

VITELS

Didactics and Design Guide

Version 1

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1 Introduction

VITELS, the virtual Internet and telecommunications laboratory of Switzerland, is a hands-on session orientated course frame work. A peculiarity of VITELS is the modular course structure with many course modules brought together by many partners. The course is presented on a common web course platform.

Although the VITELS course modules have different origins they must be identically structured and designed. This guide helps VITELS designers in their work making a unique and interesting course.

This document is subdivided into a didactic and into a design part. The didactic part explains the course structure, why certain chapters were chosen and also provides concrete implementation rules. The design part explains the optical design, the page layout and mechanisms to reach them as well as the course platform settings.

Students have the possibility to work through the course modules in a proposed order or choose those modules that are required by their curriculum.

Most sections are introduced with the *goals* denoted in blue bold italic letters. **Mandatory web pages** that are a part of the course are introduced with blue bold letters whereas **mandatory sections** are introduced with green bold letters. The text that appears as it is in the course is denoted in violet. Text that is included automatically by the design tool is denoted in orange. Special settings for WebCT are denoted in red.

2 Didactics

2.1 Common Introduction for all Modules

2.1. 1 Structure of the Introduction

The entire VITELS course is hosted on a single WebCT server. The common introduction for all modules is a chapter located in the main area of the VITELS course. It introduces students into the module structure, explains all the common parts of the modules and also provides answers to frequently asked questions. The chapter is called **Global Introduction and Resources**. This chapter's task is to avoid reiterations in each of the VITELS modules.

The structure of the chapter:

- a. **Global Introduction** (Course global objectives, VITELS pedagogical approach with brief justification/explanation, course structure and sections, authors/credits...)
- b. **General Students' Resources & Guidelines** (Studying online, laboratories reservation, resource list/links, record of student progress, FAQ...)

2.1. 2 Implementation of the Course Structure (detailed description as an example of how it should appear to students)

2.1. 2.1 Global Introduction

Course Chapter Name: [VITELS Global Introduction and Resources](#)

Course Chapter Number: 1

2.1. 2.1.1 Course Global Objectives

Course Chapter Name: [Course Global Objectives](#)

Course Chapter Number: 1

Goal: Pointing out the mission of VITELS.

VITELS' Mission: The Virtual Internet and Telecommunications Laboratory of Switzerland (VITELS) is a hands-on sessions oriented Internet-based course framework. The audiences are computer sciences students that have completed their first two years and students from technical universities. Each VITELS module introduces a topic that has a relation to the Internet or to telecommunications. The most important aspects are discussed and introduced with theory, exercises and at least one hands-on session.

VITELS provides knowledge through trial-and-error approaches.

2.1. 2.1.2 VITELS Pedagogical Approach

Course Chapter Name: [Pedagogical Approach](#)

Course Chapter Number: 2

Goal: Students and visitors should get an impression about VITELS' way of teaching.

Pedagogical Approach: VITELS is designed for students that have already acquired a two year's knowledge in computer sciences or similar branches. This already acquired knowledge provides the foundations for understanding each module's new lecture material. It also helps students to develop the autonomy and initiative required by e-Learning, more specifically during the exploration of the laboratory activities. Autonomy and initiative development is supported by providing guidelines and reflexive activities.

VITELS is an extension to traditional teaching activities in universities. VITELS modules should help students to go beyond traditional expository teaching. After the mastering of the basic knowledge, students are asked to effectively analyze and solve problems from real existing situations. All those situations are taken out of the life of telecommunications and Internet experts. These hands-on sessions allow students to apply their theoretical knowledge in a trial-and-error process. Hence, by learning in emulated and real network environments, students can develop skills for self-directed problem-based learning which will help them throughout their life. To do so, each module includes at least one hands-on session. The content of the modules, from the introduction to the tests is designed to fully integrate the hands-on session.

VITELS' modules combine the delivery of basic knowledge and the exploration of real tasks in order to develop effective know-how. In addition, reflective processes that permit to make sense of exploration and problem solving are supported by note taking in a personal log book throughout the modules' activities.

2.1. 2.1.3 Course Structure and Sections

Course Chapter Name: [Course Structure and Sections](#)

Course Chapter Number: [3](#)

Goal: A short overview of the module structure.

Course Structure and Sections: VITELS is a framework of modules and the modules can be visited independently from each other.

All VITELS modules are similarly designed to allow easy navigation and orientation. The modules' structure with short explanations are listed below:

Colors of the four blocks must correlate to the colors of the course titles.

- **Introduction:** The introduction leads you to the topic of the module. Among many other useful stuff you find special requirements, the learning goals and a module specific FAQ. In this section you write a short description of your personal expectations and goals for this module.
- **Basic Knowledge Acquisition:** The basic knowledge acquisition section is the place where you have to study theory. You start with theory and interactive exercises. Another part of this section is scientific reading that gives you an insight in the world of scientific publications. The self-test helps you to minimize the theoretical work by giving you the answers immediately and additionally pointing you to further readings in case of wrong answers. The self-test is also a place to check if you have to read through the whole theory or not. In a personal synthesis you identify what you have learned and can make links with your personal goals. You may as well use this task to build connections between the newly acquired knowledge (theory) and your previous knowledge in order to go further in your understanding of the topic. Additionally you may organize your knowledge in concept maps to better prepare the quiz and to re-use it more easily during the following activities. This section ends with a quiz that is graded by a tutor.
- **Knowledge Application/Exploration:** Knowledge application and exploration is the place to apply the previously acquired skills. This is the section with the hands-on sessions. The situations in the hands-on sessions can be emulated or real, you should not recognize any difference to reality. This is also the section where you can work in a team during the hands-on session! It is not forbidden to discuss your understanding of the results/explorations with other students. You finally use the same results for your **individual** interpretation in the final quiz.
- **Evaluation of Acquired Knowledge and Skills:** A first task is to write another synthesis by using your personal notes. You try to self-evaluate your degree of mastering the chapter's goals. This helps you to prepare your final quiz. This section ends with a final quiz that lets the tutors see if you have met the goals listed in the introduction section of the module.

There is one glossary for all the modules that is integrated in WebCT.
Text references are contained in the Recommended Readings Section.

2.1. 2.1.4 Authors/Credits

Course Chapter Name: [Authors and Credits](#)

Course Chapter Number: [4](#)

Goal: Presentation of the module designers and of the staff.

Authors/Credits: Module Name: Authors Names, Links to authors, if desired contact information.

2.1. 2.2 General Students' Resources & Guidelines

Course Chapter Name: [Resources and Guidelines](#)

Course Chapter Number: 2

2.1. 2.2.1 Studying Online

Course Chapter Name: [How to Study](#)

Course Chapter Number: 1

Goal: Studying online is much different than studying traditionally. This chapter introduces traditional students into the new learning style.

Studying Online: Online courses lack many well known features of studying. Think on text markers or the possibility to take notes in scripts. Less important but still, you can study almost everywhere, you can even take your script and read through while sitting in a hot bath. If you want to keep the script you simply store it together with all your personal notes and probably with the exam too. If you need it one day, maybe ten years later, you simply open a cartoon box and have it at your fingertips again. Traditional learning has a lot of advantages and one of the most important is: you are used to it.

