media. The lecturer and the face-to-face and online students thought interactive animations could be useful.

Recommendations

a) It is advised to make use of interactive animations and media.

For the lecturer of the RMME course it can be difficult to develop interactive animations by himself. There are different possibilities to develop the interactive animations:

Possibilities to develop interaction animations

- The lecturer can hire a company that develops the interactive animation for his course.

- The lecturer can hire the Flexible Learning Centre of UniSA to develop interactive animation for his course.

- The lecturer can ask an institute that learn students to develop interactive animation, if the development of animations for his course can be a project for the students

- The lecturer can learn to develop animations for his course. It will cost him time, but in the future he will benefit from it. SEEC does not have to hire a company for instance.
    - There is an online course available about developing interactive animations. This can be found on the following website: http://hotwired.lycos.com/webmonkey/multimedia/animation/tutorials/tutorial1.html.

- This is an animation tutorial, which consists of 7 lessons. The tutorial covers the following:
    1. Lesson 1: Tutorial Overview and Intro to Web Animation
    2. Lesson 2: GIF89
    3. Lesson 3: DHTML
    4. Lesson 4: Flash
    5. Lesson 5: Animation Approaches — Design
    6. Lesson 6: Animation Approaches — Sound
    7. Lesson 7: Animation Approaches — Styles and Integration

- Additional reading
    - Hamlin, J.S. (1999). *Effective web animation: advanced techniques for the web.* Massachusetts: Addison Wesley Longman.
      (This book is available in the UniSA library)

      This book brings one up-to-date with the tools and methods for creating animations that will not block bandwidth space or take forever to download. This book provides an overview of computer animation techniques and information on producing complex, efficient, animation using tools such as GIF, JavaScript, and Macromedia Flash.

Programs to use for developing interaction animations

There are different techniques that can be used to develop animations. One can make use of JavaScript rollovers, animated GIF, dynamic HTML, Macromedia Flash and Macromedia shockwave. The compatibility and performance of the underlying PC is an issue which of the techniques one should use.

GIF

The Animated GIF format can be used for simple animation effects, such as corporate logo's and tag line animations. The Animated GIF format requires no additional software to run. On the other side, GIF format files are raster-based and do not scale well (Williamson, 2000). See table 1 for advantages and disadvantages.

Table 1

Advantages and disadvantages of GIF animation (Hamlin, 1999)

Advantages	*Disadvantages*
Standard file format	Not object-oriented
Ease of creation	No sound
Large number of inexpensive tools available	No to little interactivity
Ease of implementation	Limit of 256 colours per frame
No server configurations needed	Animation is easy to steal.
Portions of animation can be transparent	
Highly compressible	
Many examples on the Web to learn from	
Easily viewed frame by frame in many GIF animation editors	

Flash

Flash can be used for more complexity and where interactivity is a requirement. The benefits of Flash increase as the complexity and size of the animation increases. So, flash becomes the

animation tool for more complex requirements. Flash is now installed on almost 90 percent of PC's worldwide (Williamson, 2000). See table 2 for advantages and disadvantages.

Table 2
Advantages and disadvantages of JavaScript animation (Hamlin, 1999)

Advantages	*Disadvantages*
Interactivity	Easy to steal
Object-oriented	Support only by latest browsers (Netscape3 and later, Internet Explorer 4 and later)
Works with JPEG, GIF, and PNG	Currently only a few tools
Easy to implement	
No server configurations	
Transparency with GIF and PNG	
Variable image quality	

JavaScript
JavaScript is a scripting language and not an animation technology per se. It can be used to implement animation effects, such as interactivity and randomness. A good example of the use of JavaScript, are JavaScript rollovers. The user rolls the mouse over the screen and the images move into view. JavaScript can be used with GIF animations or with static JPEG or PNG images (Hamlin, 1999; Williamson, 2000). See table 3 for advantages and disadvantages.

Table 3
Advantages and disadvantages of Macromedia Flash animation (Hamlin, 1999)

Advantages	*Disadvantages*
Interactivity	Limited interactivity
Object-oriented	Limited scriptability
Works with JPEG, GIF and PNG	Plug-in required
Streaming	Separate utility exposes Flash files to the possibility of theft
Some protection from theft	
Java alternative for plug-in	
Vector-based compression	
Inexpensive	
No programming required	
Ability to script functionality with JavaScript	

2.2.6 Simulations: Role-play & Case-study

Results evaluation phase and phase towards the recommendations
The RMME and OTE course did not make use of role-play and case study. The lecturer and the students preferred simulations, especially role-play and case studies.
One student mentioned that a subject of a role-play in the RMME course could be that the students have to interview each other. In RMME you have to deal with interviewing people, so the role-play could be a good point to practice this.

Recommendations

a) It is advised to make use of simulations, especially role-play and case studies.

Guidelines for using role-play

Role-play will be effective if one runs it in the following way:

Creating the role play

1. The lecturer should familiarize himself with the role-play ahead of time. Underline important information that the role players should emphasize (Reilly, 1999-2005). Brainstorm about several issues to do with the students. Choose one which would make an effective role play. Then choose six to eight roles for students to act out. These roles should be of people who will have different interests in the result of the discussion (McVittie, 2005).
2. Give the role players their parts to read. Each role should be described clearly and in a few words. The students should be able to read over the character descriptions in a few minutes (Reilly, 1999-2005; McVittie, 2005).

Preparing the students for role

3. There are two ways for preparing the students (McVittie, 2005):
   - One way is to give the students a week to prepare themselves for the role. This can be very effective, especially if the lecturer motivates and inspires the class. It can be a pleasant surprise, usually, to see the amount of preparation some of the students do for their roles.
   - Another way is to give the selected students five minutes before the performance, to read over their roles, and discuss their roles with the other members of the role play.
4. Regardless of which way the lecturer prepares his students for their roles, the lecturer should pick who will perform which role. There are two reasons for this (McVittie, 2005):
   - One reason is that the lecturer can have pedagogical reasons for choosing certain students.
   - The other reason is that the lecturer will have many different role plays throughout the term. The lecturer wants to balance the groups who act so that every student has a chance to act. The first role play will involve one or two of the more extroverted students, so that the more shy students will see how easy role plays are before they are forced to act.

The action

5. Just before the role play begins, the lecturer will introduce the role play. The lecturer will explain in the first role play students engage in what role playing is about. This will be less important as the students become familiar with how role plays work (McVittie, 2005).
6. The lecturer will make the problem explicit to your class. Whatever the line of action is, the actors must make a decision about an issue. The issue will be one where the right choice is not clear cut. In other words, your students should be facing a dilemma (McVittie, 2005).
7. The lecturer can set a time limit for the action. If the lecturer is going to set a time limit, he will notify his students of the time limit in advance, and he will also remind them at the point where they must stop action and make their decision (McVittie, 2005).
8. The lecturer takes each role player aside and (Reilly, 1999-2005):
   - Emphasizes the importance of playing the role realistically, and not being overly agreeable or overly stubborn.
   - Asks them to talk to the other role player(s) to get their stories straight.

- Encourages them to show real emotion and to respond naturally to the good and bad things the mediators do.
- Emphasizes the importance of their feedback to the mediators at the end of the role-play, and that their feedback is specific about what and when things were said.

9. The lecturer gives the observers instructions (Reilly, 1999-2005):
   - Take good notes about things that go well and things that go poorly.
   - Be specific about when in the process things happened and what exactly was said.
   - Ask them not to interrupt the role-play, but instead wait until the end to give their feedback.
10. During the role-play (Reilly, 1999-2005):
   - Correct role players if they are not playing the roles appropriately. Note if they are:
     - jumping in and out of character;
     - playing to the audience;
     - trying to constantly "outsmart" the mediators; or
     - being too agreeable or too kind to the mediators.
   - Help role players keep their stories straight. Make a note of new facts they make up in private sessions and be sure they share these facts with the other party.

