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Costs and Financing of eLearning

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1. Introduction

Even though the hype has abated, eLearning is still on the agenda in higher and in further education. However, its importance seems to be decreasing and new questions have arrived. For a long time eLearning was to a large extent driven by technical and technological developments, but now the discussion is turning more and more to quality and cost-effectiveness. The sustainability of eLearning-projects and programmes is (one of) the most important challenge(s) if eLearning is to survive.

The question of the return on investment or the costs and benefits has been discussed to a certain extent but merely from the viewpoint of large-scale enterprises, for which eLearning surely will decrease costs and increase benefits. But what about small and medium enterprises and – of particular relevance for the study at hand – what about (traditional) universities?

What does it cost to prepare and to run online instruction for students who cannot be forced to rely on eLearning and what are the returns to it. However, looking at the eLearning-market for traditional students, i.e. students in their twenties and learning for their first degree (bachelor, master or diploma) it does not appear that eLearning is a big market where it really pays off to invest in eLearning. A side effect of this study is the impression that (traditional) students do not request online instruction that much. On the contrary, it appears that most of them refrain from it. And to a large extent even the suppliers do not develop eLearning-programmes because of its improved effectiveness (which is so far not proven for higher education) but mainly for two reasons: the first is their personal interest and the second is the opportunity to get funds for development.

However, one of the most important questions has not been answered yet: what does it cost to plan, to develop and to implement online programmes. Is it cheaper or more expensive than traditional face-to-face classroom instruction? Anyhow, the latter question will also not be answered in this study because we do not compare eLearning with classroom learning, but we will give an indication of what the costs to be expected are, when eLearning comes on the agenda for a university professor and his staff, a department or even a faculty or a network of university departments.

To derive these figures we will start with an introductory overview on costing issues to provide those readers that are not familiar with costing matters with the necessary background. In this section we will explain the terminology and the basic concepts of costing.

In the second section we will give an overview on the activities that are involved in the planning and preparation, the development and the implementation of an eLearning project. However, the overview will present more activities than a normal project because some might be of relevance only for a number of online courses while other activities are important for other projects. This, the major issue is to derive a more or less comprehensive overview of the activities possibly related to establishing eLearning courses and programmes.

The third chapter combines the first two and presents the transfer into the costing study. We therefore derive the questionnaire and provide an impression of the structure of the interviews.

The next section will then present a summary on the findings of the case studies with a differentiation on the size of the programme developed. We will separate the case studies on the basis of whether they develop a course usually lasting one semester or whether they develop a complete study programme lasting for at least two years. The next step would be to come up with the figures for establishing e-Universities or the like. However such an approach would have two disadvantages. The first is that the number would be very small as long as we concentrate on German institutions and the second is that, so far, we could only rely on planning figures, as a "German eUniversity" has not yet been established. Well, this viewpoint might be considered as neglecting the regional organisations, such as the virtual campus of Bavaria or virtual campus of Baden-Württemberg. On the other hand, another set-up that we could take into consideration is a network aiming at the development of subject-based 'content and knowledge libraries'. The idea of these libraries is to provide all the knowledge on a certain subject as a 'knowledge base'.

The presentation of the case study findings is divided into three sub-groups, based on the scale of the project. The first group is small projects, usually aiming at providing one course, lasting one semester. The second group is medium-scale projects comprising a number of modules and serving as a two-year programme. The final group comprises large-scale projects and intend to provide content for longer study programmes. However, while the findings of the first two groups enable us to provide more or less certain results, the findings regarding the large-scale projects should not be considered that way. So far, we can rely only on two case studies where one is in the development phase and the other is directed at the provision of eBooks. Thus, even though we present preliminary findings there is some more investigation required.

In chapter five we will present each of the case studies that were conducted so far to derive the summarised figure in the chapter before.

However, we also should highlight rather early that costing eLearning and other university projects is a very critical task if those whose activities are to be costed do not write down their time input for certain tasks. And even then it might not be very accurate because often things interfere which are not directly related to the genuine task or object. For example, while gaining information by talking to someone we may also talk about something else or our Internet research is interrupted because of someone entering the room and beginning a discussion. This talk can then be directed at another project or something, which might be difficult to specify later on. Thus, for purist, the following figures will not provide really accurate figures but are estimates on the time input.

And it should not be ignored that some interviews were affected by discussions about this topic. Several interview partners highlighted that they did not write down for whatever purpose their time was spent exactly. We also experienced that some of those who were interviewed mentioned the impression that the particular time requirement may comprise some tasks which were undertaken only once or the estimation was too extensive, for whatever reason, when later reviewing the draft version of their case study. However, a difficulty of every case study and interview is that it is more or less impossible to specify the time requirement for certain activities in detail. Therefore, there will be some uncertainty about the final quality of the figures presented. However, usually the findings across the case studies appear to be stable.

Therefore, the following figures should not be regarded as exact figures but as an approximation of the real figures and we would like to ask the reader to read every figure 'as being in the range of …' even if the figure may appear to be clearly specified. Writing every time 'the time input is in the range of about xx days would be appropriate, but the report would probably not be very readable. Therefore, we decided to refrain from this approach.

2. Introduction to the Costs of eLearning

2.1 Introduction

Before going into the details of costing eLearning projects it seems advisable to introduce those readers who are not familiar with economic terminology to some basic topics and the terminology of costing education.

Everyone who is involved in online learning can incur costs. This comprises the university, the student and the faculty member who is involved in programme development or delivery, administration etc. The costs (and benefits) of all these stakeholders can be envisaged at the micro level of eLearning. At the macro perspective we would have to consider the social costs (and benefits). Thus we would have to include the effects on tax income and social insurance contributions etc.

Yet, the study at hand will concentrate on the costs of the institution that is responsible for the provision of the online programme. Thus, we consider the level of the provider, i.e. generally the university and its departments.

The next section will draw the reader's attention to the economic terminology of costing.

2.2 Terminology and costing concepts

2.2.1 Principles of budgeting and costing

There is a general differentiation between budgeting and costing. The former refers to financial planning and includes all money that is planned to be spent within a certain period of time. In Germany a fiscal year usually lasts from January 1 to December 31.

Costing includes all costs and this means that not only the expenditure during that period is included but also expenditure of previous periods can be incorporated if consumables or buildings and equipment which were bought before that particular period are used. For example, a computer (price: EUR 1,500) bought on January 1, 2000 can be utilised for e.g. 3 years, i.e. until December 31, 2002. The invoice is paid in early January 2000, thus the expenditure in 2000 is EUR 1,500 and zero in 2001 and 2002. The costs are spread over the three years of utilisation, i.e. EUR 500 p.a.[1]

For analysis, expenditure is divided into four categories:

- Human resources (staff),
- Premises and accommodation,
- Equipment and furniture,
- Stocks, supplies, consumables and expenses.

[1] It can be left open here whether costs are assessed with depreciation or with the opportunity costs of capital input.

The costs and expenditure for human resources cover all people on the payroll including their on-costs such as social insurance contributions, employment taxes and company benefits. Whether external consultants or contracted (external) people are part of human resources is debatable. In general, we would suggest that they are accounted for as separate group.

Premises and accommodation covers (Rumble, 1997):

- The purchase of a building,
- The costs of putting up a building,
- Rents,
- Rates (a tax levied on the occupation or ownership of land and buildings),
- Insurance of buildings and their contents,
- Utilities (heat, light, water, power), waste disposal, telephone, fax, etc., unless these are charged to a particular department and treated as an expense,
- Repairs and maintenance (direct labour plus materials, or outside contractor charges plus management and supervision costs),
- Grounds and gardens,
- Porters,
- Security,
- Cleaning and
- Management and supervision of all these activities.

Equipment covers plant, machinery and tools and is expected to last for a number of years. If it can be used in general for one year only it is considered as consumable which is valid also for 'equipment' of minor (monetary) value such as chairs etc.

"Stocks, also called 'inventory', are holdings of goods and raw materials and components, work in progress (i.e. partially completed stocks), or finished goods (i.e. completed manufactured goods held for sale)" (Bates, 1997, p. 8). Examples of stocks with respect to the topic we are dealing with in this study are, for instance, course texts and cassettes.

Material used in production and of which the determination of how much is used is difficult or impossible are considered as supplies, such as toner for laser printers. Consumables are used for production but are not part of the product, like stationery. And expenses are costs of something other than material, for instance, travel and postage costs.