But studying online is getting more and more popular. Tutors can for example address a bigger audience without a loss of quality. There are many advantages for you too: You study whenever you like to. VITELS is open 24/24h and 365 days a year. It offers interactive content where you apply and increase your skills. You get pointers to additional lecture and content and are able to access it at once. Many useful tools are integrated, such as a glossary or a discussion board.

Comparing traditional and online learning, there is still a lot to improve in online learning. But already now, online learning offers a rich environment with many useful and interesting contributions.

Human beings are creatures of habit. Therefore it is not surprising if you do not like your first experiences with the new learning style. With a little effort of your side you should start feeling comfortable in the new learning environment soon.

2.1. 2.2.2 Laboratory Reservation

Course Chapter Name: [Reservation System](#)

Course Chapter Number: [2](#)

Goal: Introduction and explanation of the laboratory reservation system.

Reservation System: In some modules it is necessary to reserve time slots for the hands-on sessions because the very expensive laboratory devices are available only in limited numbers. The reservation system does not affect anything else than the hands-on sessions of some of the modules. All other sections of these modules are accessible all the time.

VITELS has a reservation system to manage the restricted equipment capacities of those laboratories.

You find the link to the reservation system on the homepage and in all the modules where you have to book time slots.

The username and password are identical to those for WebCT.

Principally you can only book one time slot per module. You can book in advance and have the opportunity to get your preferred time slot. It is possible to reserve additional time slots if you need to: If there are still free slots one day before the day you need the additional slots you can reserve them.

You can and should free time slots that you are not going to use.

2.1. 2.2.3 Resource List/Links

Course Chapter Name: [Resource List and Links](#)

Course Chapter Number: 3

Goal: Providing additional information sources.

Links: The links presented here are from general nature and not module specific.

www.whatis.com

www.swissvirtualcampus.com

www.cisco.com

Each module has an own resource list and links section.

The glossary is integrated in WebCT. Each module creator adds the specific terms to the glossary.

References are a part of the Recommended Readings section.

2.1. 2.2.4 Record of Student Progress

Course Chapter Name: [Record of Student Progress](#)

Course Chapter Number: 4

Goal: History of learning.

Record of Student Progress: When working through the course modules you encounter different tools that help checking your knowledge level. Most of them are evaluated and you can earn points:

- Discussions	15
- Log book	20
- My Goals	10
- Personal Synthesis I	10
- Self-test	0
- Quiz	20
- Personal Synthesis II	10
- Final Quiz	30
- Surveys	0

All of the above mentioned tools are required.

A very special tool in this course is the log book. You might be familiar with this tool from real life. The log book is a virtual book in this course, where you add comments and experiences made during the learning process. You start using the log book at the very beginning until the very end of the module. Each module has its own log book ready for you.

Click on Quiz in the Action Menu at the top and choose Log Book. You get to the Quiz dialog and then you can start.

There are no time limitations to this task and you can always come back. Another entry point to this task is via Evaluation on the Navigation Bar on the left hand side.

Evaluation criteria for the log book:

You can earn a total of 20 points for this task:

- 5 points for a correct syntax and language
- 5 points for the quantity and the quality of the content

WebCT: Quiz (Note book): - maximal points available: 20

- must be available all the time
- must be exclusively displayed on the left navigation bar
- can be repeated
- must be set to “essay question”
- must not have a time limit
- tutor Email notification must be set on

2.1. 2.2.5 Discussions

Course Chapter Name: [Discussions](#)

Course Chapter Number: [5](#)

Goal: Discussions accompany the learning process and help students to exchange and improve knowledge.

Discussions: Discussions are a major part of daily life and of this course. Throughout the whole course you will encounter minor and major problems that can block your progress.

A good way to get help is in the discussion board. It is also the place to help others.

Discussions are that important that you get points for postings, be it questions or answers.

Evaluation criteria:

You can earn a total of 15 points for this task in each module:

- 5 points for each posted module topic-related message (excluded are off-topic postings, insults, nonsense...)

2.1. 2.2.6 VITELS Help Pyramid

Course Chapter Name: [VITELS Help Pyramid](#)

Course Chapter Number: 6

Goal: This section explains how students get help in case of problems.

VITELS Help Pyramid: Students need feedback to their questions. A discussion board helps to solve problems and involves eager students in the support process. A discussion board also offers a way for discussing hot topic out of the course.

After each course cycle, important questions are extracted and summarized in the frequently asked questions section.

Students expect a fast response in case of severe problems such as hardware failures. As a result of that, we suggest a help pyramid with the tutor on the top. Each step of the pyramid filters questions and finally only urgent question find their way up to the tutor. The first step of the help pyramid is the frequently asked questions section. The second step is the discussion board. The third, Email support and the last telephone support by the tutor.

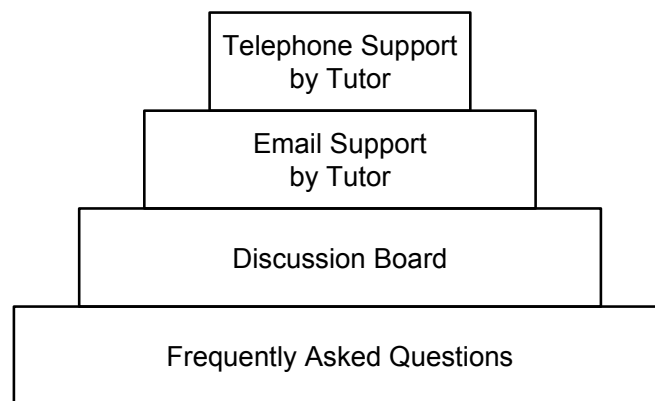


Figure 1: VITELS help pyramid

2.1. 2.2.7 FAQ

Course Chapter Name: [General FAQ](#)

Course Chapter Number: [7](#)

Goal: The FAQ section gives answers to questions that concern all the modules.

If the FAQ grows bigger than 20 questions a search or indexing function should be integrated. For the beginning, Questions are alphabetically sorted.

FAQ:

Q: How can I shorten the theory section, I think I already know most things?

A: There is a self-test and if you pass the self-test without problems you probably pass the quiz with any problems.

Q: Is there an order in the modules?

A: Yes there is. If you start with module one and go through all the modules you always learn the necessary things for the next modules. The base knowledge for module one is two years of computer science studies at university. You are free to make the modules in any order you prefer

Q: Do I have to work through all the modules?

A: No, you attend only the modules that you like or that your tutor declares as required.

Q: What is the maximal amount of points I can get in a module?

A: The maximum is **115** points. **15** points for 3 postings in the discussions, **20** points for the log book, **10** points for the verbalization of the personal goals, **10** points for the synthesis about the theory section, **20** points in the quiz about the theoretical section, **10** points for the synthesis and **30** points for the final quiz.

2.2 Modules (*detailed description as an example for teachers and course developers*)

2.2. 1 Structure of the Modules

Goal: Getting a common, unique module and content structure throughout the whole course.

All VITELS modules have the same structure, although it is possible to split up the hands-on session and thus to repeat step b to c one to several times.