Case-study

It is advised to keep the following principles in mind, when designing a case study (Herreid, 1997; Herreid, 1998; Driscoll & Carliner, 2005): A good case

- has a specific time frame. A good case is short. It is easier to hold the students' attention for brief moments than long ones. Case studies must be long enough to introduce the facts of the case but not so long as to bore the reader or to make the analysis boring. If one must introduce complexity, do it in stages. First, give some data and then a series of questions and perhaps a decision point before more information is introduced (Herreid, 1997).
- specifies a sequence of events. A good case study tells a story. A good case study focuses on an interest-arousing issue.
- contains a plot structure – an issue (what should be/have been done?). It must have an interesting plot that relates to the experiences of the adult learners.
- is relevant to the reader. Case studies should be chosen that involve situations that the students know or are likely to face. This improves the empathy factor and makes the case study really something worth studying.
- must have pedagogic utility. What functions will the case serve? What does it do for the course and the student? What is the point of the story in the education of the student and is there a better way to do it? When using the case study, it should be made incredibly explicit to the students what is expected from them; what they need to look for, or what they need to discuss afterwards.
- has generality. The lecturer should know what he/she wants to accomplish in the case study: what facts, principles, view points the students should cover.

The lecturer can make a case study him/herself, use a case study of a colleague, or search on the Internet for case studies. When a lecturer types in 'case study' in search engine Google, he/she will get many hits. For example:
http://ublib.buffalo.edu/libraries/projects/cases/case.html.
This is a website from the University of Buffalo. Here one can find case studies from for example the NASA, technology reviews and other scientific case studies. Also hyperlinks to other sites with case studies on it are offered.

According to Palloff & Pratt (2005), the lecturer can also encourage students to bring case studies from their own work or life situations into the (online) classroom. Students receive input from their group-members on potential solutions.

2.2.7 Recorded lectures

Results evaluation phase and phase towards the recommendations of the RMME course
The course did not make use of recorded lectures. The lecturer and the students preferred recorded lectures in an e-learning environment.

Results evaluation phase and the formative evaluation of the OTE course
The course did not make use of recorded lectures. The lecturer and the students preferred recorded lectures in an e-learning environment. The lecturer preferred recorded lectures that are embedded in a PowerPoint slide.

Recommendations
a) It is advised to make use of recorded lectures in an e-learning environment.

Guidelines for recorded lectures
- For each lecture to be recorded (Virtual university, 2005):
    - Prepare a detailed script
    - Prepare slides
    - Prepare graphics (figure, tables, etc., to be provided electronically)
    - Define animations for video insertions where appropriate

- Select the technical recourses that will be used during the lecture (beamer, PowerPoint presentation, whiteboard, computer/laptop) (University of Amsterdam, 2005).

- Restrict the number of sheets up to absolutely necessary minimum for the support and for understand the explanation (University of Amsterdam, 2005).

- Structuring of the content in order to facilitate treating video recordings (University of Amsterdam, 2005):
    - Structure the content in logical components that include an explanation of, for instance a term.
    - Give a clear introduction and conclusion or summary.
    - In case of a continuation college: give a short overview or summary of the previous college to make connection to the new college.

- Presentation during the lecture (University of Amsterdam, 2005):
    - Speak loud and clear', not to fast, however on a natural manner.
    - In case of using a beamer: point on the sheet and not on the screen. This is clearer on the video and gives a quieter picture and overview.
    - Check if the sheet is sharp on the display device.
    - Restrict walking to a minimum. This to avoid that the lecturer runs out of the range of the camera.
    - Avoid the use of two sheets at the same moment; it creates obscurity and is difficult to synchronize with the video in the template.

- The total recorded time of each lecturer should not be too long, around 1 hour (Virtual University, 2005).

- Wherever possible, theory should be explained with the help of examples taken from everyday live (Virtual University, 2005). This fits with the characteristics of adult learners.

- The lecturer is responsible for reviewing the recorded lecture immediately after the recording session to identify any mistake either in content or in delivery and take necessary steps to remove the mistake in the next recording session (Virtual University, 2005).

Recorded lecture with the use of audio

There are different possibilities available to add recorded audio with a lecture:

- Directly into PowerPoint
- Separate WAV files
- Streaming files
    - Combined audio and video
- MP3 files
    - Audio files
- Adding multi-media content

Below, in table 4, the differences between these possibilities will be described (Kasser, 2005):

Table 4

Possibilities of recorded lectures with audio

Possibilities	**Differences**
PowerPoint	- No additional software required - Produces very large files - Sound cannot be edited
WAV files	- Needs recording software - Inexpensive Shareware - Can readily be embedded into PowerPoint - With 3 clicks - 5 second minimal time limitation
Streaming files	- Needs a server - Tends to be real-time - Many producers - Real Media http://www.real.com - Windows streaming files
MP3 files	- Records audio as WAV file(s) - Converts to MP3 - Free Lame software from GoldWave site - Relatively low bandwidth - Voice quality, not CD - Reasonable file sizes - If one file, requires speaking prompts

If the lecturer does not know how to record audio, he/she can contact Joseph Kasser. He is experienced with recording audio and also works at the unit SEEC.

Use of recorded lectures
- The lecturer can submit on his website a whole recorded lecture of about 1 hour.
- The lecturer can submit in the PowerPoint slides of his website, a part of the recorded lecture. These parts explain important information, which is hard to understand for the students without the explanation.
- The lecturer can submit on his website a recorded lecture of 1 hour in two pieces. After the first half our, there are some question for the students to answer. This way, students can see if they have understood the lecture and can otherwise go back and listen again.
- Download time of a recorded lecture.
  When the lessons make use of recorded lectures (video and/or audio), the download time of the different lessons will increase. For some students with a dial-up connection it will be hard to download these recorded lectures. To make sure all the students can make use of the recorded lectures, it is advised that the lecturer gives the students the opportunity to receive the recorded lessons on a CD. This possibility can be announced at the beginning of the course. This possibility can be added to the e-mail about how to log-in and were the students can get help if they cannot log-in.

2.2.8 Live virtual classroom

Results evaluation phase and phase towards the recommendations
The RMME and OTE course did not make use of a live virtual classroom. The lecturer and the online students preferred the use of a live virtual classroom, because it improved the e-learning environment. The lecturer mentioned it will be useful to make use of a live virtual classroom two times in the course, especially for the online students. It will be too time-consuming and expensive to use it much more.

Recommendations
a) It is advised to make use of a live virtual classroom.

Tactics for using live virtual classroom
Tactics for the live virtual classroom can be divided into two groups: communication-based tactics and collaborative-based tactics. In the following section these two tactics will be explained (Driscoll & Carliner, 2005):

Communication-based strategies
Communication-based tactics are good for making learners aware of facts, concepts, principles, and processes.

Lectures
The goal of this is to deliver information to the students, just like in a face-to-face classroom session.

News magazine
The goals of news magazines are to deliver information and, if needed, to motivate the audience to seek additional information by going to a website. One of the advantages of using

the news magazine format in the virtual classroom is the ability to interact with the audience via live questions and answer and to poll the audience for instant feedback.

Talk show
The goal of this is to make a subject-matter expert accessible to students and to communicate information. In the live virtual classroom, the students can send in questions in advance or interact with the guest by asking real-time questions. This format requires planning for the lecturer and the guest. Successfully communication requires sharing the interview questions in advance. It is helpful if the guest supports slides or graphics to his or her responses.