Some other terms will be used to distinguish between different costs which will be introduced here.

2.2.2 Capital and recurrent or operating costs

The distinction between capital and recurrent or operating costs refers to the regularity at which these costs arise. Capital costs generally occur only once over a couple of years although the number of years may differ. A building will last for – let's say – fifty years while a computer has to be replaced after 3 to 5 years. In contrast, recurrent or operating costs arise every year, e.g. for staff, electricity, cost for providing services etc.

Although this distinction might be plausible in general, it is questionable in detail. For example, teaching materials like books are often used for a number of years, but are often considered as recurrent costs.

2.2.3 Direct, indirect and opportunity costs

Direct costs are costs which are directly linked to a certain activity. For instance, if a lecturer giving a course or if a CD is produced for a particular course, all costs corresponding to the development and the production of the CD are direct costs. Other costs, e.g. for administrative and support staff are indirect in that they are not directly linked to the course or the production of the CD, such as secretarial work or material that is used for a number of courses is considered as indirect costs. Accountants often use the term 'overheads' to describe any cost other than a direct cost identified with producing a service or product.[2]

Sometimes, opportunity costs are also regarded as indirect costs. Opportunity costs arise whenever the consequence of an activity is that another activity cannot be undertaken. For example, while writing this report I cannot conduct another project where I might gain income. This lost income is the opportunity cost of my activity, writing this report. The consequence is that every activity will be costed with its time input even if the respective person is paid in any case, whatever s/he is doing. This will also lead to higher costs than expenditure.

For example, the professor who supervises a project is generally not paid for his project activities because he receives his salary from the university and is expected to do this su-

[2] Rumble (1997, p. 23) points out that there is room for confusion because the term "overhead costs, which is also used, technically applies only to the sum of indirect expenses, indirect labour cost and indirect material cost – all of these being production costs. The term overhead refers to selling and administrative costs as production overhead costs. To avoid confusion some writers refer to *'production* overhead costs' and 'overheads'." (Italics in original)

pervision without additional payment. If the supervision was not carried out by the professor, someone else, who might have to be paid for it, would have to do it. Thus, expenditure would be incurred.

One could also argue that if the professor did not spend his time on the project but on another he may earn additional income. Therefore, it is most appropriate for the calculation and to incorporate all costs.

2.2.4 Fixed and variable costs

Variable costs change with the number of students or student study hours, depending on the particular unit under investigation. In contrast, fixed costs do not change according to the unit but provide the basis for production, course delivery or whatever. Some refer also to semi-variable costs to define costs which are fixed over a certain range of activity but are variable if that range is left. For example, for a course of 15 or 25 students one lecturer is needed, if the course has more than – lets say – 50 students another lecturer might be employed.

Variable costs may move linearly, increasing or decreasing. In case of linearity the costs change by the same amount whenever another unit is added, the costs of this last unit are also called marginal costs. Increasing marginal costs may arise under certain conditions, but are usually rare. An example of increasing marginal costs might be when another co-operation partner has to be integrated. In this case the time for meetings may increase over-linearly as the number of contributions will increase due to cross-references.

In relation to the context, decreasing marginal costs are more important, that means the costs of the second additional unit are lower than the cost for the first one. Online courses (without tutoring) may be a good example with relevance to the context. The cost of another student is very low (sometimes close to zero) compared to the first student. Here, the average costs decrease with every student attending such a course. Here, economists speak of economies of scale.

2.2.5 Average and marginal costs

The average costs relate the total cost to a total number of appropriate (output) units. What these (output) units are depends on what is investigated and what is the most appropriate unit. In many studies on educational costs the number of students is regarded as

the output unit.[3] Another measure is the cost per student contact hour combining the number of students with the number of hours spent (on average) to study some material per student (Bates, 1995). Such a unit cost approach might be of interest when looking at different options in deciding which technology should be applied to a certain course. Different costs per student contact hour can be a signal. For the study at hand, it would mean estimating demand for certain courses, which is a very crucial task depending on too many (arbitrary) assumptions. Even if they fit under certain circumstances they would definitely not be appropriate for another situation but simulate a situation or result that is unsuitable.

Some recent studies investigating the costs of online learning have started to identify the cost per hour of student learning (see e.g. Hülsmann, 2000). This measure relies on the number of hours necessary to learn a particular module or course, often related to the number of credits. When we started with the investigation it appeared this approach was a good indicator and a good unit for the costs of an eLearning-project. While conducting the study it proved to be impossible as there is no chance of observing the time requirement of the students for a certain eLearning-programme. We therefore refrain from defining the student learning hours as possible unit to calculate the average costs.

If one tries to calculate the unit costs it appears to be best to relate it to the number of students requesting a course because the costs may rise (or fall) when another student attends this course.

The marginal costs then would refer to the enrolment of this additional student. For example, when the particular session under investigation is based on video-streaming, an additional student probably will not alter the costs. Thus, the marginal costs are zero. In contrast, the costs of a cbt-course will rise, at least because the CD-ROM has to be prepared (burnt) and delivered to (or collected by) the student. The marginal costs will be higher than zero.

From the viewpoint of the university entity that plans to provide eLearning instruction the question of average and marginal costs may also refer to the number of sessions. The average costs are the total costs divided by the number of sessions, and the marginal costs are the costs of an additional session.

[3] From a general point of view one could question whether students or even graduates are the output of an educational institution. From my understanding it seems more appropriate to regard the particular course (hour) as output because this is what students request. The number of students or participants is (realised) demand for this course. This does not affect measures like "cost per student" or "cost per graduate".

Obviously the definition of the appropriate unit which is essential for the calculation of the average and marginal costs depends on what is considered. It might be the introduction of one additional unit, one more student or the extension of an online course by one hour.

The definition of the unit will impact on the concrete results. The marginal costs of another student watching a course on the TV can be zero if he joins a group of people. Even if he watches at home using his own TV he does not increase the costs of the provider but his own costs. If the marginal costs are zero the average costs of a course with (n+1) students are lower than for n-students. To be accurate the average cost will decrease whenever the marginal costs for student n are lower than the marginal costs for the previous student (n-1).

2.2.6 Production and delivery costs

The distinction between production and delivery costs is relatively new and seems to have been introduced with the upcoming of the new learning technology although they can also be distinguished in the context of traditional classroom teaching.[4] However, the differentiation is of much more importance for online learning where the production costs are often far higher than the costs of delivery.

The production costs refer to the planning, designing and development of the teaching materials whether a film, a CBT- or a WBT-course. Thus they determine the costs of most activities which are a necessary pre-requisite for course delivery. The production costs can be expected to rise with technology, its sophistication and quality.

In some cases, e.g. CBT-courses, the costs of delivery will tend to be zero while for tutorial courses they will rise with the number of students and are of real importance for the total costs.

Having defined the terms to be used in the rest of the report we can now provide the floor for the investigation of the eLearning costs. This will be conducted on the basis of an activity-based approach.

[4] Although I do not agree – and I think that many teachers and lecturers would not – Bates (1995) argues that the costs of teaching tend to be the same each year. In contrast, the relation between production and delivery costs will change dramatically for online learning.