The **required** structure of the modules:

- **Introduction:**
 - Special requirements
 - Goals linked with activities and time expected
 - Relationship to other modules and links to other modules
 - Verbalization of personal goals
 - Module specific introduction
 - FAQ

- **Basic Knowledge Acquisition:**
 - Theory chapter
 - Readings
 - Personal Synthesis
 - Self-test (formative evaluation) with links to sections related to failed questions
 - Quiz (Success required to access Laboratory)

- **Knowledge Application/Exploration:**
 - Laboratory work, can be emulation or real
 - Tracking data or registered results
 - Possible team work to solve/discuss the task

- **Evaluation of Acquired Knowledge and Skills:**
 - Personal synthesis
 - Final Quiz

2.2. 2 Implementation of the Course Structure

2.2. 2.1 Introduction

Course Chapter Name: **Introduction**

Course Chapter Number: 1

2.2. 2.1.1 Welcome Message

Course Chapter Name: **Welcome**

Course Chapter Number: 1

Goal: This is the “modularized” introduction section.

Abstract: Welcome message and a very short introduction (abstract like) to the module. It is recommended to add a short video welcome message. [Presenters Online] answers many questions on how to make a video.

Useful tips for your video presentation:

- Adequate illumination
- Look into the camera
- Talk such as you would do to your best student if you want to convince him
- Bring personal experiences into the message
- Show why the module is important
- Emphasis the three most important things of the module
- Wish fun and luck

Special Requirements: All the requirements that are not covered by the first two years of computer sciences studies. It is recommended to add most topics of what is expected.

Authors: Responsible organization and person of the module. This is the same information as in 2.1.2.1.4.

2.2. 2.1.2 Goals Linked with Activities and Time Expected

Course Chapter Name: **The Goals and how to Reach Them**

Course Chapter Number: **2**

Goal: Students know what they will learn and also how much time it takes them.

This section consists of a list of goals, a list of what is expected and a storyboard as described below:

Students must know (below formulated as subtitles in order to address students directly):

- Goals: What you are going to learn in this module.
- What is expected from you (or how to reach these goals):
 - What you will be asked to do (activities) (description of main activities and student learning/studying strategies with a reference to the storyboard)
 - Why is this important?
 - How you will be evaluated (test description and evaluation criteria, type of quiz or exam)
- How much time it should take.

Goals: The module goals are listed and briefly explained. Goals must be precisely formulated and not sound as: You learn what computers are.

There are mainly three aspects that must be covered in the formulation of a learning goal:

- 1) The task: What kind of activity must be done by the student? You must use a verb in the formulation. Try to use a verb or an action that can be measured/assessed. Possible verbs are for example: writing, managing, reading, organizing, researching...
- 2) The condition: How must the student perform the task? You must add objects to the verb: by measuring the traffic, by writing a socket, by summarizing the theory. You can add more conditions: in a team, alone, with the two routers, without help. You can even include variables: no matter how high the CPU load is, no matter how much time it takes.
- 3) The standards: How well the student must perform the task. Many times you find standards defined like this:
 - a. -How often? (every day, ten times, before starting the laboratory)
 - b. -How well? (until passing the test with 0 errors, within one hour)
 - c. -How many? (set up two different networks, collect two logs of the measurement)
 - d. -How much? (during two hours)
 - e. -How will I know it is done? (until being able to answer the asked questions)

Storyboard: This section contains three subsections:

- 1) A short description of the learning and studying activities. (a little story, contains some lines of text as a contrary to the very short formulated goal)

- 2) An explanation of why doing the proposed activities will permit to reach the target goals with high standards. (by giving a reason for the task it seems less stupid)
- 3) How they will be evaluated or how the level of goals reached will be assessed. (short description of test types and criteria for the evaluation)

Schedule: A storyboard lists the main chapters and the time students are expected to spend in each. The storyboard is graphically designed and shows the times expected and already spent in a module. The total time for one module is 12 hours. This should help students to plan their online work and study time.

Important: The Storyboard section including title is generated automatically!

2.2. 2.1.3 Relationship to other Modules

Course Chapter Name: **Module Vicinity**

Course Chapter Number: **3**

Goal: Most students have to work throughout the whole course, others take-out few modules. The map shows the logical order and it's relation to the rest of the course.

Position Map: The module has a proposed position among all the other modules. The main idea behind the position map is to graphically locate the module in its vicinity with the other modules for those students that work through the whole course.

The map must additionally inform about the possibility to perform the modules independently and in any desired order.

Mind Map: Mind Maps are a method to reflect associations. In those maps, the main topic is located in the centre. From there, branches grow outwards in all directions. Written on each branch and sub branch are key words. For more information visit **[Mind Maps]** or **[Inspiration]**.

The module name is written in the center circle of the map. At least some of the main branches must be printed in and named. It is recommended to add some smaller branches too to provide an impression about the module and the relationships to other topics. The map must be printable so that students could add additional branches.

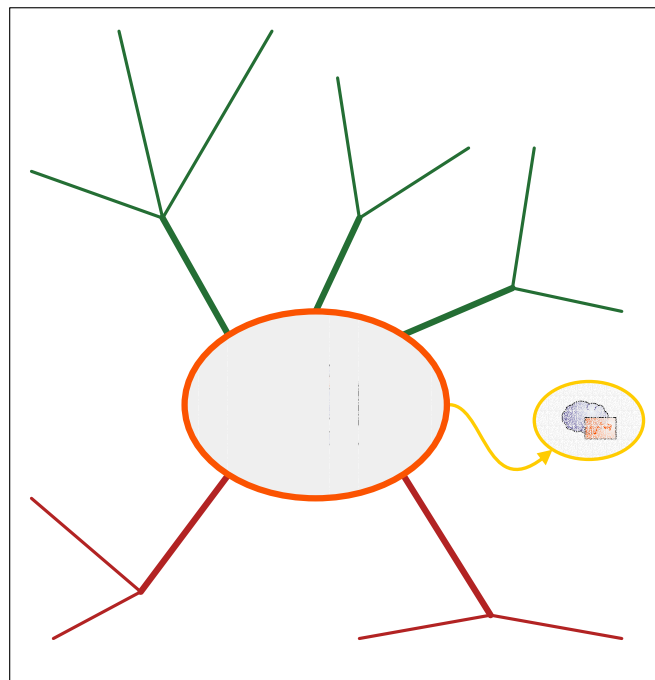


Figure 2: Example of a mind map.

In this example the topic entries follow the order of the table of contents and are arranged clockwise around the center. Also, the theoretical part is kept on top, while the practical part is arranged below the center. Links to related modules should be placed accordingly. Note the color coding:

Type	Color sample
Module	rgb(251,82,0)
Theoretical	rgb(35,109,51);
Practical	rgb(178,34,34);
Relation to other modules	rgb(255,204,0)

Table 1: Colors used in Figure 1.

2.2. 2.1.4 Verbalization of Personal Goals

Course Chapter Name: **My Goals**

Course Chapter Number: 4

Goal: Let's see what the students expect from us and provide them with anchor points to build their new knowledge from what they already know.