Expert panel
The goal of this tactic is to bring a group op people together to provide a perspective. This can be difficult to do, because the lecturer has less control. Strong facilitation skills are needed to summarize the panel's comments and to manage and direct students' questions to the right panel member.

Collaboration-based strategies
Collaborative learning is defined as a style of teaching and learning where students work in teams toward a common goal. The following strategies rely on some form of collaborative learning or group work. These strategies have consequences in the traditional physical classroom and in most cases the live virtual classroom only changes the medium.

Case study
There are several ways to organize a case study. The easiest way to do this is to provide a short text-based case study as part of the live virtual classroom session. If the case study is more complex and the student has to review number, tables etc, it is advised to send the students these items in advance. Focus the live virtual class time on discussions and case work.

Action learning
In action learning, the students bring a real problem forward that must be solved by the group. Action learning via the live virtual classroom allows learner from different background to come together easily.

Modelling and Role Play
Modelling and role-play-based lesson should be done with small groups, allowing for frequent and active participation, practice and coaching. A live virtual classroom role play differs from a traditional role play in that the live physical aspects such as personal space and overall body language are not visible (most live virtual classrooms are optimized for close-up shots of the learners' face) and the observers are virtual.

Guidelines for designing for the live virtual classroom
When designing a live virtual classroom, there are some guidelines to keep in mind. According to Driscoll & Carliner (2005) that are the following:

- Use a script, like the sample shown in table 5, to plan the program. The script will help determine what graphics are needed, provide a sense of program flow, and provide a rough estimate of timing.
- Keep the program short. There is no exact length of how long or short a live virtual classroom program should be. This depends on the topic, the audience, their level of technical skill, and how much content the lecturer must teach.

- Consider class size.
- Determine how familiar your learners are with the live virtual classroom. The first lesson should allow time to provide an orientation. It is advised that the lecturer introduce the features such as polling, whiteboards, application sharing, assessments, hand raising, feedback, and yes/no responses slowly.
- Becoming a skilled presenter takes time.
- Take time to check in with the audience. Use live virtual classroom tools such as pacing meters, hand-raising, and yes-no buttons to get feedback.
- Start and finish on time. Strive for the discipline needed to start and finish the program on time. This means having the lecturer and program arrive ten to fifteen minutes in advance and someone dedicated to act as time-keeper. It is easy to fall behind unless the script has markers to help the lecturer know how they are doing relative to the absolute time.
- Rehearse the program. Even when the content is familiar to the lecturer, running a rehearsal is important. Without a rehearsal, the lecturer can be surprised by the complexity of the interface and all the places on the screen that need to be monitored. It is also important to make notes during the rehearsal as to where the lecturer will stop and ask for feedback.
- Draft questions for the live virtual classroom. It comes as a surprise to many instructors to find that questions that work well in the traditional classroom such as 'How many of you completed the pre-work?' and 'Are there additional topics you hoped I would cover?' do not work in live virtual classrooms. Questions need to be carefully translated into questions that indicate how the lecturer want the students to respond, for example, 'Please press yes if you completed the pre-work,' and 'Please use the questions dialog box to send me the additional topics you would like to discuss.'

Table 5
Sample Live Virtual Classroom Script

Elapsed time	Time remaining	Event	Audio	Visual	Comments
5 min. prior to start	60 min.	Program opening	Music	Title graphics and call in numbers for - conference call tel. number - help desk tel. number	Make sure the LVC is ready and running 5 minutes before official start time
3 min.	57 min.	Introduction	Host introduces Senior VP of Branch Bank Retail Sales	Photos of host and VP with captions	This program may be delivered three times. The third time the Junior VP will deliver the presentation. Create an alternative slide for this segment.
.	.	.	.	.	.

2.2.9 PowerPoint slides with pictures, graphics and diagrams

Results evaluation phase and phase towards the recommendations of the RMME course
More pictures, graphics and diagrams would help students understand the content better. This way the lessons would fit better with several learning styles. The students and the lecturer said it was important to have more pictures, graphics and diagrams.

Recommendation for the RMME course
a) It is advised to make use of PowerPoint slides with pictures, graphics and diagrams.

Using visuals has several learning benefits (Driscoll & Carliner, 2005):
- Visuals best communicate inherently visual content, such as a product, a process, and the comparison of results.
- Visuals communicate some ideas more efficiently than text.
- Learners remember visuals, especially images they interact with frequently.
- Visuals appeal to the affective domain by gaining and holding attention and by building trust.
- Visuals accommodate learners with a need for visual content.

Guidelines for using visuals
Some guidelines for using visuals according to Driscoll & Carliner (2005) are:

1. Pay attention to aesthetics

Visuals should be simple and contain only necessary elements. There should be a balance in the visual. That is, the different parts of the visual do not compete for the learners' attention. If the visual is showing a procedure or an organization chart, it is advised to reveal the procedure or the organization one part at a time. This is called a build sequence.
When students have finished reading, the next part appears on the screen. It is best to let the students press Enter before the next part appears on the screen. This way, every student can read in his own pace.
In a PowerPoint presentation, avoid annoying effects; items should just appear on the screen.

2. Balance visual appeal with usability

There should be a balance between form and function; students should easily find information of interest and move in this information.

3. Make visuals comprehensible

This can be done by removing irrelevant details from images. This can be done by cropping out irrelevant details in a photo refinishing software programme (like PhotoShop and Microsoft Photo Editor).
Also labelling visuals proper will make visuals comprehensible. Well-placed words help learners properly interpret visuals. For example labelling axes, providing a legend, labelling key parts so students can associate names with different parts of a product or process.

4. Avoid using visuals solely for adornment

If visuals have no educational value they can only distract the students from learning.
One thing to keep in mind is that graphic files have much more data to transmit and, as a result, can load more slowly, especially on dial-up connections. So there must be a balance in the need for graphics with the use of a dial-up connection to the Internet.

To avoid loading times, graphic files should be kept as small as possible. This can be done by limiting the amount of detail in graphics, and by using the JPEG format for photographs in stead of GIF, or other formats.

The advantages of GIF files are (Lynch & Horton, 2002):
- It is the most widely supported graphics format on the Web.
- GIFs of diagrams look better than JPEGs.
- GIF supports transparency and interlacing (Hamlin, 1999).

The advantages of JPEG images are (Lynch & Horton, 2002:
- Huge compression ratios mean faster download speed (the size of JPEG files is smaller than photographs stored in other formats).
- JPEG produces excellent results for most photographs and complex images.
- JPEG supports full colour images.

For more information on visuals, see chapter 13 in Driscoll, M. & Carliner, S. (2005). *Advanced web-based training strategies. Unlocking instructionally sound online learning.* Pfeiffer: San Francisco.

2.2.10 Classroom Discussions

Results evaluation phase and phase towards the recommendations
The students preferred the use of classroom discussion. The students and the lecturer found classroom discussion very important, so they can hear somebody else's opinions.

Recommendation
a) It is advised to make use of classroom discussions.

Types of class discussion
Dempster and Raff (1992) mention that there are two basic types of class discussions: open ended and problem solving.

Open ended discussions:
In open ended discussions the topics are usually general in nature, even though they may be controversial. They should provide possibilities for discussion where any numbers of possible outcomes are acceptable. The topics can be varied on current events and interests of the students. There is no need to draw a conclusion at the end of these discussions, because they are open ended (Dempster & Raff, 1992).