3. An activity-based costing approach

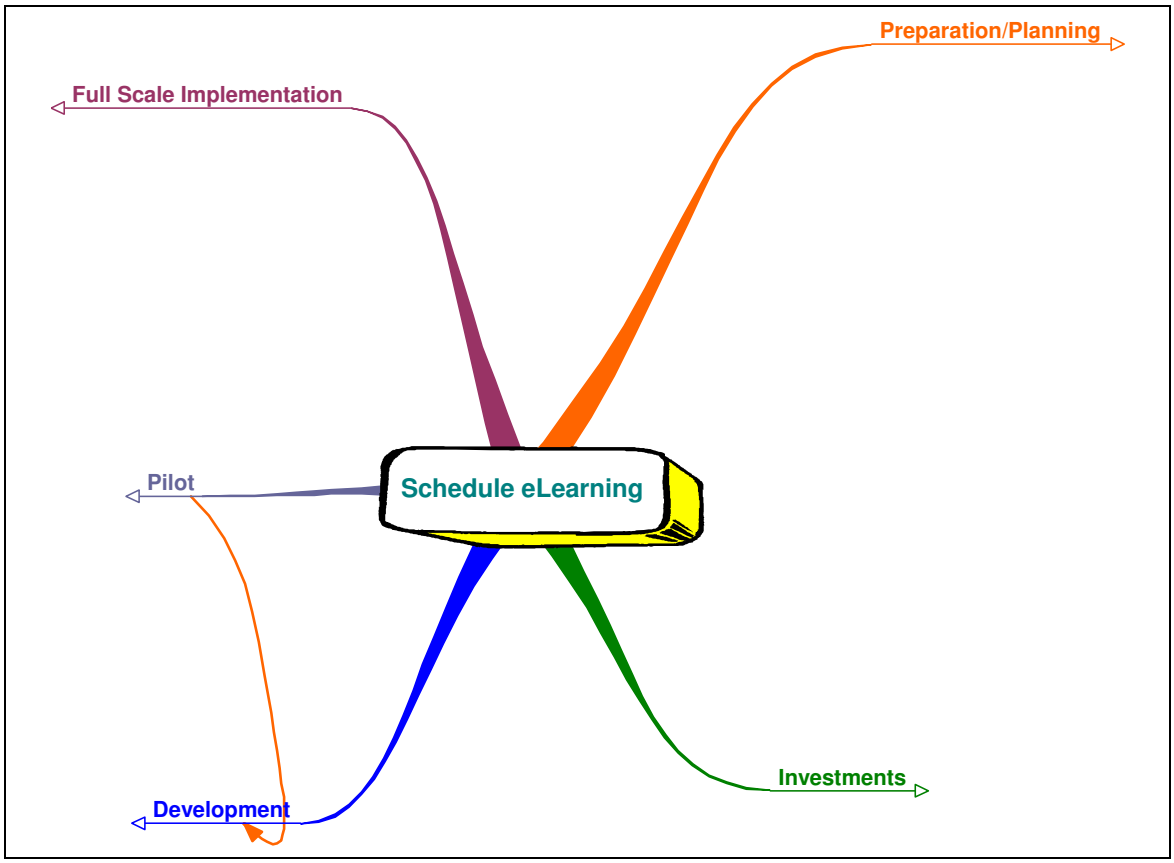
The costs of eLearning shall be estimated on the basis of the activities to be undertaken during an eLearning project. We therefore will divide the whole eLearning project into a number of activities leading us through the several stages. Starting from preparation and planning it comprises all major activities up to evaluation and controlling.[5]

An eLearning project can be subdivided into five major steps (see also Picture 1):

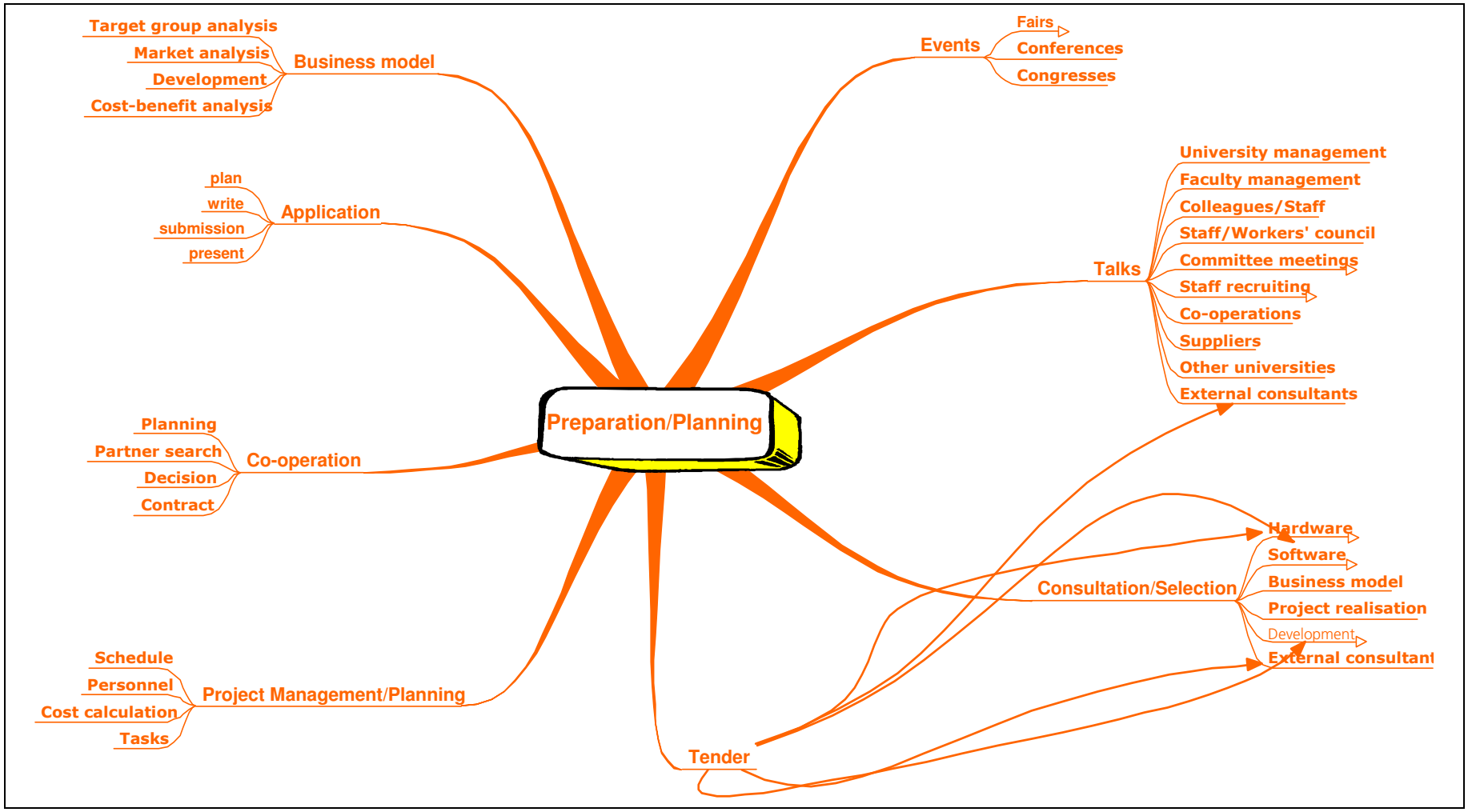
1. Preparation/planning
2. Obtaining technology and infrastructure
3. Development
4. Pilot
5. Full-scale implementation.

The tasks that may be fulfilled during each of these steps will now be presented in more detail. However, it should be taken into consideration that none of these tasks has to be conducted necessarily where it is presented and discussed within this framework. Nor is the list to be regarded as comprehensive. The "list of activities" should be considered as examples of which tasks may take place when. Some will be conducted at another stage, another time or even take place repeatedly at several points during the project. And, some might be irrelevant for a number of projects.

[5] It should be highlighted that the only aim of this chapter is to identify all the activities but not to describe them, as it would be the aim of a project management tool book. The reader who has no experience with eLearning and who wants to know more about the details and the background on how to run such a project and what to be undertaken and why is recommended to consult the particular project management literature on eLearning.



Picture 1: A five step eLearning project matrix



Picture 2: Preparation and planning tasks

3.1 Preparation and planning

Considering a project matrix narrowly it might appear that preparation and planning of a project are two different tasks that can be distinguished more or less clearly by something like a very formal decision. However, a number of tasks cannot be clearly allocated to the one or the other project stage.[6] We therefore decided to combine these steps into one, more comprehensive, step: preparation and planning (see Picture 2).

It should be pointed out that this approach has also some consequences for the overall costs of an (publicly or privately funded) eLearning project because the costs presented in this study may differ from the amount of money awarded. This is due to a different approach. If we looked at the project in the formal sense a number of activities considered in this study are usually not part of the project application but part of the application procedure. For example, we also include the time and the cost that is necessary to prepare and submit the application for the funding agency but this is not incorporated in the calculation of the budget application.[7]

If one would try to follow a more or less comprehensive approach it would mean starting from the very first beginning of a project, i.e. the moment when the idea of an eLearning project emerges. Even though it is evident that such a moment cannot be specified exactly, highlighting this topic should be considered as broadening the horizon in identifying possible tasks to be conducted during such a project. Often, the next sub-steps are talks with colleagues and (superior) staff to gather information and to see what they think about the idea.