Essay: Students formulate their expectations of the module. The text is sent to the tutors but not graded (10 points because without nobody does it). It helps to see what students expect from a module before they entered into the topic. It also helps the students to get a feeling of the module and to feel ownership. It also helps to activate their prior knowledge for that topic. This will also be used to track the evolution of the student knowledge and competencies (See the personal synthesis (2.2.2.4.1))

You are now invited to formulate your personal expectations from this module. This short essay helps us to see what you expect after reading the module's topic.

When you think about your expectations and goals for this module, you activate your already existing knowledge.

At the end of this module you can compare your own goals with the reached ones.

Evaluation criteria:

You can earn a total of 10 points for this task:

- 5 points for a correct syntax and language
- 5 points for the quantity and the quality of the content

WebCT: Quiz: - maximal points available: **10**

- must be available all the time
- must be exclusively displayed on the respective page in the action menu bar
- must be set to "essay question"
- must not have a time limit

2.2. 2.1.5 Module-specific Procedures

Course Chapter Name: **Tips**

Course Chapter Number: **5**

Goal: Show the differences from the global introduction.

Module Specific Procedures: If there are additional remarks that are not covered by the global introduction they must be in this section.

Module-specific procedures, well known pitfalls...

2.2. 2.1.6 Frequently Asked Questions

Course Chapter Name: **FAQ**

Course Chapter Number: **6**

Goal: Provide answers to the reappearing questions.

Each of the modules contains a FAQ section with module-specific problems. It is recommended to pick the questions and answers from the discussion board. The list of frequently asked questions with answers grows with time.

If there are more than 20 questions a search function should be integrated. Till then questions are alphabetically sorted.

FAQ:

2.2. 2.2 Basic Knowledge Acquisition

Course Chapter Name: **Theory**

Course Chapter Number: **2**

2.2. 2.2.1 Theory Chapter

Course Chapter Name: **Theoretical Basics**

Course Chapter Number: **1**

The first sub chapter page is generated automatically by the tool.

Goal: Provide necessary knowledge for the hands-on session.

Theoretical Basics: Everything that is essential for the laboratory must be in this section. To remember: VITELS expects a two year computer science education from its students.

The theory section must include text, graphics, animations, and should include interactive animations.

A summary of the theory must be provided as a .pdf file.

2.2. 2.2.2 Readings

Course Chapter Name: **Readings**

Course Chapter Number: 2

Goal: The reading chapter makes an excursion to “heavier” literature that is not especially prepared for students.

Readings: There are many intentions behind this chapter. Students get, as in real life much more references as they can work through. But this is intentionally; students have to practice real life, especially in a laboratory. To help students, the reading section is subdivided in the two sections required and recommended readings.

You have now reached the readings section that is subdivided into required and recommended readings.

Required readings are articles taken out of real life that are part of the theory section. Recommended readings are interesting and fit the theory but are not a must; they are intended for people more interested into the study matter.

With these readings you get used to the style of information you have in your diploma or doctoral studies.

It is not easy to read and understand scientific articles. If you start reading with the abstract you get an overview of the work presented. The introduction leads to the presented facts and helps understanding them. The most important section is the discussion. That is where the gained results are brought into context.

2.2. 2.2.2.1 Required Readings

Course Chapter Name: **Required Readings**

Course Chapter Number: [2.1](#)

Goal: Minimal readings required for the module understanding.

Required Readings: The readings in this section are a must for everybody because they are essential for the laboratory session. Required readings are not just additional theory texts written by the tutor. Required readings are original essays or publications that match the module topic. The idea behind is to bring students to real life also in theory as the major source of knowledge in the later life are scientific publications. It is recommended to add one long or two short articles.

Students that are very skilled or think they know everything can proceed to the self test. If they solve the self test without any problem, they should go on without the required readings.

Future option: As soon WebCT supports a dynamic set-up of readings, the theory for each student can be based on this tool.

2.2. 2.2.2.2 Recommended Readings

Course Chapter Name: **Recommended Readings**

Course Chapter Number: [2.2](#)

Goal: Other readings that would help to deepen the module topic.

Recommended Readings: Recommended means the same as what you do when you recommend a book in your lecture. We recommend that you read this, if you have time or are interested. Text references must be in this section.

2.2. 2.2.3 Personal Synthesis

Course Chapter Name: **Personal Synthesis**

Course Chapter Number: 3

Goal: Here, students are asked to synthesise what they know or have learned and to organize their knowledge. They must go through their experiences made before and express them in their own words.

Personal Synthesis: Take the goals of the module and now write in your own words what you have learned in the theory section. How close are you to the goals?

This is the first out of two personal syntheses you have to write in this module. The synthesis is an essay about your gained knowledge during the theory chapter. You tell in your own words and thoughts what you experienced and try to link the new with already existing knowledge.

Click on Quiz in the Action Menu at the top and choose Personal Synthesis. You get to the Quiz dialog and then you can start with the essay. There are no time limitations to this task and you can always come back. Another entry point to this task is via Evaluation on the Navigation Bar on the left hand side.

Evaluation criteria:

You can earn a total of 10 points for this task:

- 5 points for a correct syntax and language
- 5 points for the quantity and the quality of the content

WebCT: Quiz: - maximal points available: 10

- must be available all the time
- must be exclusively displayed on the respective page in the action menu bar
- can be repeated
- must be set to “essay question”
- must not have a time limit
- tutor Email notification must be set on

2.2. 2.2.4 Self-test (formative evaluation) with Links to Sections Related to Failed Questions

Course Chapter Name: **Self-test**
Course Chapter Number: 4

Goal: Helps students to orientate in the theory part and to discover missing parts.

Self Test: The self test immediately provides results and in case of wrong results points to a resource where the missing information can be read. Provide a positive feedback even in case of a correct answer. Self tests are not graded nor reviewed by a tutor.

The Self-test helps you to decide whether you are ready for the Quiz or not. In case of wrong answers you get links to additional information where you can improve your knowledge. The Self-test is not reviewed by anybody. It is for your personal use and benefit only.

Click on Self-test in the Action Menu at the top and start with the test.
There are no time limitations to this task and you can always come back.

Evaluation criteria:
No points can be earned for this task.

WebCT: Self-tests are page related and appear in the action menu bar. If the quiz is entered directly into WebCT it might disappear after changing page names. It is recommended to write the quiz in a .txt file with the self test syntax and to upload the file.

2.2. 2.2.5 Quiz

Course Chapter Name: Quiz

Course Chapter Number: 5

Goal: Helps tutors to discover missing theory parts or to discover lazy students.

Quiz: The quiz is the final test before proceeding to the lab session. Students have to pass the quiz before they proceed to prove a minimal knowledge and to pass the laboratory session within the estimated time. Quizzes are graded.

If you feel ready for the hands-on session and you are satisfied with your Self-test results, solve the Quiz. The Quiz results will be reviewed and evaluated by your tutor. You must finish the Quiz before starting the hands-on session!

Click on Quiz in the Action Menu at the top and choose Quiz. You get to the Quiz dialog and then you can start.

There are no time limitations to this task and you can always come back. Another entry point to this task is via Evaluation on the Navigation Bar on the left hand side.