Problem solving discussions:
Problem solving discussion can be used in a variety of situation, but must have an outcome which should be understood and accepted by all members of the group. When problem solving discussions turn up with answers/solutions, these solutions should be realistic (Dempster & Raff, 1992).

Tactics for using classroom discussion
When having a classroom discussion, the following tactics make a classroom discussion effective:

1. Set clear expectations for student participation in discussion sessions.
The lecturer lets the students know, on the first day of class, if a portion of their final grade for the course will be based on how effectively they participate in class discussion sessions. The lecturer can specify a class rule like "The students are not allowed to say 'I do not know' in this class when asked a question." The students are not required to *know*, but they are expected to *think*. So if the lecturer asks a question and the students does not know the answer, he/she is responsible to think of an answer, to guess, to speculate, to wonder aloud (Barton et al., 2005).

2. Break the ice with informal talk outside of class.
Informal "small talk" may help break the ice before a discussion, and a relaxed and comfortable student will regularly tend to add her or his opinions to the conversation (Barton et al., 2005).

3. Control and use classroom space strategically.
Krahnke (English Department, Colorado State University, In Barton et al., 2005) and Dempster and Raff (1992) mention it is important that the students put their desks in a circle or horseshoe shape. This prevents them from hiding in corners or behind other students' bodies. The circle improves communication by allowing them to see each other's faces and hear each other's responses.
The circle or horseshoe shape also allows the teacher easier physical access to students than does the narrow passages of the row/column grid.

4. Participation.
According to Barton et al. (2005), the role of the lecturer is also to ensure that everyone is participating and ensuring that no-one dominates the discussion. Krahnke (English Department, Colorado State University, In Barton et al., 2005) suggests that establishing eye contact opens a communication channel. If the lecturer makes eye contact with the students in class, they are more likely to stay involved—and if they are not involved, he will know it immediately.

5. Avoid open questions; call on individual students.
Krahnke (English Department, Colorado State University, In Barton et al., 2005) suggests using direct questions to specific students and distributing turns around the room. This will increase the number of students who participate. If the lecturer consistently asks questions that are open to anyone in the class to answer, that will allow the hyper-verbal students to dominate and allows others to hide (Barton et al., 2005).

6. Ask good questions.
The kinds of questions that are asked can make all the difference between an effective and ineffective discussion. It is advised that the lecturer writes down a script of questions he wants to ask during a class discussion, being open, so there is the possibility to move away from the plan.

Barton et al. (2005) suggest to avoid some forms questions:
- The "Guess What I'm Thinking" Question - in which the teacher asks a question to which he or she already has a specific answer in mind. This makes "class discussion" into mind reading for students. Questions like "What *should* Mark have done to improve his focus?" asks the students to guess at the answer hiding in the lecturers head, whereas "What *could* Mark have done to improve his focus?" asks for their input.

- The Yes/No Question and the Leading Question - in which the teacher's question can be answered with a simple yes or no, which stops a discussion.
- The Information Retrieval Question - in which students are asked to simply look in the text at hand, find specific, concrete information, and bring it back to the teacher.

7. Concluding the discussion

The lecturer's role is to bring the discussion to a positive close. This can be done by summarising the discussion or clearly state the final agreed solution in a problem solving discussion (Barton et al., 2005).

2.2.11 Group-work

Results evaluation phase and phase towards the recommendations

Group-work was not working effective. The students found it difficult and the discussions did not contribute to their learning process. The students did prefer working with other students. The students and the lecturer found group-work very important.

Recommendations:

a) It is advised that at the beginning of each course some time is spent on how to work effectively in groups.

The students should encourage and stimulate each other in the group to have meaningful discussion. The atmosphere should be one in which the students want to learn from each other and share experiences, not to keep everything for themselves. Students should be made aware of the fact they are expected to have a pro-active attitude and contact each other to discuss topics. They should not wait until the lecturer tells them.
Group-work can be a key factor in making distance courses as good as or better than face-to-face courses (Hiltz & Wellman, 1997, In Turoff, Discenza & Howard, 2004).

Benefits group-work

Turoff et al. (2005) name several benefits of group-work:

- Due to social pressures, students tend to be more concerned with how other students view their work quality than how the lecturer views it. They are significantly more motivated to participate in a meaningful way when their fellow students can view their contributions.
- When equality of communications is encouraged, students cannot get away with being passive or lazy. The transcript or electronic recording of the discussions on the discussion board shows who is and who is not participating. It is visible to both the lecturer and other students that someone is being lazy.
- It becomes more noticeable what the outstanding students learn.
- The performance of students at the lower end of the distribution is improved. The communication systems permit them to catch up, because they are able to obtain a better understanding of the material with which they are most uncomfortable or have the least background knowledge.

The lecturer can use the document made by the Learning Connection of the University of South Australia about group-work:
http://www.unisanet.unisa.edu.au/learn/learningconnection/?PATH=/Resources/workshop%2Dteams/Working+in+teams/&default=Welcome.htm

b) It is advised to submit a document in the e-learning environment of how to work effectively in groups.

Every student should have access to this document. To make sure every student reads this, the lecturer can say in the meetings and write on the website in the schedule 'To improve your grade – download these papers and read them.' This gives the students a reason to read the documents. The hyperlinks below provide a good guidance for working in groups. The first is made by the Learning Connection of the University of South Australia:
http://www.unisanet.unisa.edu.au/learn/learningconnection/?PATH=/Resources/workshop%2Dteams/Working+in+teams/&default=Welcome.htm

A second hyperlink leads to a document also used by Joseph Kasser, a lecturer of unit SEEC, in his distance courses:
http://web.cba.neu.edu/~ewertheim/teams/ovrvw2.htm#effect
The lecturer can choose which hyperlink he wants to submit in his course.

c) It is advised that the lecturer stimulates group-work, by showing interest in how the group-work is progressing.

In the meetings the lecturer can walk to each group and ask how the group-work is going, if there are any problems. When working on the tutorials and for the online students, the lecturer can call different members of the groups and ask them how the group-work is going. By calling different members in a group, and not always the same person, the lecturer gets a good idea how the group-work is really going.

d) It is advised that halfway trough working in groups in the course, the students fill in a questionnaire about collaboration.

The questionnaire is provided below in table 5. When using this questionnaire, students have to think about how the group-work is going and what their own role is in the process. When necessary they can change things for the rest of the course to make the group-work, go better. The lecturer can stimulate the students to reflect on the group-work, by making it clear to them at the beginning of the course that they can improve their grade by participating active in group-work and when they fill in the collaboration questionnaire. When they submit a filled in questionnaire in which it is clear that they have really done their best to reflect on how the group-work is going, this will be 2% of their grade. By giving the students a grade for filling in the collaboration questionnaire, they are more willing and motivated to do it. It is recommended that the collaboration questionnaire will not be marked, but that it is compulsory. The Collaboration questionnaire should be printed on one A4, with a front and a backside.

The inclusion of reflection on the application of the collaborative group-work in a (online) class can help to develop skills students need to lead or function in a virtual team in the work environment (Palloff & Pratt, 2005). Reflection can promote the further development of one's skills or individuality. Mathews and Sayers (1997, In Vos & Vlas, 2000) say: "If you always do what you have always done, you will always get what you always got". Without reflection, without looking back at your own actions (experiences, activities), ideas (knowledge, insights) or attitude (emotions, feelings), no-one gets easy sight at and insight in his own possibilities, and without that no-one can develop his/her competences further, in the sense of: completing, improving, replacing, fitting or combining with other operations, ideas and attitudes (Vos & Vlas, 2000).