If someone is not yet familiar with the topic documents, articles and books will have be identified, printed, borrowed or purchased and read. The major cost of this information gathering process is time (an opportunity cost) and the cost of purchasing the literature. In practice it is more or less impossible to specify the time that is spent on this task. And the costs for purchasing books usually cannot be specified as they are purchased by the university library and are thus not accounted for. The major information therefore is that it should be taken into consideration that this activity might consume some time which also could be spent on other purposes.

6 We also realised during our interviews that project phases are really mixed up and that some activities related e.g. to development are undertaken during the preparation and planning phase in order to prepare the application for public funding.

7 However, we realised that to a certain extent some project applications obviously comprised a hidden time input for the preparation of new projects. Sometimes, it also appeared that the project application was more or less to reimburse the costs for a project that, in fact, to a large extent was already finished.

For the same reason of gathering information and familiarising with the topic and, furthermore, to get an overview of the market, trade fairs may be visited. The same might be valid for conferences and other events. Besides the time required for participation the direct costs are travel and accommodation expenditure and the participation fee. If one would try to be very detailed, the higher cost of food expenses would also have to be considered, which in Germany is usually is reimbursed on the basis of lump-sum payments, so-called "Verpflegungsmehraufwand". However, in practice it would be very (too) time consuming to identify all the costs involved in this activity so that we will have to concentrate on the time input and the travel expenses for larger, i.e. more than one day, conferences and trade fairs. All the smaller events will not be incorporated in this study most probably, as the projects do not have a computerised project accounting system allowing for a specified bookkeeping related to cost-centres.

The planning stage surely consists of the detailed planning process itself, i.e. identification of tasks to be conducted, time planning, and costing and budgeting. This task is often interrelated with the preparation of the application for financial support (from the university, ministry of education or other funding agencies, etc.).[8] The major cost here is the time required for the planning process. If the particular project is a co-operation project there may also be communication and travel costs for meetings etc.[9]

If the project cannot be conducted with already employed staff, new staff has to be recruited. This may require the preparation of a job description and the placement of an advertisement in journals. Candidates need to be selected and interviewed. The major cost of this activity is the time for selection of candidates, accompanied by travel reimbursements and the cost of advertisement. However, it appears that most projects recruit staff who are already known from their student days. Only one project interviewed pointed out that staff recruitment was time intensive with about 20 days. But as the corresponding costs could not be specified with an appropriate input of time, the costing is incomplete, because travel expenditure could not be reported.

To ensure that the project will be supported and approved by colleagues (university management, faculty management) and works committee or staff council, a number of talks may be necessary. Furthermore, the project development will be presented and discussed. The most important cost is the time input by all the persons involved. It appears

8 So far, only one eLearning-project did not include at least a small application for (external or internal) funding. The projects conducted without additional funding are those that are run out of the normal budget of a department, i.e. where it is prepared as part of the normal duties of the department.

9 To summarise certain kinds of cost the term travel costs generally comprises not only the travel fares but also accommodation and meals.

that this is sometimes a crucial issue in the preparation of projects if it is not supported but hampered by committee members. On the other hand, an impressive time input for presentation and discussion in meetings may also highlight the importance and the support of such a project.

The development of a business model might be advantageous though not natural, particularly not for German universities. Therefore, the particular market needs to be investigated, including potential competitors, market demand etc. The expected development of the market and of the project's own position (placement) might be gathered from studies, interviews etc. The expected economic development has to be transferred into an economic analysis of income and outlays to see whether the business model will be sustainable. The result can be translated into a return on investment (ROI). The major cost of this activity is – as usual – the time input. Sometimes, developing a business model might be interrelated with visits of fairs and conferences, so that costs cannot be clearly allocated to one or the other activity. However, none of the projects investigated so far had developed (something like) a business, although this was for some projects a prerequisite for public support.

If the project is organised in co-operation with another organisation, co-operation partners will have to be identified, and after talks about the co-operation a contract has to be negotiated. As well as the time requirement the major cost is travel expenses. And a first finding is that the co-operation and co-ordination costs of some projects are surprisingly huge. In one project we arrived at costs of more than € 280,000 (9 % of the project budget) for this purpose.

As immediate preparation of the next step (procurement of technologies and infrastructure), information on appropriate hard- and software, learning management systems etc. is required. Therefore, in most cases consultations with experts are necessary to make the right decisions. Here, as for most other activities, time is the most important cost. Other important costs might be travel expenses and communication. And, finally, depending on the amount to be spent, a tender procedure might be necessary for formal reasons. However, it was found that only two of the larger projects spent much time on this issue. And in one case the identification process of a platform was not successful but lead to the consequence that the platform had to be developed as part of the project, though it was not part of the application.

Finally, the project idea may have to be translated into a project application to get financial support or the financial means to run it. The application has to be written, submit-

ted and possibly presented personally. The major, if not only cost of the preparation of the application is time.

Before we turn to the next major step we will briefly summarise the corresponding costs of preparation and planning.

Costs

The major cost of these activities is time, an opportunity or indirect cost. Time is necessary for enquiries, reading, (project) planning, preparation of applications, communication, talks and consultations etc.

The direct costs in relation to these duties are:

- purchasing or borrowing (e.g. books): purchasing price or borrowing fee.
- printing documents and articles (from the Internet): costs of printing.
- communication: telephone charges, Internet charges, stamps etc.
- fees for joining conferences, trade fairs etc.
- travel (fares and accommodation, living expenses).

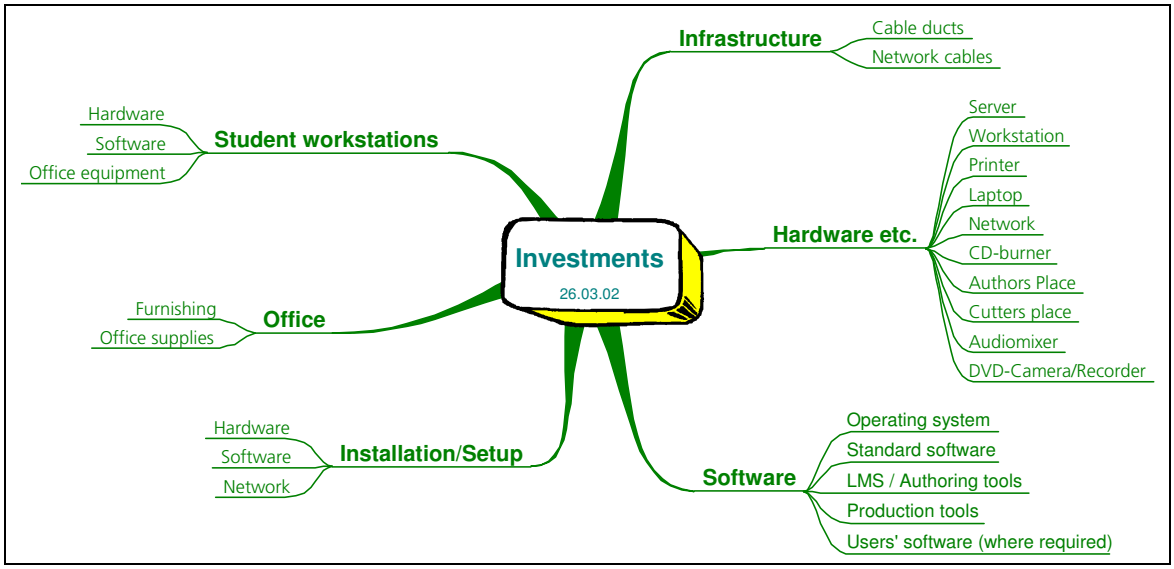
Before the development process can start the investment goods have to be purchased, which is often linked to very high costs. We will therefore consider the investment phase as a separate phase.

3.2 Purchasing technology and infrastructure (investment costs)

After consultation with experts, which has been assumed to have taken place in step 1, the particular technologies, software and the learning management system etc. are to be purchased (see Picture 3). The same is valid for office equipment like desks and chairs, shelves etc. Finally, some consumables are necessary. Although they are usually not regarded as investments, this appears the appropriate place to mention them.

The most important cost in this respect is the purchasing price of the commodities. However, an issue of discussion is what price should be accounted for in this study. Particularly software is sold at a special fee rate to universities so that the price they pay is lower than private entities would pay. It might therefore be appropriate to refer to the normal market price anyone else would have to pay. However, there are two reasons for not doing so. The first is a practical one; it would have been a very time consuming activity because we would have to identify the market rate for each of the investments goods. Anyhow, this would be possible in general if we had the detailed and specified informa-

tion what was purchased. Yet, as many other things, this proved more difficult than expected. From several institutions we got only a rough figure on the price and the goods purchased. Therefore, it would not be possible to identify the prices for these commodities. The second reason is, that this study is primarily for readers in (public) educational institutions who themselves would be in a position to get the software at the same rate. Thus, it is not necessary to conduct a comprehensive market study on the price levels.