Evaluation criteria:

You can earn a total of 20 points for this task:

- each question gives a certain amount of points
- correct use of language
- is the required material in essay questions provided

WebCT: Quiz: - maximal points available: 20

- must be available all the time
- must be exclusively displayed on the respective page in the action menu bar
- cannot be repeated
- tutor Email notification must be set on

2.2. 2.3 Knowledge Application/Exploration and Skills Practice

Course Chapter Name: **Knowledge Application/Exploration**

Course Chapter Number: 3

2.2. 2.3.1 Laboratory Work

Course Chapter Name: **Hands-on Session**

Course Chapter Number: 1

The first sub chapter page is generated automatically by the tool.

Goal: Apply the theory and trial-and-error learning.

Hands-on Session: The laboratory session consists of emulations or work on real devices. Both types of session should be as close to reality as possible.

- Tracking data or other recorded results of actions
- Possible team work to solve/discuss the hands-on session tasks. The post laboratory work must be done by EACH student independently; else conclusions are not done by both.

The laboratory report, automatic from tracking or else from self-assessment is part of the questions in the final quiz.

2.2. 2.4 Evaluation of Acquired Knowledge/Skills

Course Chapter Name: Prove Your Knowledge and Skills

Course Chapter Number: 4

2.2. 2.4.1 Personal Synthesis

Course Chapter Name: Personal Synthesis

Course Chapter Number: 1

Goal: Students express in own words what they did.

Essay: The task for the students is to write a short essay in which the acquired knowledge must be put together by them. The synthesis should contain reflections on adopted strategies and the observed results. A very simple example: You explain a hammer and nails. The synthesis for the students is now to add hammer and nails together and describe how to drive a nail into a wall. An example: In the theoretical part of the module IP Security, students learn a lot about virtual private networks (VPN). In the hands-on session they have to apply the knowledge for setting up routers and establish a VPN. Now they should know the theory of VPNs and also how to use routers in this context. A synthesis task could be to implement a VPN on a certain link that only routes UDP traffic and nothing else.

The synthesis could be a concept map or a system description in the students' own words. The students could synthesize what they have learned and what they could /should study more deeply.

You are now asked to write your second personal synthesis. The form is again a short essay in which you describe the acquired knowledge made in the hands-on session.

Describe newly adopted strategies and the observed results.

Describe also what you would like to have done additionally for satisfying your personal interest of the module topic.

Click on Quiz in the Action Menu at the top and choose Personal Synthesis. You get to the Quiz dialog and then you can start with the essay.

There are no time limitations to this task and you can always come back. Another entry point to this task is via Evaluation on the Navigation Bar on the left hand side.

Evaluation criteria:

You can earn a total of 10 points for this task:

- 5 points for a correct syntax and language
- 5 points for the quantity and the quality of the content

WebCT: Quiz: - maximal points available: 10

- must be available all the time
- must be exclusively displayed on the respective page in the action menu bar
- can be repeated
- must be set to "essay question"
- must not have a time limit

- tutor Email notification must be set on in the quiz settings (WebCT sends an Email after each received quiz)

2.2. 2.4.2 Final Quiz

Course Chapter Name: Final Quiz

Course Chapter Number: 2

Goal: Analyze what students really understood.

This is the final quiz that is graded. In this quiz, students must prove that they have learned and understood the learning material. Once again, it is not possible to perform this quiz in a team as it is sure that only one student will work on it or do not more than half of the quiz. In this quiz, results of the lab must be considered.

Final Quiz: The final quiz includes log files of the hands-on session. The quiz is a possibility to evaluate your work and to see what you have learned in the module.

In the Final Quiz you reply less theoretical than practical questions. Major parts of this quiz are the results and log files gained and saved during the hands-on session. This is the last evaluated task of this module. Nevertheless it is also required to fill the module survey.

Click on Quiz in the Action Menu at the top and choose Final Quiz. You get to the Quiz dialog and then you can start.

There are no time limitations to this task and you can always come back. Another entry point to this task is via Evaluation on the Navigation Bar on the left hand side.

Evaluation criteria:

You can earn a total of 30 points for this task:

- each question gives a certain amount of points
- correct use of language
- is the required material in essay questions provided

WebCT: Quiz: - maximal points available: 30

- must be available all the time
- must be exclusively displayed on the respective page in the action menu bar
- cannot be repeated
- tutor Email notification must be set on in the quiz settings (WebCT sends an Email after each received quiz)

2.3 Evaluation of the Course by the Students

VITELS is a heterogeneous construct realized in a common framework. One part of that framework is the VITELS feedback form that is used by all partners.

The purpose of the form is to gather technical as well as personal experiences students make during the course.

The VITELS experience report and feedback form is in Appendix A.

In the electronic implementation of the course we use the Survey tool offered by WebCT.

3 Design

3.1 Motivation

The didactic aspects of chapter 2 give the course a common set of rules that define how the content must be prepared and presented. But the course must also have a common design (remember the corporate design).

3.2 WebCT

3.2. 1 Settings

The VITELS course is hosted on a WebCT system. WebCT allows global and page-related settings. Global settings must not be changed! Individual settings must be according to chapter 2.

3.2. 2 Folders

You must not touch any file or folder that is not yours.

The common language for folders and files is English.

Directory Structure in WebCT:

My-Files/design: common design setting

My-Files/general_introduction_and_faq: common introduction to all modules

My-Files/pictures: Pictures used in the whole course, icons of the homepage, reservation system icons

My-Files/scheduling: Laboratory reservation system folder

My-Files/(coursemodulename): Each course module has a folder according to the name of the module. The folder must be easily brought into context with the title of the module.

In the course module folders, it is recommended to create subfolders for each chapter and one for pictures.

System folders:

My-Files/chat: Logs of the chat rooms

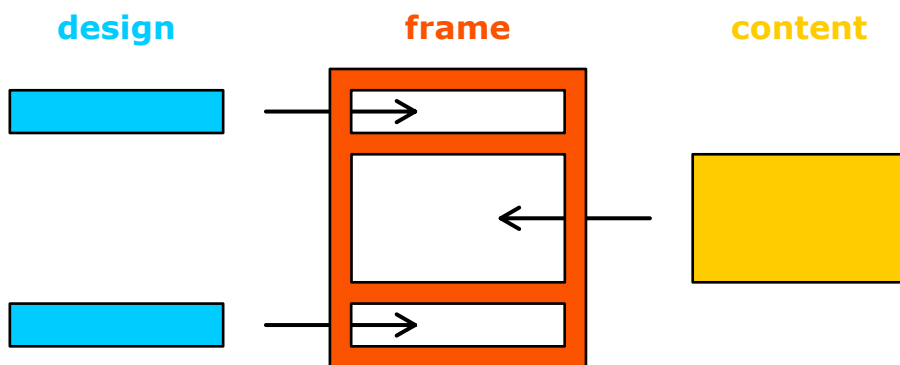
My-Files/student_pres: Uploaded files from students and their presentations

My-Files/whiteboard: Saved whiteboard sessions

3.3 Implementation

3.3. 1 Principles

To achieve a common design throughout a course, all modules belonging to this course need to use common design rules. To allow changes and updates of these rules without affecting the module creators, an easily maintainable file structure is required. Therefore, the design rules and the content of a page have been separated. A page is dynamically generated using the common design rules and the page related content file.



Now, module creators only need to edit the content, they won't have to care about the overall design. Nevertheless, every module creator has to use the same set of XHTML tags when she/he writes the content.