Reflection topics

Topics to reflect on, mentioned by Reed and Koliba (1995), can be:

- **Establish goals**: When starting to work in groups, first some basic rules and goals have to be established like the teams' vision or strategy, how work will be divided, who the team leader is and how group members are going to communicate.
- **Create a safe space**: The key to open and honest reflection is an environment in which participants feel safe and comfortable. In order for group members to express their thoughts and opinions they must feel that they can do so without fear of attack or criticism (Palloff & Pratt, 2005). Participants who feel safe are more likely to make honest and genuine contributions and to feel solidarity and respect towards other group members.
- **Manage disagreements**: It has been said that "whatever resists will persist." Each group member should look at recognizing tension building in the group, and respond to it immediately. Among the most useful strategies is to repeat the ground rules established by the group (Palloff & Pratt, 2005), including a reminder that criticism should relate to ideas not to people. It is important that negative behaviour is handled immediately so that participants do not get the impression that the negative behaviour is ignored and therefore tolerated.
- **Promote equality**: Equality of participants should be communicated and modelled by all participants. It should not be permitted that group members are arguing up against any group member(s), and should not take sides in any developing debate. Such situations can be counteracted by recognizing all members, and encouraging their participation equally (Palloff & Pratt, 2005).
- **Be mindful of power, and who has it**: All groups have opinion leaders or people who most others look up to. Often, these opinion leaders will set the tone for a discussion, thereby limiting active involvement of the more reserved members. Therefore it is important that other opinions are heard too.

Other topics one can reflect on, mentioned by Palloff and Pratt (2005) and Reed and Koliba (1995), are:

- knowledge of the group
- keeping the group on track
- avoiding/ not avoiding topics
- dealing with disagreements
- encouraging challenging issues

Collaboration questionnaire

Students can use the questionnaire in which the previous literature is combined (table 6). This questionnaire is based on the Collaboration Questionnaire on Assessment provided by Palloff and Pratt (2005, p. 52):

Table 6

Collaboration questionnaire

Collaborative factors	*Strongly agree*	*Somewhat agree*	*Neither agree nor disagree*	*Somewhat disagree*	*Strongly disagree*
We established common goals.					
We communicated well as a team.					

We dealt well with disagreements in the group.					
Group discussions were contributing to my learning.					
We chose a leader without difficulty.					
Everyone contributed equally to the final product.					
We had adequate time and resources to complete our task.					
I was satisfied with the way we worked together.					
I was satisfied with the final outcome.					
I feel that I learned from the group-work activities.					
Please add some comments on why you think some collaborative factors went well:					
Please add some comments on why you think some collaborative factors didn't went well:					
Please add some comments on how you think you can improve the group-work:					
Please add here any other comments about the course:					

2.3 Recommendation with respect to feedback

This section will discuss recommendations about improving feedback for the RMME course.

Results evaluation phase and phase towards the recommendations of the RMME course
Feedback on assignments was not always timely. The students did not get any marks back yet, so they did not know how far learning had progressed. Students did not always receive personalized feedback from the lecturer. The overall course did not contribute to the online students' knowledge and/or basic skill base. The students and the lecturer found feedback in the right way and at the right time really important.

Recommendations for the RMME course

a) It is advised to answer e-mails or phone calls within 3 business days.
This should give the lecturer enough time to think about the question. The lecturer may be very busy when he gets the e-mail or phone call, but it should be possible to answer the questions within 3 days. For students, 3 business days is not too long. If it takes more than 3 days for the lecturer to answer questions, students may get de-motivated and not want to finish the assignment on time.

b) It is advised to mark assignments within 3 weeks.
Lecturers can be very busy with other things, but they made the schedule of the course, so they know when students deliver something that has to be marked. Marking can take a lot of time, but 3 weeks should be enough. For students it is important they get a mark back on their work, as soon as possible. Otherwise the effect of the feedback is gone (Desimone, Werner & Harris, 2002). Students need to know how they did it. This keeps them motivated (Desimone et al, 2002). If they do not get a mark back, or only after 2 months, then students do not know what they have submitted and it is not really relevant for them anymore.

c) It is advised that the feedback is constructive.
Feedback should not only be negative, students need to know what can be improved. Here, it is also important that they need to know how it can be improved. Students also need to know what they did well and why it is good (Palloff & Pratt, 2005). So, the feedback needs to be informational (Desimone et al., 2002). According to Van Dellen (2001, In Kessels & Poell, 2001), good feedback promotes effective learning.

d) It is advised that every student receives personalized feedback on their assignments.
This is important, so students know where they are in their learning process. When they only get general feedback, they cannot do that.

e) It is advised that general feedback is submitted on the discussion board.
This way all students can read it. This is important, because if general feedback is told in class, then the online students and the students who could not attend the meeting did not hear it. When students start working in the next assignment they can read the general feedback again and keep that in mind while they are working on the assignment.

2.4 Recommendation with respect to assignments

This section will discuss recommendations about improving the assignments for the RMME and OTE course.

Results evaluation phase and phase towards the recommendations
It is not clear for the online students what was expected from the assignments. The students and the lecturer found it important that assignments are clear and explicit.

Recommendations

a) It is advised that the written material is more explicit as to what steps need to be taken to complete the assignments.

This way the online students know better what steps they need to complete to finish the assignment. Palloff and Pratt (2005) suggest that when a lecturer submits the question 'Is everyone clear about the assignment task?' on the discussion board, this will free the students up to ask questions that they might otherwise be embarrassed to ask. In this way bad assignments submitted by students can be prevented.

b) It is advised that the lecturer submits extra information concerning the assignments on the discussion board.

This recommendation is especially important when in the face-to-face classroom sessions there have been several questions about the assignment, or when he receives e-mails or phone calls with the same questions in it. If the lecturer submits this information on the discussion board it can be accessed by all students and especially for the online students this is useful.

2.5 General recommendations

In this section some general recommendations are discussed, that are usable in both the RMME and OTE course, and they are also usable in other courses.

2.5.1 Course explanation

Results evaluation phase and phase towards the recommendations
It was not clear for the students what they should expect of the course, before the course started.

Recommendations

a) It is advised to submit more detailed course information on the universities website.

Students have a look at the universities website to find out more about the course. This information helps them make a decision of what wish to enrol. Especially for elective courses this is important. But for compulsory courses it is also important that students know what to expect. This way, students can make a better decision.
Information on the universities website should contaIn

- Aims and objectives of the course;
- List of lessons and the topics that are going to be discussed in those lessons;
- How many face-to-face meetings there are;
- How many assignments there are in this course;
- A short description of the assignments; and
- The amount of group-work and individual work.

2.5.2 Course website (e-learning environment)

Results evaluation phase and phase towards the recommendations
The buttons of the website for each course were not in the same order. The course outlines did not use the same format and this can be confusing for the students. The students and the lecturer thought it was important that every course puts the buttons in the same order and that every course uses the same format.

Recommendations
a) It is advised to put the buttons in the same order.
b) It is advised to use the same format for the course outline.

Buttons
In table 7, the order for the buttons is provided. This order can be used by all the courses within SEEC.

Table 7
Order of the buttons

RMME	**OTE**
Sitemap	Site map
Notice board *1	Notice board *1
Welcome	Welcome
Preparing for online learning - Website information - Getting help	Preparing for online learning - Website information - Getting Help
Contacts - Staff contact - Student contact	Contact - Staff contact - Student contact
Course information - Course outline	Course information - Course outline
Assessment - Tutorial 1 - Tutorial 2 - Etc	Assessment - Tutorial 1 - Tutorial 2 - Etc
Lessons *2 - Lesson 1 - Lesson 2 - Etc.	Lessons *2 - Lesson 1 - Lesson 2 - Etc.
Additional resources - Additional text - Websites - Etc	Additional resources - Additional text - Websites - Etc
Discussion page	Discussion page
Future Directions & Summary	
Sample Proposals	
Help	Help

*1

It is advised that the notice board is the first thing that opens when the students visit the course website. This way the students see immediately if something new is submitted or changed on the website.