Picture 3: Investments for an eLearning project

Furthermore, for all but one institution investment was only undertaken in relation to hard- and software but not for other equipment which is generally provided by the particular university. Additionally, it is often not only used for the respective project we are considering here. It would therefore have to be considered as an overhead cost, if we were in a position to get adequate information, which is often not the case. Another approach would be to undertake a separate study on the equipment available etc. which would be a very time consuming task with a result that is unimportant for most readers because they will also have the equipment already available. Thus, the investment cost for equipment will not be specified in this study.

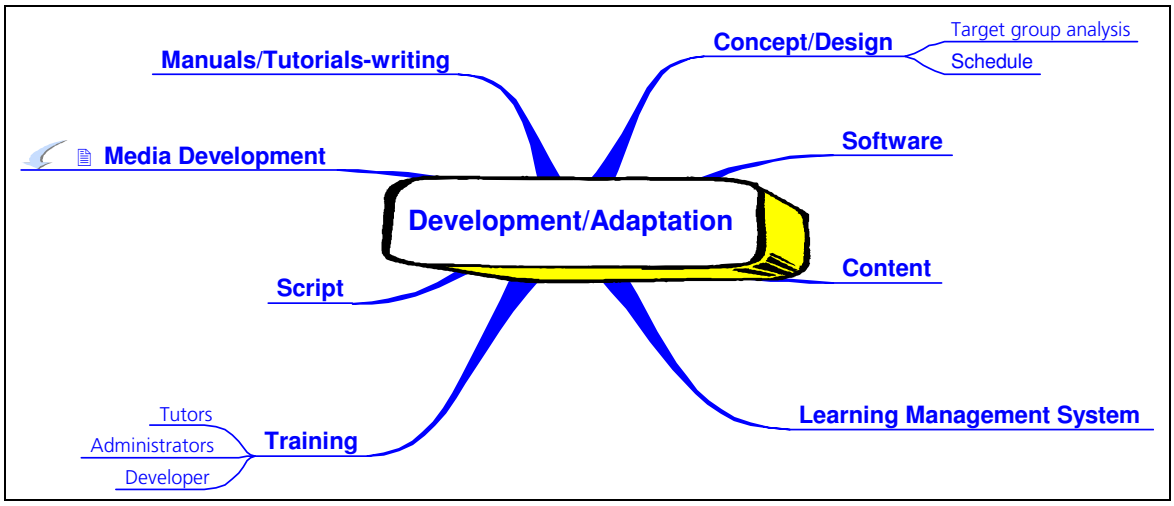
It should be taken into consideration that cable ducts, cables and (telephone and communication) lines are part of the infrastructure and, thus, should be accounted for, if not already available. That means that preparatory work for the establishment of the network etc., i.e. the infrastructure, should not be forgotten within the project-planning frame. The same is valid for the installation of software onto the computers etc.

However, none of the projects investigated had this cost, because they relied on university accommodation with appropriate facilities.

3.3 Development

After procurement, establishment and installation of hard- and software one can start with the development of the online courses and its medial products (see Picture 4). However, one of the first needs might be to train the particular staff providing them with the knowledge to develop online learning programmes etc.

The corresponding cost is the time of the (internal) trainer and those who are to be trained. In case of an external trainer the fee rate of the trainer or the participation fee would probably be the major direct cost. If training is outside the university, travel expenses and accommodation has to be included. In some cases also the cost for selection of the trainer or the training company would have to be added. If the staff is sufficiently prepared for developing the online course one can start the development process in the narrower sense.



Picture 4: Development and adjustment

Following Tiemeyer (2001), the first step will be the analysis and definition of the target group, followed by a specification of their educational needs. Information and material will be gathered to structure the content. The strategy of instruction and learning as well as necessary standards need to be defined. All this will be very time consuming and involve a number of people. The major, if not the only cost of this activity is the opportunity cost for the time input. Direct costs may arise particularly if external staff is deployed for certain tasks.

Before starting with the second step, to conceptualise and to design the online course, a strategic decision has to be made. The question is whether to buy or to make the course. If courses are (partially) purchased, those who will produce the course have to be as-

sessed and chosen.[10] In the latter case, content has to be structured; the methodological concept has to be developed (instructional design). This includes the question of how students will be advised and supervised (synchronous or asynchronous), which sub-unit will be taught when and, if whether and where teleteaching, teletutoring or telecooperation will take place. Along with the instructional design goes medial and technical design, comprising all questions and tasks related to the online learning course (Tiemeyer, 2001):

– Elements of presentation such as text, graphics/pictures, animation, simulations etc.
– Required elements for steering interaction and process.
– Case studies.
– Feedback elements (learning accounts with failure analysis, tutor contact, workshops).
– Test elements (multiple choice, cloze tests, reconstruction of complex cases and case studies).
– Additional material (for print).

The result of all this should be an integrated concept for the online course that can be combined with several elements.

The most important cost is – as usual – the time input of the staff involved. Whenever external experts and specialists come into play, the corresponding expenditures are direct costs. Another direct cost might be the price of literature that is purchased to gain more detailed information etc.

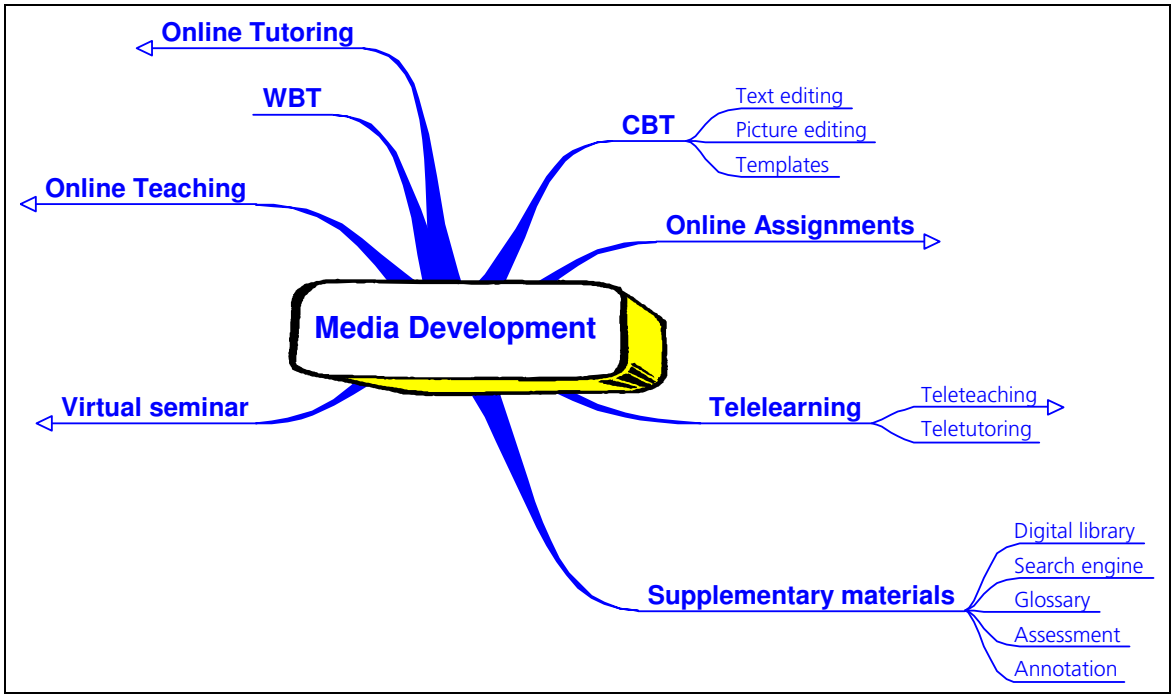
One of the most important activities in developing the online programme is content development for which sometimes external specialists are deployed. The content is sometimes provided as a study-book or disappears in animations or other applications. In this case the developing costs comprises also the cost for printing and binding the first study-book while these costs are to be considered as recurrent cost for the implementation phase. The size of the costs furthermore depends on the number of participants, as the costs of delivery if the booklet is sent by mail.