3.3. 2 Content File

The content file contains all that should be displayed on a single page. The language to be used by the module creator for the content file is XHTML. XHTML is an extension to HTML 4.0, with stricter rules. The difference to HTML 4.0 in short is that all tags must be closed. The following XHTML tags may be used by the module creator:

Text:

<code><p></p></code>	Paragraph
<code>
</code>	Forcing a line break
<code><pre></pre></code>	Preformatted text

Lists:

<code></code>	Unordered list
<code></code>	Ordered list
<code></code>	List item

Tables:

<code><table></table></code>	Table element
<code><tr></tr></code>	Table row
<code><th></th></code> <code><td></td></code>	Table cell

<code><h2></h2></code>	Header element
<code><a></code>	Link element
<code></code>	Image element
<code><div></div></code>	Grouping element (block-level)
<code></code>	Grouping element (inline)

3.3. 3 Available CSS Classes

The use of cascading style sheets (CSS) classes ensures the common design and is therefore recommended. To emphasize certain words or phrases, the format of the text can be changed. The following table lists the available font classes with a sample text. Note that the standard font family is set to a sans-serif and the standard font size to small.

CSS Class Name	Sample text
left	This class provides left justified text. This class provides left justified text.
center	This class provides centered text. This class provides centered text.
right	This class provides right justified text. This class provides right justified text.
justify	This class provides justified text. This class provides justified text.
monospace	This class provides monospaced text. This class provides monospaced text.
serif	This class provides serif text. This class provides serif text.
medium	This class provides medium sized text. This class provides medium sized text.
small	This class provides x-small sized text. This class provides x-small sized text.
italic	<i>This class provides italic text. This class provides italic text.</i>
monospaceItalic	<i>This class provides monospaced italic text. This class provides monospaced italic text.</i>
bold	This class provides bold text. This class provides bold text.

The following classes are to be used with lists and list items:

noindent	<ul style="list-style-type: none"> • This class provides a shorter indentation and justified text for unordered () and ordered lists ().
li.answer	<ul style="list-style-type: none"> • This class provides a formatted list item to be used for answers (e.g. in the FAQ).
li.question	<ul style="list-style-type: none"> • This class provides a formatted list item to be used for questions (e.g. in the FAQ).

To group text within the same context (e.g. numbers), different colors and/or fonts can be used. The following table lists the available font color classes with a sample text:

CSS class name	Sample text
green	This class provides green colored text over a transparent background.
maroon	This class provides maroon colored text over a transparent background.
navy	This class provides navy colored text over a transparent background.
purple	This class provides purple colored text over a transparent background.
boldGreen	This class provides bold, green colored text over a transparent background.

boldMaroon	This class provides bold, maroon colored text over a transparent background.
boldNavy	This class provides bold, navy colored text over a transparent background.
boldPurple	This class provides bold, purple colored text over a transparent background.
monospaceBoldBlack	This class provides monospaced, bold, black colored text over a transparent background.
monospaceBoldGreen	This class provides monospaced, bold, green colored text over a transparent background.
monospaceBoldMaroon	This class provides monospaced, bold, maroon colored text over a transparent background.
monospaceBoldNavy	This class provides monospaced, bold, navy colored text over a transparent background.
monospaceBoldPurple	This class provides monospaced, bold, purple colored text over a transparent background.

To further ensure the common look, some CSS classes for special purposes have been provided:

CSS class name	Sample text
code	This class provides a blue framed, monospaced, black text over a light steel blue background. The text is rendered as given in the HTML source with all leading and trailing spaces.

3.4 Content Design Rules

When you prepare your module's content you should follow certain rules of good design.

1. Keep your content short and simple
2. Limit the numeration hierarchy of the Table of Contents entries (recommended depth of 3, maximum 4 numbers)
3. Limit the number of different font families and formats per page (maximum 3)
4. Limit the amount of different colors per page (maximum 5)
5. Reuse font formats and colors in the same context

Especially when creating graphics or animations try to apply these rules:

1. Respect the maximum width of 540 pixel in your graphic/animation
2. Use color selective (emphasize key elements, keep the surroundings black/white/grey)
3. Use light, appealing colors (not too dark or somber)
4. Limit the amount of gradients

When you need to place section titles (i.e. the mandatory sections) within your page you should use the <h2> tag, e.g.

```
<h2>Special Requirements</h2>
```

You should write your standard text within paragraphs with justification. This can be achieved using the class `justify`, as shown in the following sample code:

```
<p class="justify">
This is a short sample sentence. This is a long sample sentence.
This is a short sample sentence. This is a long sample sentence.
</p>
```

If you want to change the format of your text within a paragraph, you should use the `` tag, e.g.

```
<p class="justify">
In this paragraph the font weight will be changed. This is done
using the &lt;span&gt; tag. <span class="bold">This</span> word
will be rendered with bold letters.
</p>
```

Links should always be opened in a new window to not risk the invalidation of the current WebCT session. To achieve this, the parameter `target` should be set to `_blank`, e.g.

```
<p class="justify">
Have a look at the recommended and required
<a href="2/2_2_readings.html" target="_blank">Readings</a> of this
module.
</p>
```

For command lines you should use a monospaced font, e.g.

```
<p class="monospaced">
ifconfig eth0 10.1.1.1 255.255.255.0
</p>
```

To display code snippets, you should use the preformatted text tag together with the `code` class, which will cause the browser to render a frame around your code and format the text properly, e.g.

```
<pre class="code">
while( true ) do
{
    nothing
}
</pre>
```

When you list question and answers in a collection (i.e. the FAQ chapter) you should use the unordered list tag with the appropriate class for each list item, e.g.

```
<ul class="noindent">
  <li class="question">What time is it?</li>
  <li class="answer">It's 10 o'clock.</li>
</ul>
<ul class="noindent">
  <li class="question">Where do I start?</li>
  <li class="answer">Right here.</li>
</ul>
```


3.5 Adaptation of Existing Modules

To ease your adaptation work a small utility (file framework generator & formatter – ffgf) is provided. The ffgf takes a Table of Contents as input and translates it into a numbered and formatted framework of files. It contains a template of a Table of Contents based on this guide, which should give you a good starting point to easily adapt the structure to the one of your module.

3.5. 1 Installation of the ffgf

Unzip the archive into a directory of your choice. After unpacking the archive you find the following directory structure:

<i>ffgf/</i>	start scripts and readme
<i>ffgf/bin/</i>	GNU awk binaries
<i>ffgf/input/</i>	input files (Table of Contents)
<i>ffgf/output/</i>	output files

3.5. 2 Usage of the ffgf

The common sequence of operating the ffgf is as follows:

1. Edit the Table of Contents file

ffgf/input/template_toc.txt

2. Run the start script matching your OS

```
ffgf/ffgf_win.bat <ToC file with path> <module directory name>
```

or

```
ffgf/ffgf_nix <ToC file with path> <module directory name>
```

3. Edit the content files

ffgf/output/module directory name//*.cont*

4. Edit the module specific file

ffgf/output/module directory name/module_specific.php

5. Run the start script matching your OS again

```
ffgf/ffgf_win.bat <ToC file with path> <module directory name>
```

or

```
ffgf/ffgf_nix <ToC file with path> <module directory name>
```

Below each step is explained in detail.