*2

Under the button lessons the students can find a table like followed:

#	Date (and place)	Theme	Readings	Lecture options
1	25-10-2005	Qualitative research	Chapter 1 Driscoll & Carliner Article: ….	PowerPoint slides Recorded lecture Practice exercises
.	.	.	.	.

It is advised to hyperlink the readings and lecture options, so it is easy to access for the students.

Course outline

It is advised to use the following contents for the course outline document of the different courses:

- Welcome
- School contact details
- Course statement
- Learning objectives
- Unit value of course
- Graduate Qualities profile
- Text(s
- Course home page
- Extra course information
- Other resources
- Assessment summary
- Assessment details
- Important information about all assessment
- Students with disabilities
- Submission and return of assignments
- Referencing
- Re-Submissions
- Extensions
- Return of Assignments
- Evaluation of the course

2.5.3 Delivery environment

Results evaluation phase and phase towards the recommendations

The students and the OTE lecturer preferred a blended learning environment. The RMME lecturer did not prefer a blended learning environment; he preferred a synchronous face-to-face delivery environment. This is not possible, because there are also students who follow the course only online. Blended learning is than a good alternative.

Recommendations

a) It is advised to have more face-to-face meetings for the OTE course.

Students can meet and interact with each other in face-to-face meetings. They think that is very important. Now the OTE course is offered as an online course, but students would like to have face-to-face meetings. The OTE lecturer offered a couple of workshops in his own time, this is really helping the students; they would like to have them even more.

2.5.4 Access e-learning environment

Results evaluation phase and phase towards the recommendations

Some students have problems with log-in. The students and the lecturer found it important that students know who they can contact if that happens.

Recommendations

a) It is advised that the lecturer send all the students an e-mail at the beginning of the course to check if the students can log-in and if they have problems with this, who they can contact. Students should all respond to this e-mail.

This way the lecturer knows if the students can log-in, and gives them help if they cannot do this. If students have problems with log-in during the course, they know who they can contact and do not have to spend a lot of time searching in the universities website for a contact person.

2.5.5 Delivery of learning material

Results evaluation phase and phase towards the recommendations

Lectures/resources get delivered a week before the lessons, that is too late. Because of their busy work schedule students are having difficulties to plan everything in. They can get behind because of this. The students and the lecturer thought it could be helpful for the students when material is delivered two lessons ahead.

Recommendations

a) It is advised to deliver the learning material two lessons ahead.

This way the students can schedule their studies better into their work schedule, but cannot work too far ahead.

3 Planning

In the previous chapter the conclusions of the different activities and the belonging recommendations for each course and some general recommendations were presented. This chapter will elaborate on the planning for the recommendations. A distinction is made between planning while the course is running (section 3.1), a short term planning (section 3.2) and finally, in section 3.3, a long term planning is presented.

3.1 Planning while the course is running

There are a lot of suggested recommendations that need to be taken care of while the course is running. These recommendations are scheduled in table 8.

Table 8
Recommendations scheduled in the course

Recommendation	***Explanation***	***Who is responsible?***
It is advised that the lecturer makes a place on the discussion board where students have to submit in short their personal background information.	Students need to submit their personal information at the beginning of the course, so they can use this information during the rest of the course	Students are responsible, but the lecturer should encourage students to do this and make it compulsory.
It is advised that the lecturer calls the online students at least one time during the course.	This has to be done during the course, so the lecturer should organize some time in his agenda to do this.	The lecturer.
It is advised that the lecturer uses the students' background information in the material, so that especially the online students can relate to it.	Once the students have submitted their personal background information, the lecturer can have a look at these and use them for examples, or explaining something.	The lecturer.
It is advised that the lecturer stimulates the students more to use the discussion board by: - Submitting general feedback on the discussion board. - Submitting relevant questions, asked by one student via for example e-mail or in the face-to-face meetings, on the discussion board. - When a student places a question on the discussion board, it is advised that the lecturer gives the other	This can only be done during the course, when students have submitted assignments, or have questions about the lessons/tutorials.	The lecturer.

students opportunities to answer that question. - It is advised that the lecturer respond after a couple of days (for example at the end of the week) to the answers given by the student.		
It is advised to keep the notice board up-to-date	Every week some new information should be submitted.	The lecturer.
It is advised to make use of a live virtual classroom.	The live virtual classroom is held during the course. Once the students have enrolled they can start making arrangements for participating in the live virtual classroom. The lecturer should prepare the live virtual classroom.	The students have to make sure they are available at the suggested date and arrange the facilities for them to participate. The lecturer is responsible for coming with a date to hold the live virtual classroom at a proper time. He is also responsible for the way the live virtual classroom is going.
It is advised to make use of classroom discussions.	A discussion is held during the course, when a question was asked, or when students have a different opinion about a topic.	It is the lecturer's responsibility to ensure that no-one is dominating the discussion and that everyone is participating. He has to make sure the discussion comes to a positive end. It is the responsibility of the students to participate active in classroom discussions and to make sure that everyone can say what he wants to say.
It is advised that at the beginning of each course some time is spent on how to work effectively in groups.	This is scheduled in the first meeting. The lecturer has to prepare himself for this.	The lecturer.
It is advised that the lecturer stimulates group-work, by showing interest in how the group-work is progressing.	This is something the lecturer has to do when the students work on the tutorials, so this can only be done during the course.	The lecturer.
It is advised that halfway of working in groups in the course, the students fill in a	This is done during the course. Students cannot know how group-work is	The lecturer is responsible for making sure that the students know they have

questionnaire about collaboration.	going before the course.	to fill the questionnaire in. The students also need to know where they can find this questionnaire. The students are responsible for filling the questionnaire in as honest and serious as they can.
It is advised to answer e-mails or phone calls within 3 business days.	This is necessary when students send an e-mail or phone during the course.	The lecturer.
It is advised to mark assignments within 3 weeks.	This is during the course, because students make assignments during the course.	The lecturer. He has to create time in his agenda before the course starts, so he can be sure that he can mark the assignments within 3 weeks after they have been submitted.
It is advised that the feedback is constructive.	This can only be done during the course, when it is necessary to give feedback.	The lecturer is responsible for giving constructive feedback.
It is advised that every student receives personalized feedback on their assignments.	This should be done during the course, because students make assignments during the course.	The lecturer.
It is advised that general feedback is submitted on the discussion board.	This can only be done during the course, when it is necessary to give feedback.	The lecturer.
It is advised that the lecturer submits extra information concerning the assignments on the discussion board.	This can only be done during the course. The information concerning the assignments was put on the course website before the course started, so only extra information has to be added. For example when the same question is asked by the students, it is better to put the question and the answer on the discussion board.	The lecturer. He has to think if it is a relevant question for all students. Also when a question was asked in class and this can be a relevant question for the online students as well, the lecturer is responsible for putting the question and the answer on the discussion board.
It is advised that the lecturer sends all the students an e-mail at the beginning of the course to check if the students can log-in and if they have problems with this who they can contact. Students should	This has to be done first thing when the course is running.	The lecturer is responsible for sending the e-mail to all students. He should also watch if every student sends an e-mail back. The students are

all respond to this e-mail.		responsible for checking if they can log-in and then sending an e-mail back to the lecturer.
It is advised to deliver the learning material two lessons ahead.	This is while the course is running. The first two lessons have to be made available before the course starts.	The lecturer.
It is advised to make use of recorded lectures in an e-learning environment (video).	During the course, while the lecturer is giving the lecture, he can tape the lecture. He can put this the next day on the course website. This can't be done before the course starts, because the lecture has to be taped.	The lecturer.