An interesting and important question related to content development is whether it is more cost-effective to generate the content with internal or external staff. If we look at the findings of the study at hand and other studies (e.g. Hülsmann, 2002) it seems that the latter is less expensive than the former.

10 The tasks to be undertaken are described somewhat more in detail, for example, in relation to the selection of investment goods (see above).

Some other costs more indirectly related to content development are the costs for copyright clearing which is often neglected. Only one of the case studies in this investigation clearly stated that they had this cost.

Depending on the particular mode of instruction pictures have to be identified and selected, templates be prepared, animations be developed etc.



Picture 5: Media development

Based on these steps and the decision which media shall be applied, which is part of the first step in this phase, preparation of concept and design, this media can be produced and implemented to run the (pilot) course. However, some additional material might be prepared, such as tutorials and manuals for those tutoring the course or advising students.

Here again, the major cost is time or salary for the people employed. The direct costs depend on the mode of delivery, as the materials for developing teletutoring courses are different from traditional WBTs and CBTs. They will be identified and listed more in detail in the cost calculation frame.

The cost structure of the developmental cost will highly depend on the mode of media applied. The developmental costs are expected to be higher for study programmes with less recurrent costs and vice versa. Lower developmental costs are combined with higher recurrent expenditures.

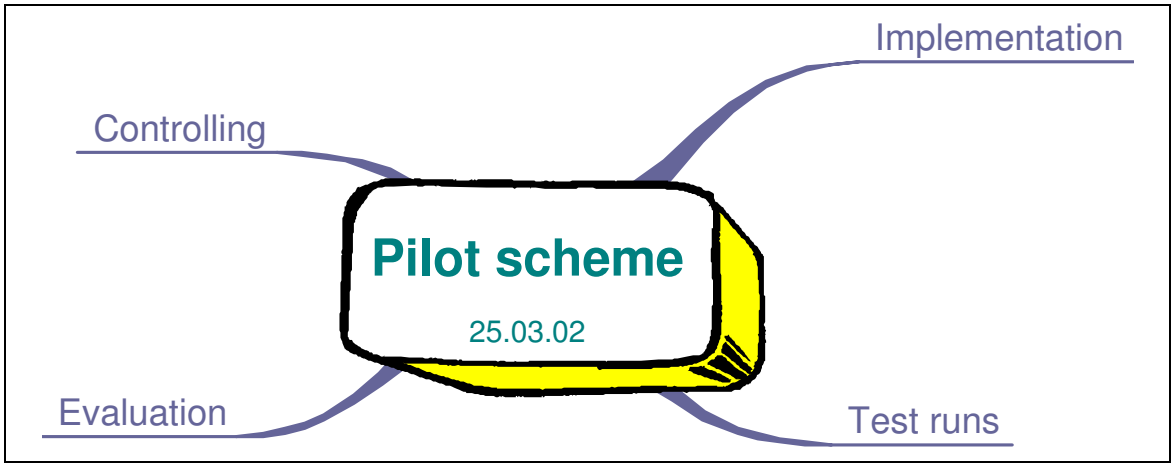
Summarising the previous section, the major costs are the time costs of the personnel involved. Possibly more than the other phases (except for online seminars) the develop-

mental phase might rely on external experts which is important for two reasons. One reason is that a university department might not have all specialists available that are necessary for content and media development. The second reason is that it might be cheaper to produce content etc. using external specialists.

Relying on external staff is linked to direct costs due to fee payments. Other direct costs are copyright clearing, the material used for the development and preparation of the different media. Costs for printing and binding may add up.

3.4 Pilot course

If the online course has been developed successfully, the pilot course can be started. This includes implementing it on a low scale and testing whether the programme runs as planned. If the programme does not work appropriately, one would have to return to step 3 (development and adjustment) to improve the respective features. Otherwise, the online course could be implemented on a full scale.



Picture 6: The steps of a pilot course

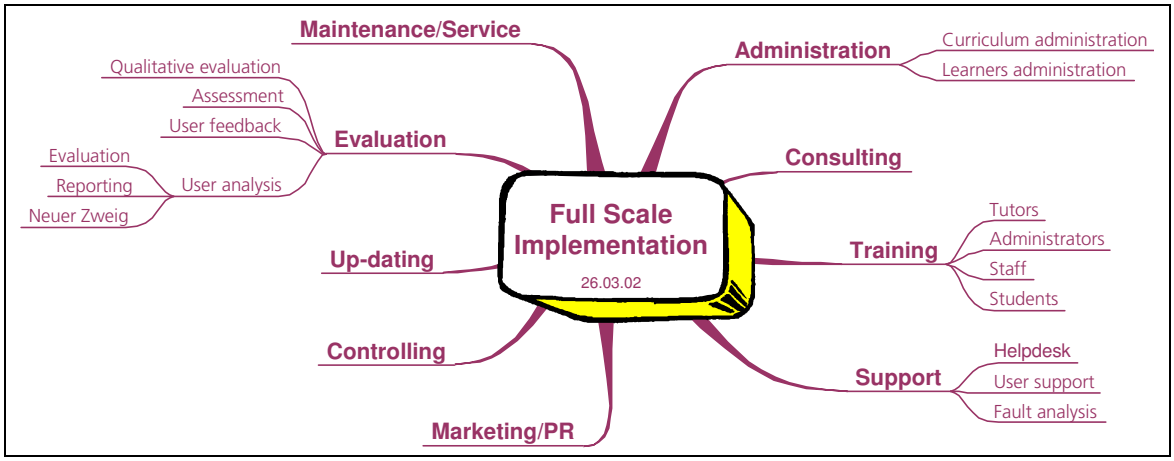
Here again, the major cost is the time of the staff involved. If the result of the pilot phase is that the course does not run as expected and/or has to be improved the subsequent costs for improvement are costs of development and would be specified under the previous phase.

3.5 Full scale implementation

The implementation of the course or programme on a full scale is combined with a number of related tasks, such as administration, advice and support of students, evaluation and controlling and, last but not least, marketing and public relations. Prior to that,

the staff that has to conduct all these tasks may have to be trained to do their business properly.

As for staff training in the previous section, the costs cover the time of the trainees and the trainer, if s/he is internal or the fee for external trainer. If the course is conducted by an external training institute participation fees may arise as well as travel and accommodation costs.



Picture 7: Full Scale implementation

Those who are responsible for moderating and tutoring the course often conduct student support and advice. Students may have questions regarding the technology and its application or regarding content; they may ask questions and contribute to the discussion. Under this headline we will also summarise the preparation of the sessions, the generation of questions and exercises and the supervision and control of the students' contributions. If considering a virtual seminar this will be the most important activity for the success of the course and it is often the most time consuming activity of implementation.

In relation to this activity the most expensive cost is time, and to a certain extent it is the only one. It might also be transferred into a direct cost if the moderator is an external staff member who receives a fee rate for this. In this case, the fee rate may also comprise the moderator's cost for communication etc., although often it is not specified and probably paid out of the fee rate and, thus reducing the net payment of the moderator. However, for the university this might be an interesting opportunity to forward costs.

Another task which shall be mentioned here is maintenance and, at certain intervals, upgrading of software and course content. If an online course runs or has run for a couple of years it is necessary to upgrade and to update the content which, otherwise, might be outdated someday. One of the major advantages of eLearning is that it is often more up to date than lectures and traditional seminars but this is related to a cost, the cost of

keeping the content current. However, the cost of updating content depends on the particular course. A language course, for example, will not require to be updated regularly while a course on nanotechnology would require regular updating as the development process is still ongoing. Updating content will therefore be a crucial issue for good and up to date online instruction.

If content updating is the responsibility of internal staff, the major cost is time. In contrast, external staff is paid a fee rate and incurring a direct cost. Another direct cost might be copyright clearance, as is for content development.

If software has to be updated due to an improvement of technology the corresponding cost is the internal time cost of development or the external direct cost of purchasing the most recent technology. The latter may also require keeping an eye on market development to be aware of new technological developments. Here, the corresponding costs are time and salaries.

Public relations and marketing seems to a large extent not to be on the agenda of universities. However, such a statement overlooks the different players in universities. If one looks at traditional courses, PR and marketing are really at a very low level and appear not to take place, except with the intention of acquiring new funding sources. Looking at further education courses the picture changes (slightly) because most of these courses depend on the revenues gained. The cost of PR and marketing comprise the generation of an appropriate web-site, the development of flyers and brochures, the generation and placement of advertisements, exhibitions at trade fairs, presentations at conferences etc.