3.5. 2.1 Edit the Table of Contents

Before you start the ffgf, you probably want to adapt the Table of Contents to match your module. This can be done easily by editing the file

ffgf/input/template_toc.txt

A section entry in the Table of Contents file consists of a section number and a section title separated by a colon (":"). As follows (without the <>):

<section entry> := <section number>:<section title>

The section number consists of one or more digits separated by a dot ("."). The section title has no special format.

Note that only one section entry per line is permitted. Each section entry must have a preceding and numerically matching chapter. The entry of a chapter is similar to a section entry, apart from an additional parameter indicating the chapter duration in minutes. Also, the chapter number must not contain any dots. As follows (without the <>):

<chapter entry> := <chapter number>:<chapter title>:<chapter duration>

Of course, the chapter and section entries must be sorted ascending by their section number (like any other Table of Contents).

Here is an example of some valid chapter and section entries:

```
1   : First chapter:40
1.1 : First subsection
2   : Second chapter:120
```

Here is an example of some incorrect chapter and section entries:

```
1.1 : First subsection    !
2    : Second chapter:120
3.1 : Third subsection    !!
4    : Fourth chapter     !!!
```

! missing preceding chapter, e.g. "1 : First chapter:40"
!! missing preceding chapter, e.g. "3 : Third chapter:120"
!!! missing chapter duration, e.g. "4 : Fourth chapter:180"

Note: Make sure there are no trailing spaces at the end of a section entry (i.e. after the section title or the chapter duration).

When you have completed the Table of Contents you can proceed to the file generation.

3.5. 2.2 Run the Start Script the First Time

Start the script matching your operating system, i.e.

- under Windows in the ffgf directory type without the <>

```
ffgf/ffgf_win.bat <ToC file with path> <module directory name>
```

```
ffgf/ffgf_win.bat ..\\input\\template_toc.txt template_module
```

Note: To open a command shell under Windows go to Start->Run... and type in "cmd", then press ENTER. Now change into the ffgf directory. Be aware of the double backslash "\\" in the path name. It is required by the Windows command shell.

- under Linux /Unix in the ffgf directory type

```
ffgf/ffgf_nix <ToC file with path> <module directory name>
```

```
ffgf/ffgf_nix ../input/template_toc.txt template_module
```

It is also possible to edit the existing "create" script files to match your preferences and thereby avoid the usage of the command line parameters, i.e.

- under Windows edit

```
ffgf/create_template_win.bat
```

- under *nix edit

```
ffgf/create_template_nix
```

The script will start and give you some information about its progress. When the script finishes you can find the resulting files in the following directory:

```
ffgf/output/module directory name/
```

For every chapter a sub-directory has been created and the files for the section entries have been placed accordingly.

```
ffgf/output/module directory name/1/  
ffgf/output/module directory name/2/  
ffgf/output/module directory name/3/  
ffgf/output/module directory name/4/
```

In a chapter directory you'll find three files for each section entry. The HTML frame (<section_entry>.html), the PHP file (named <section_entry>.php) and the content file (named <section_entry>.cont).

3.5. 2.3 Edit the Content Files

After you've run the start script for the first time, the created content files (<section_entry>.cont) should be empty. Now you can fill them with the content for the respective section entry. Of course, the file name for a section entry must not be changed when saving your work.

The format of the content file is XHTML. Since the header, the title and the footer are written by the PHP file, you can start right with the text and/or images:

```
<p>  
No title, e.g. &lt;h1&gt;, is needed, since it will be written  
by the PHP file.  
</p>  

```

3.5. 2.4 Edit the Module Specific Files

The module specific file can be found under:

ffgf/output/module directory name/module_specific.php

This file will only be created if it does not exist already. It contains some specific settings for the created framework. You only need to edit the first two variables, i.e. replace \$title and \$author with the values matching your module.

```
$title = "module name";  
$author = "first author, second author";
```

3.5. 2.5 Run the Start Script Again

When using a HTML editor to add your content to the section entry files, such an editor will also add HTML header and footer information. As explained above this information will be written by the PHP file and is therefore not required.

To make sure your edited content files match the requirements of the PHP file you'll need to run the start script again. Note that existing content files will not be overwritten. The script will check for unnecessary header and footer information in the content files and remove them if encountered. For safety reasons a backup file of the current content files is created before changing anything.

3.5. 3 Maintenance of the ffgf

Because of the simplicity of the ffgf, there are some things to be aware of.

Every time you change the Table of Contents the start script needs to be run to apply your modifications. However, when you rename or remove a section entry in the Table of Contents, the respective files (HTML frame, PHP file and content file) will not be renamed or removed. In case of renaming a section entry it means that two new files will be created and the two files with the old name will stay in the respective chapter directory.

Every time you want to publish your files on the Internet and you have changed your content files the start script needs to be run to check for unnecessary HTML header and footer information.

Because of the two maintenance points mentioned above you might want to use this tool only, when your Table of Contents is in a rather fixed state (i.e. no big changes are expected).

3.6 WebCT Integration

3.6. 1 Preparation & Indexing

When you want to upload your files into WebCT you should zip all the files and directories in your module directory (except the backups *.bak)

*ffgf/output/module directory name/**

After uploading the file into WebCT and unzipping it into your module directory you can simply start to index the HTML files into the Table of Contents of your module "Add file". As the file name contains the section number the order of your Table of Contents will be correct, when you start with the upper most file of your module and continue downwards. It is also possible to index multiple files at once, e.g. indexing files belonging to the same section. You only need to correct the indentation of the entries.

3.6. 2 Customization of the Table of Contents in WebCT

To also apply the common design to the Table of Contents of your module the following steps are required:

1. On the Table of Contents page of your module select "Designer Options"
2. In the right frame of the window under "Actions" click "Edit Content Module Settings"
3. At the bottom of the page under "Page numbering" select "Hidden" and click "Update"
4. At the bottom of the right frame of the window under "Customize Table of Contents" select "Edit/Add upper textblock" and click "Go"
5. Paste the following code into the text field and click "Update":

```
<link rel="stylesheet" href="/_COURSEID_/design/vitels_style.css" type="text/css"/>
```

```
<body class="lightgray">
```

5. In the right frame of the window select "Edit/Add lower textblock" and click "Go"
6. Paste the following code into the text field and click "Update":

```
</body>
```

4 References

XHTML 1.0 <http://www.w3.org/TR/xhtml1/>

HTML 4.01 <http://www.w3.org/TR/html401/>

CSS 2 <http://www.w3.org/TR/REC-CSS2/>

Mind Maps <http://members.ozemail.com.au/~caveman/Creative/Mindmap/>

Presenters Online http://www.presentersonline.com/training/train_bigindex.html

Inspiration <http://www.inspiration.com/home.cfm>

Appendix

Appendix A: VITELS Feedback Form, Paper Version

Dear VITELS student,

we hope you enjoyed the laboratory from the beginning up to the end.

VITELS is in a constant change, we try to improve the modules all the time. The modules are built and maintained by different partners; therefore they have different approaches and tools in their modules.