3.2 Short term planning

Some recommendations do not need months of planning, but they need to be planned in before the course starts. These recommendations still need a lot of thorough thinking and are presented in table 9.

Table 9
Recommendations before the course starts (short term)

Recommendation	*Explanation*	*Who is responsible?*
If something new is submitted on the notice board, the students receive an email.	This lecturer makes out of a notice board a discussion board. He has to take the same steps as creating a discussion board; he only names it then 'notice board'. The setting of the notice board has to be that way that when something is submitted, an e-mail is send to the students. This setting can be done before the course starts.	The lecturer and the students. The students can indicate on the notice board if they want to receive an e-mail.
It is advised to submit the newest information on top of the notice board	The setting of the notice board has to be that way that when something new is submitted, this comes on top of the notice board. This setting can be done	The lecturer.

	before the course starts.	
It is advised to make use of hyperlinks in an e-learning environment.	Before the course starts, the lecture has to look for good websites and add the hyperlinks in the course website. This may take some time, but is does not need a planning months before the course starts.	The lecturer.
It is advised to make use of simulations, especially role-play and case studies.	Before the course starts, the lecturer has to think of a role-play or a case study. Or he has to look on the Internet for examples of them. The lecturer should also work them out, so they are ready for use, also for the online students.	The lecturer.
It is advised to make use of recorded lectures in an e-learning environment (audio).	The lecturer has to create a script and a PowerPoint presentation. The lecturer can create these before the course and post them in the course website. He has to do this before the course starts, so he can take the time to make sure the lecture is recorded well. If the lecturer does not know how to do this, he has to make sure he gets this knowledge.	The lecturer.
It is advised to make use of PowerPoint slides with pictures, graphics and diagrams.	The lecturer should think about the way he puts the information in the PowerPoint slides. They have to be short, but still clear enough for the online students to understand them. He has to think about what pictures, graphics and diagrams he is going to put in, and look the right ones up on the Internet or in own files.	The lecturer.
It is advised to submit a document in the e-learning environment of how to work	The lecturer has to decide what document he is going to put on the course	The lecturer.

effectively in groups.	website. He can submit this document in the course website before the course starts.	
It is advised that the written material is more explicit in what steps have to be done to complete the assignments.	The lecturer creates the assignments before the course starts and he adds the assignment to the course website before the course starts. The written material should be made clearer.	The lecturer.
It is advised to submit more detailed course information on the universities website.	This is done before the course starts, because this information makes the students do the course. The information also helps the students to know what they can expect from the course.	This cannot be done right now, so it is necessary that the LMEF program director, dr. Tim Ferris, makes clear to the people higher up that it is necessary to put more information on it. Once this is possible, it is up to the lecturer to do this.
It is advised to put the buttons in the same order.	When the lecturer is creating the course environment, he should have a look at the right order for the buttons.	The LMEF program director, dr. Tim Ferris, has to make sure everyone has the right order for the buttons. The lecturer is responsible for using the right order.
It is advised to use the same format for the course outline.	When the lecturer is creating the course environment, he should have a look at the format he uses.	The LMEF program director, dr. Tim Ferris, has to make sure everyone has the right format. The lecturer is responsible for using the right format.

3.3 Long term planning

The recommendations presented in this section are recommendation that need a lot of time preparing them, or the recommendations need to go through an administrative process. This can take months and after the administrative approval the recommendations need preparing time before they can be used in the course, (see table 10).

Table 10
Recommendations before the course starts (long term)

Recommendation	*Explanation*	*Who is responsible?*
It is advised to structure the discussion board by lesson.	This recommendation is not possible yet. The	The program director of the LMEF Masters

	Flexible learning Centre can make it possible to structure the discussion board, but they need approval from higher up. Somebody has to go to these people and ask for this approval.	program, dr. Tim Ferris, should go higher up and ask for approval. The Flexible Learning Centre has to make it possible for the lecturer to create these folders in the course website. When this is done, it is the lecturers' responsibility to create these folders.
It is advised that all students and the lecturer receive an e-mail when something has been submitted on the discussion board.	This is not possible yet, but the Flexible Learning Centre can do this. They need approval from higher up. Somebody has to go to these people and ask for this approval.	The program director of the LMEF Masters program, dr. Tim Ferris, should go higher up and ask for approval. The Flexible Learning Centre has to make it possible for the lecturer to put this option in for the students. The students have to take responsibility and make sure they choose the option that suits best for them.
It is advised to make use of online practice exercises.	It can take a lot of time to create a quiz or another online practice exercise. This is something the lecturer should really take time for.	The lecturer.
It is advised to make use of interactive animations	These animations have to be created. This can be done by the Flexible Learning Centre, another company or by the lecturer himself. The lecturer really needs to think what kind of animation he would like to have. This has to be done carefully and thoughtfully. If he is going to make an animation himself, he needs to learn how to do this.	The lecturer has to come up with an idea for an interactive animation. The Flexible Learning Centre, another company or the lecturer himself is responsible for creating it.
It is advised to have more face-to-face meetings for the OTE course.	DSTO does not want to offer the courses face-to-face to all students, so some students have to do the courses online. This is	The contact person of unit SEEC for DSTO, A/Prof. David Cropley, should do these negotiations with DSTO.

	something that should be discussed with DSTO, but this takes a long time of negotiating.	

4 Costs

For a good realisation of the implementation plan it is needed to have some insight in the costs involved in the suggested improvements. These are appointed in this chapter, split up to non-recurrent (section 4.1) and structural costs (section 4.2).

4.1 Non-recurrent costs

The lecturer can create online practice exercises by himself. He can do that by attending a workshop offered by Learning Centre (given by Jodi Smith). This workshop can be attended for free. The lecturer can learn how to make an online practice exercise by doing a self-guided workshop on the Internet. Links to these workshops were provided in chapter 3. These self-guided workshops are for free. If the lecturer wants to do a professional workshop though, it will bring extra costs with it.

The lecturer can create an interactive animation by himself. He can use the link provided in chapter 3 to do a self-guided, free workshop. It will take several hours before the lecturer knows how to create an interactive animation. And after that it will take the lecturer more hours to come up with an idea for the animation and even more hours to create his idea. But when this is all behind, the animation can be used a long time.
If the lecturer hires a company like the Flexible Learning Centre to make an interactive animation, it will cost a reasonable amount of money. The costs depend on how big the animation is and how much time the designers spend on making the animation, but it can vary from AUD 1000 and AUD 10.000.

4.2 Structural costs

Calling students up, especially online interstate students, costs money. This can become a real cost, because these conversations can last for 20 minutes.

The use of a live virtual classroom will lead to costs made every time the course is running. The technical side needs to be paid (phone bill and if not available, the technical support to do a live virtual classroom) and the room needs to be reserved.

When more practice exercises are submitted in the course website, this may increase downloading time and time that the students spend on the Internet. This will increase their costs. For students who have a dial-up connection, this can be a negative side to the recommendations. The same can be said about recorded lectures with audio or video. But students can download these files at work, to decrease the downloading time at home and their costs.