Thus, the costs related to PR and marketing are manifold, particularly fees for the development of the materials, which are very often prepared by external agencies. Other direct costs are the costs for printing and binding, the fees for exhibitions at fairs and conference attendance, travel and accommodation costs etc. The cost for the placement of the advertisement should not be overlooked here.

Another task that so far has not been mentioned explicitly is project management and administration. This task is undertaken from the beginning of the project until its end and it is more important and costly the bigger a project is. For small scale projects administration and management comprise only a few hours or even days. In contrast, for large scale projects the corresponding costs arrive at 15 to 20 percent of the overall project cost, which may add up to half a million Euro for some projects.

It should briefly be pointed out that some other costs would have to be identified separately as they are not related to project-oriented activities. Such a cost is, for example, the

cost of stationery and office supplies or the costs of power supply etc. This cost will be presented separately as part of the recurrent expenditure.

3.6 From the identification of activities to activity-based costing

3.6.1 The concept of activity-based costing

Based on the identification and short presentation of activities in the previous chapter we are now in a position to translate the several activities of a project into a cost-calculation scheme. The aim of this cost-calculation approach is to provide a detailed and specific overview on the costs related to the development and implementation of an e-Learning project at universities.

It might appear easy to calculate the personnel costs for those staff members who are only involved in the eLearning project under investigation and for equipment that is purchased immediately for the project. Much more difficult is the calculation, sometimes even estimation, of how much time was spent by other staff not only deployed in this project. And even more difficult is often the estimation of how much time was spent for the several activities of such a project. This has to be particularly highlighted, as the interview partners could not rely on personal notes of staff members about their time input. Only the case study on the Master of Distance Education at the University of Oldenburg in co-operation with the University of Maryland University College could to a certain extend rely on such notes.

The difficulty of specifying the time input is particularly valid for directors and professors who are managing or supervising the project. Even more difficult is the estimation of the time input for those who are working at other institutions[11] or are only involved at a certain stage and at the margin of the project, e.g. professors and (faculty) staff who are a members of a committee which is involved in the decision-making process. All these tasks so far were considered from the viewpoint of the implementing university.

In most parts the costing elements will be presented according to the project-planning matrix that is presented in Picture 1 and covers the following five steps:

1. Preparation/planning
2. Obtaining technology and infrastructure
3. Development

[11] It might be of interest for the reader to note that one interview was abandoned when we had to realise during the interview that it was impossible to specify the time input as our interview partner was merely responsible for co-ordination and had no information on the time input of his co-operation partners. Furthermore, it seems that there is a strong unwillingness particularly form professors to provide others with such information.

4. Pilot course
5. Full-scale implementation.

As we will rely on the distinction between capital and recurrent expenditure/costs and direct and indirect expenditures/costs it appears appropriate to start with the capital expenditure which is related to investment costs. We will then turn to summarise the direct and indirect cost of the activities of the several project phases, which were already presented somewhat more in detail in the previous chapter, and finally to the overhead costs.

3.6.1.1 Capital expenditure/costs of investment

Capital expenditure refers partially, though not completely, to technology and infrastructure. The major cost items are therefore the procurement of hard- and software and other necessary equipment. Most investment items are already presented in Picture 3.

Another important investment that is not mentioned there are buildings and their costs of purchasing or construction though this issue was pointed out in chapter 2.2.1. However, it should be noted that German universities do not invest in new buildings in relation to eLearning projects so that these costs would be a rare exception. When we mention this topic here, it is mainly to provide a full overview on the costs that may arise under certain circumstances. We therefore refer to the principle opportunity here, while investment costs of buildings and accommodation will not even appear on the interview frame. If a building or office space is rented for the project, costs are treated as recurrent expenditure; thus they are not accounted for under capital costs but as a recurrent cost. Anyhow, in all case studies accommodation will be an overhead where investigation showed that it is even impossible to gain any information about it. By the way, this is also valid concerning information about rents etc. Knowing this, this section is just for completeness and to allow for costing in international settings.

We will also not be able to gather information on purchases of land and the rates, which is a tax levied on the occupation or ownership of land and buildings, as well as insurance[12] of buildings and their contents. A full picture would also take into account for special taxes or fees on purchasing land and/or buildings [e.g. land transfer tax (Grunderwerbssteuer)].

12 With respect to German universities it should be pointed out that, according to our knowledge, they generally do not have insurance policies. In case of emergency, as public entity they would have to rely on assistance from the finance ministry.

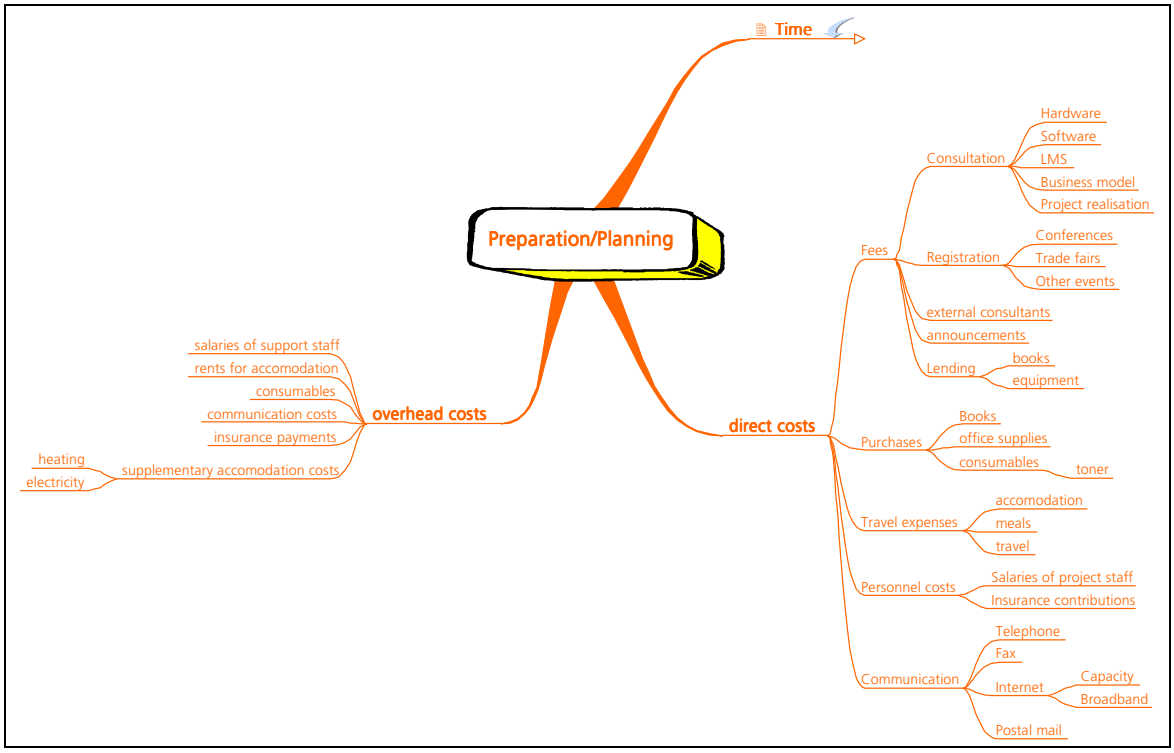
3.6.1.2 The direct and indirect costs of activity-based costing

The following section summarises the costs we have already presented and briefly discussed in the first five sections of this chapter.

1. Preparation/planning

Turning to the costs of preparation and planning, the major cost is time – an opportunity cost (see Picture 8 and Picture 9). In the case that the project is fully or partially run by someone else, i.e. that the online course or parts of it are purchased instead of being produced, this opportunity cost turns into a direct cost, i.e. a price for the product or service.