- | | | |
|----|---|---------------------------|
| 1) | Linux Installation and Configuration | Uni of Genève |
| 2) | Simulation of IP Network Configuration | Uni of Bern |
| 3) | Configuration and Performance Evaluation of a Real IP Network | Uni of Genève |
| 4) | Client/Server Programming | Univ of Neuchâtel |
| 5) | Protocol Analysis | Technical Uni of Fribourg |
| 6) | IP Security | Uni of Bern |
| 7) | Firewalls | Uni of Fribourg |

Your feedback helps us to improve VITELS. This questionnaire contains two sections:

- a) Experience Report
- b) Feedback

In the report section, you are asked to describe your learning experience with a specific module. Your tutor will distribute the modules among the students, in order to prevent that everybody writes about the same module. The feedback section allows you to provide feedback about all modules. You will be asked to assess specific areas or aspects of the course and to specify the concerned modules. For questions 16 and 17, it is recommended to give a short comment explaining what you specifically refer to in the module

a) Report

Please shortly describe your learning experience with the module _____ from the beginning up to the end. Make sure to mention the major positive experiences (“aha” and insights) as well as negative ones (problems and obstacles).

b) Feedback

1) Gender

Female Male

2) First Language

English French German Italian

3) Organization (where do you study?)

4) Study branch (what do you study?)

5) What kind of computer did you use for this course? (multiple selections possible)

Home Computer Work-Station Laptop

Other: _____

6) Operating System (multiple selections possible)

Windows: 98 NT 2K XP Linux Unix Mac:

9.x X

Other: _____

7) Connection (multiple selections possible)

LAN ADSL/Cable ISDN Modem 56kbps

Other: _____

8) Web Browsers (types and versions)

Answer:

9) Place of pre lab work (multiple selections possible)

Home Office University, School...,

10) Place of lab work (multiple selections possible)

Home Office University, School...,

11) Place of post lab work (multiple selections possible)

Home Office University, School...,

12) What was the best pedagogical* contribution or strength of the course? Why?

13) What was the worst pedagogical* contribution or strength of the course? Why?

14) What kind of learning activities could have been added?

14) What kind of learning tools could have been added?

15) Is there any need that you perceived as you worked and that was not fulfilled?

16) Do you have any suggestion to enrich our learning activities / learning tools?

17) Could you recommend this course to others?

* Pedagogy is the strategy that we have adopted in the course to help you learn. It is manifested by the learning activities that we have planned and set-up for you, what we asked/suggested you to do and the tools that we offered.

Virtual Internet and Telecommunications Laboratory of Switzerland
Didactics and Design Guide v1.0, April 2003

18) If you did **not** like some parts or aspects of the course, indicate the areas and the specific modules that caused problems: (Make sure to provide a brief comment explaining the problem and identifying to which module it applies)

Area/Module	1	2	3	4	5	6	7	Comments
Connectivity - download speed								
Connectivity - uptime of the lab systems								
Own hardware								
Own Software								
Course Software								
Reservation system								
Was the content adapted to the learning objectives?								
How could the content be improved?								
Quizzes								
Feedback of the tutors - quality								
Feedback of the tutors - quantity								

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Didactics and Design Guide v1.0, April 2003

19) If you **especially like** some parts or aspects of the course, indicate the areas and the specific modules that are concerned: (Make sure to provide a brief comment explaining the problem and identifying to which module it applies)

Area/Module	1	2	3	4	5	6	7	Comments
Connectivity - download speed								
Connectivity - uptime of the lab systems								
Own hardware								
Own Software								
Course Software								
Reservation system								
Was the content adapted to the learning objectives?								
How could the content be improved?								
Quizzes								
Feedback of the tutors - quality								
Feedback of the tutors - quantity								

20) Anything that was not covered above:

Appendix B: Étapes proposées pour la création d'une carte conceptuelle

ETA-6709 Étapes proposées pour la création d'une carte conceptuelle par Jacques Viens

Plusieurs méthodes peuvent permettre de réaliser une carte conceptuelle. Nous vous proposons ici une technique qui s'apparente aux premières étapes de la construction de modèles mentaux proposées par Gentner & Stevens (1983).

1. Énumérer les concepts importants.

Énumérer tous les concepts qui viennent à l'esprit, ne pas discriminer.

Analyser la liste et voir si des concepts importants manquent.

2. Établir des relations entre les concepts.

Trois types de relations permettent de regrouper les concepts:

- . **location** (temps et espace)
- . **partie/tout** (est une partie de, possède)
- . **inclusion de classe** (est une sous-catégorie de, contient la sous-catégorie)

D'autres relations peuvent mieux représenter d'autres liens :

- . **de caractéristiques:**
 - . partage des caractéristiques avec
 - . est différent de
- . **d'actions:**
 - . influence/est influencé par
 - . origine de/mène à
 - . synthétise/est synthétisé par

Il faut essayer de relier les concepts et d'établir des relations entre eux. On peut se poser des questions comme: qui fait partie de quoi? Qui influence quoi? Sous quelles conditions? Il peut être utile de regrouper les concepts sous différentes structures. Rappelez-vous qu'il n'y a pas de structure idéale, seulement des points de vue et des niveaux d'analyse différents sur les concepts.

3. Organiser une première version de la structure.

Certains concepts seront faciles à regrouper, d'autres seront plus difficiles. C'est souvent en relation avec le de point de vue que vous adoptez lors de l'analyse des

concepts. Essayez de changer de point de vue ou de perspective pour identifier de nouvelles relations entre les concepts. Deux stratégies peuvent être explorées: 1. organiser d'abord les concepts en petits groupes pour ensuite passer à un niveau d'organisation plus général, 2. organiser d'abord le cadre de référence général en prenant les concepts les plus englobants et, par la suite, préciser les relations avec les autres concepts à un niveau plus détaillé.

Ne vous en faites pas, créer une carte conceptuelle est un travail difficile qui demande une certaine période d'exploration.

4. Évaluer les structures résultantes et le modèle général.

On peut se poser les questions suivantes:

- 1-La carte conceptuelle est-elle compréhensible?
- 2-En résulte-t-il un cadre de référence cohérent?
- 3-Les concepts importants sont-ils tous présents?
- 4-Les relations importantes sont-elles identifiées?
- 5-La présentation visuelle est-elle attirante? trop lourde? trop complexe?
- 6-Que pourrait-on changer pour améliorer la carte conceptuelle?

Vérifier les perceptions des autres étudiants et bien sûr,

5) Modifier la carte conceptuelle en fonction des résultats

La révision de la carte s'opère sur plusieurs cycles. Nous raffinerons la carte tout au long de la session. Idéalement, vous devriez **terminer avec en votre possession**:

- A) **Une série de groupes de concepts organisés en une ou plusieurs structures.**
- B) **Un court texte (1 page) exposant le rationnel** de votre carte conceptuelle.
- C) **Vous pouvez ajouter:**
 - a) des définitions de certains termes
 - b) des synonymes
 - c) des images
 - d) des conditions éclairant certaines relations

N.B. Lorsqu'on produit la carte dans un environnement informatisé interactif comme Supercard, des boutons interactifs, des textes et des images peuvent enrichir la présentation de votre carte conceptuelle.

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