When more face-to-face meetings are offered, it will bring more costs for the client, because the lecturer has to be paid for those hours. Students will most likely learn more though when they have face-to-face meetings.
Adding recorded lectures with audio or video in the course website can be a structural cost. It depends if the lecturer changes things between two courses about the PowerPoint slides. If he changes things (and that is most likely), he has to make sure the PowerPoint slides and the belonging audio are still up-to-date. The same can be said about recording with video. The

lecturer has to arrange a camera and somebody who can look after the filming while the lecturer is presenting. This person can be a student or somebody from the supporting staff.

Other costs that should be considered is that the majority of the suggested recommendations take more time for the lecturer to prepare the course and to work on the course while it is running. This does not really cost more money, but because of this he can do less to other courses or other projects. This may cost money in the end.

When the lecturer decides to give all students a Compact Disk (CD) with the PowerPoint slides that contain audio and video, assignments, articles and references, these need to be bought. These CD's need to be burned, this costs time and time is money. The lecturer can burn it, but he can also ask somebody of the supporting staff to do it for him. The distribution of the CD's is also a cost factor, because all the interstate students need to get it by post. The local students can receive the CD in the first meeting, but still, when students cannot attend the first meeting, then they need to get it by mail as well.

5 Risks

To implement the suggested recommendations within the two courses RMME and OTE, and also within unit SEEC, the chance of succeeding depends mostly on the time and effort spent by the lecturers on it. The succeeding of the recommendations depends on these critical factors. Another critical factor is money. In this chapter these critical factors are discussed.

The self-guided workshops and the workshop run by the Learning Centre do not cost money. The making of an interactive animation can be practiced for free via the suggested links in chapter 2.
Lecturers can use each others knowledge. The lecturer of the OTE course has experience in making recorded lectures with audio in it. Both lecturers can go to their colleague A/Prof. Joseph Kasser. A/Prof. Joseph Kasser has a lot of experience and knowledge about distance learning.

When lecturers want to qualify themselves in making interactive animations, recorded lectures or online practice exercises such as quizzes, they must take the time to really learn. If they need to do a workshop, they should make that effort and do that workshop. Thinking of an idea for the practice exercise or an interactive animation takes a lot of time, even more when the lecturer is going to create it himself. He should be realizing that and take that time.

When students have submitted their personal background information, the lecturer should make the effort to read this information and deal with it in examples or explanations.

Stimulating the use of the discussion board is a recommendation that can only succeed if the lecturer makes the effort to do the advised recommendations.
The lecturer is the one who has to spend some time on structuring the discussion board into folders. If he does not do this, nobody will.

The big risk is that the lecturers start preparing and organizing the course one or two weeks before the course starts. This is too late for most recommendations. As was shown in chapter 3 of this implementation plan, some recommendations need a long term planning and some a short term. Even when the course is running, a lot of time has to be spend on keeping all the information up-to-date and as recent as possible. The lecturer also has to make sure that he responds to questions within 3 business days and that he marks assignments within 3 weeks. If the lecturer does not take these recommendations into account, and does not plan this in his personal agenda, or just does not do these, then the recommendations are most likely to fail.

When using these recommendations it is important to keep in mind that the next time when the course is running, some recommendations can be hardly used. Lecturers can then think of removing for example the practice exercise, or the recorded lecture with video. But the students in the course after the first course can have totally different learning styles. They may prefer to use online practice exercises, or learn a lot from interactive animations.

6 References

Barton, J., Heilker, P. & Rutkowski, D. (2005). *Fostering effective classroom discussions.* Retrieved October 19, 2005, via Virginia Tech: http://www.mhhe.com/socscience/english/tc/discussion.htm.

Brennan, R.E., McFadden, M. & Law, E. (2001). *Review of research. All that glitters is not gold: online delivery of education and training.* Leabrook: NCVER.

Dempster, M., & Raff, D. (1992). *Class discussions: a powerful classroom strategy.* Australia: Hawker Brownlow Education.

Desimone, R.L., Werner, J.M. & Harris, D.M. (2002). *Human Resource Development.* Third edition. Harcourt College Publisher: Orlando.

Driscoll, M & Carliner, S. (2005). *Advanced web-based training strategies.* San Francisco: Pfeiffer.

Hamlin, J.S. (1999). *Effective web animation: advanced techniques for the web.* Massachusetts: Addison Wesley Longman.

Herreid, C.F. (1997). What makes a good case? Some basic rules of good storytelling help teachers generate student excitement in the classroom [electronic version]. *Journal of College Science Teaching*, *(12)* 163-165.

Herreid, C.F. (1998). Return to Mars. How not to teach a case study [electronic version]. Journal of College Science Teaching, (2). Retrieved at October 10, 2005, from: http://ublib.buffalo.edu/libraries/projects/cases/teaching/mars.html.

Kasser, J. (2005). Professional Teaching Practice Workshop: Think async!

Kessels, J.W.M. & Poell, R.F. (2001). *Human Resource Development. Organiseren van het leren.* Samsom: Groningen.

Lynch & Horton (2002). *Use for GIF and JPEG files*. Retrieved October 15, 2005, from http://www.webstyleguide.com/graphics/summary.html

Massachusetts attorney General's Office. Retrieved October 18, 2005, from: http://www.ago.state.ma.us/sp.cfm?pageid=1995

McVay Lynch, M. (2004). *Learning online: a guide to success in the virtual classroom.* New York: Routledgefalmer.

McVittie, J. (2005). *Role play.* Retrieved October 18, 2005, from: http://www.usask.ca/education/coursework/mcvittiej/methods/role.html

Moran, J.J. (1997). *Assessing adult learning. A guide for practitioners.* Florida: Krieger Publishing Company.

Nielsen, J. (2004). *Guidelines for visualizing links.* Retrieved October 17, 2005, from: http://www.useit.com/alertbox/20040510.html

Office for Domestic Preparedness (2003). *ODP Approach for Blended Learning*. Retrieved September 12, 2005, from: http://www.ojp.usdoj.gov/odp/blendedlearning/pdfs/bls.pdf

Palloff, R.M. & Pratt, K. (2003). *The virtual student. A profile and guide to working with online learners*. San Francisco: Jossey-Bass.

Palloff, R.M. & Pratt, K. (2005). *Collaborating Online. Learning together in community.* Jossey-Bass: San Francisco.

Reilly, T. (1999-2005). *How to run effective role-play*. Massachusetts attorney General's Office. Retrieved at October 18, 2005, from: http://www.ago.state.ma.us/sp.cfm?pageid=1995

Reed, J. & Koliba, C. (1995). *Facilitating reflection. A manual for educators and leaders.* Retrieved at October 25, 2005, via University of Vermont: http://www.uvm.edu/~dewey/reflection_manual/

Scratch media (2005). *Clear hyperlinks.* Retrieved October 17, 2005, from: http://www.webdesignfromscratch.com/clear_hyperlinks.cfm

University of Amsterdam (2005). Retrieved at October 18, 2005, from: http://www.fee.uva.nl/docentenhandleiding/object.cfm/objectID=4583FFA0-EA30-4387-B286B47CF7A73628#paragraaf2

Virtual University (2005). *Guidelines for professors/consultants.* Knowledge beyond boundaries. Retrieved at October 18, 2005, from: http://www.vu.edu.pk/Guidelines.html

Vos, H. & Vlas, H. (2000). *Reflectie en actie*. Retrieved at October 25, 2005, via University of Twente, DINKEL Instituut / Faculteit der Elektrotechniek: http://www.utwente.nl/itbe/owk/publicaties/onderbouwing/doc00-07.pdf

Williamson, A. (2000). *Internet animation.* Wairua consulting. Retrieved 14-10-2005, from: http://www.wairua.co.nz/publish/web_animation.html#Design%20Versus%20Usability.