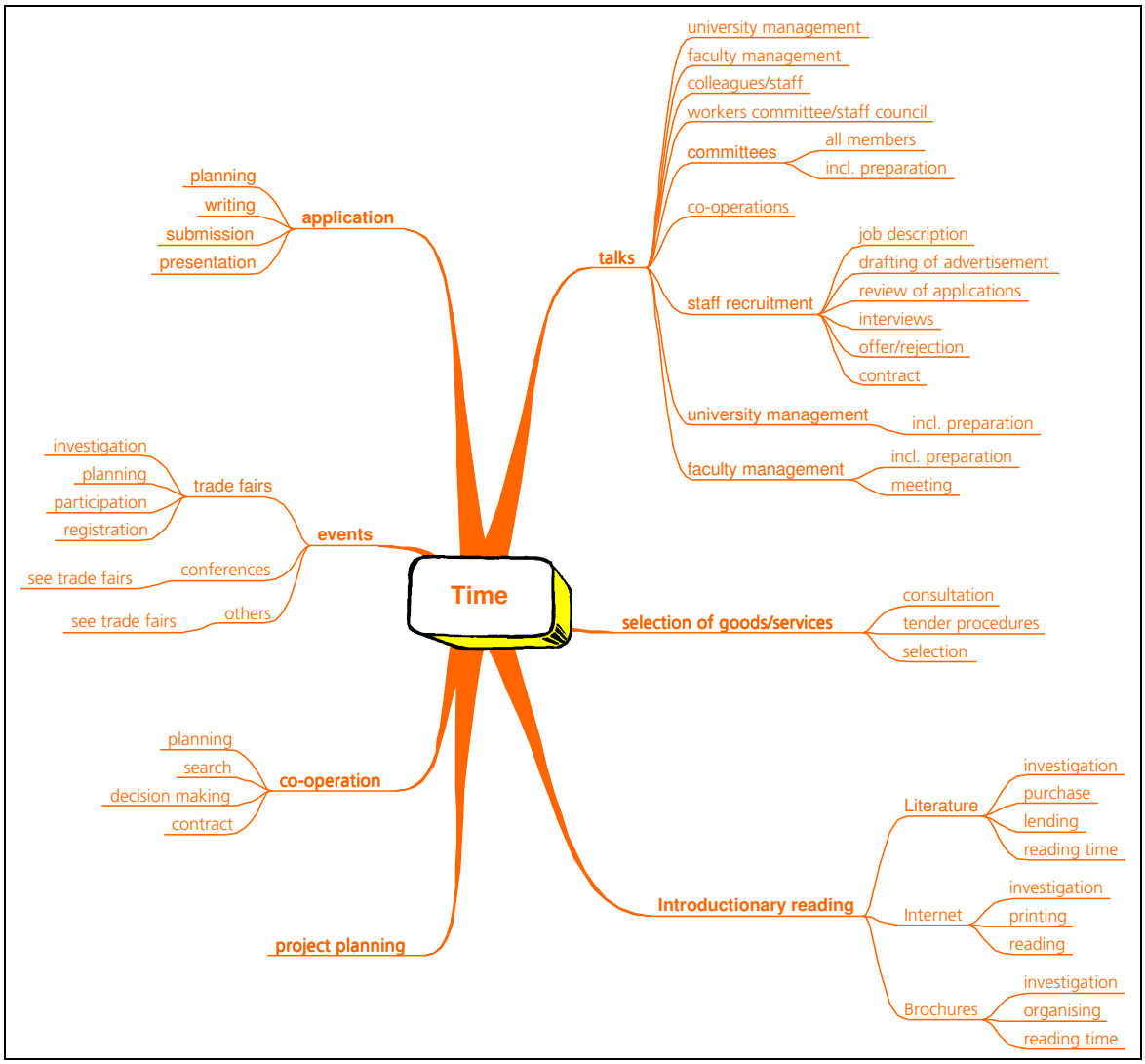
Picture 8 shows that preparation and planning is linked to some direct costs, such as registration and consultation fees or for purchases of books. The other relevant costing figures are overhead expenditures of which some are mentioned in Picture 8. We will come back to the overhead costs at another stage in this study.



Picture 8: The costs of preparation and planning an eLearning project

Picture 9 shows that preparation and planning is a very time-consuming activity. If the particular staff member is fully employed for the particular project the annual costs are equal to his salary, including the employer's social insurance contributions and other directly related payments.

In all other cases, i.e. an employee is working only part time for the project though deployed on a full time basis, the calculation may start from this and the project related costs will be calculated by estimating the time spent for the eLearning project in relation to his fulltime employment figure.



Picture 9: Time-consuming activities of preparation and planning an eLearning project

It should be pointed out that for those activities where a number of people are involved, e.g. committee meetings, the time of all people involved has to be accounted for. And the time for the preparation of the meeting has to be included as well. We will specify this when appropriate.

Finally, it should be highlighted that the same activity may incur different kinds of costs. For example, if the project application is prepared by full time staff, than the time consumption is a personnel cost. However, if an external consultant prepares the application the cost incurred is the fee for the external consultant which is a direct cost.

Other direct costs of preparation and planning are:

- fees for external experts and specialists, lawyers or consulting companies and consultants etc.
- fees for participation in conferences, fairs and other events, announcements,
- costs for purchasing books, office supplies, consumables etc.
- travel expenses (incl. accommodation and meals) for visiting conferences, fairs or for meetings with co-operation partners etc.
- communication costs for telephone, Internet, postal mail etc., if they can be accounted for this particular project.[13]

What we have presented here as time cost translates into a direct cost when looking at the personnel expenditure which includes the salary of the particular staff. If we assumed that the working time of all staff that is at least part-time involved in the project would be reduced appropriately, we could consider all personnel costs as direct costs.

However, although this may work for most staff it will not be appropriate for professors. There time input will be a time cost in any case. And this will be valid for some other staff as well.

2. Development and adjustment

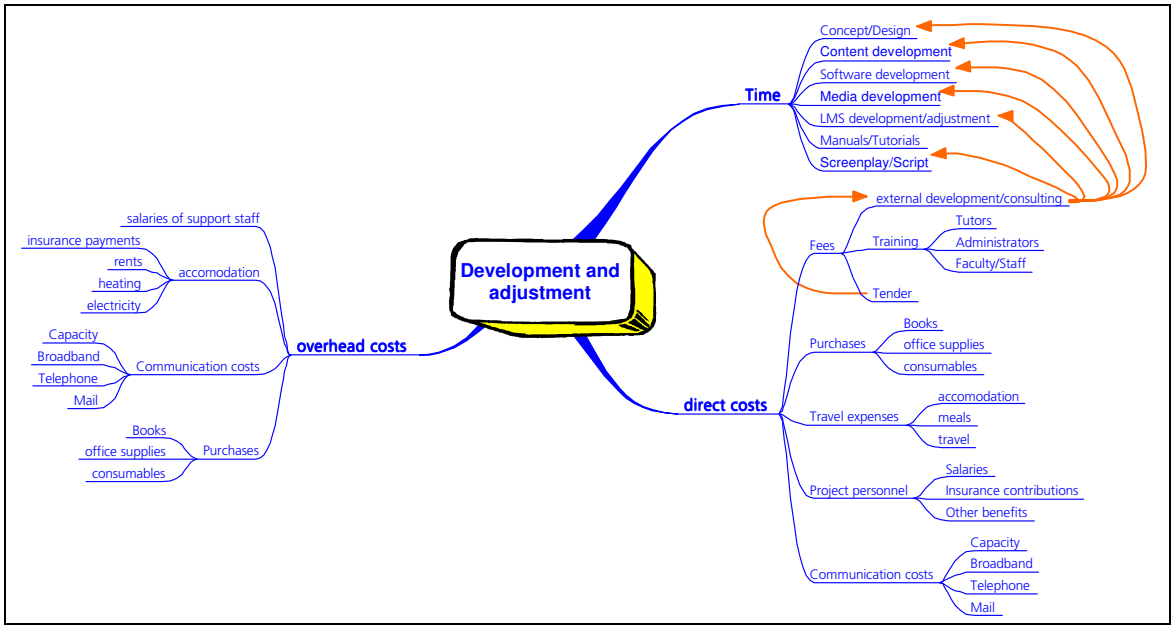
As for the planning phase, the major cost of development and adjustment of content and media is time, provided that development is the task of the project. If content and media are developed by external providers then time consumption is less while direct costs increase. Some of the major costs of this step are presented in Picture 10.

The direct costs of development and adjustment are:

- fees for training of staff, participation in conferences and fairs, etc.
- fees for external staff, e.g. responsible for content development
- travel expenses (incl. accommodation and meals)
- purchases of books, office supplies and consumables,
- costs for communication.

[13] If this cost cannot be specified for this project it si to be considered as an overhead cost.

Adding up, the direct costs of the second project phase of development and adjustment are more or less the same as for the first phase. The only exemption, so far, is the training fees.



Picture 10: The costing items of development and adjustment

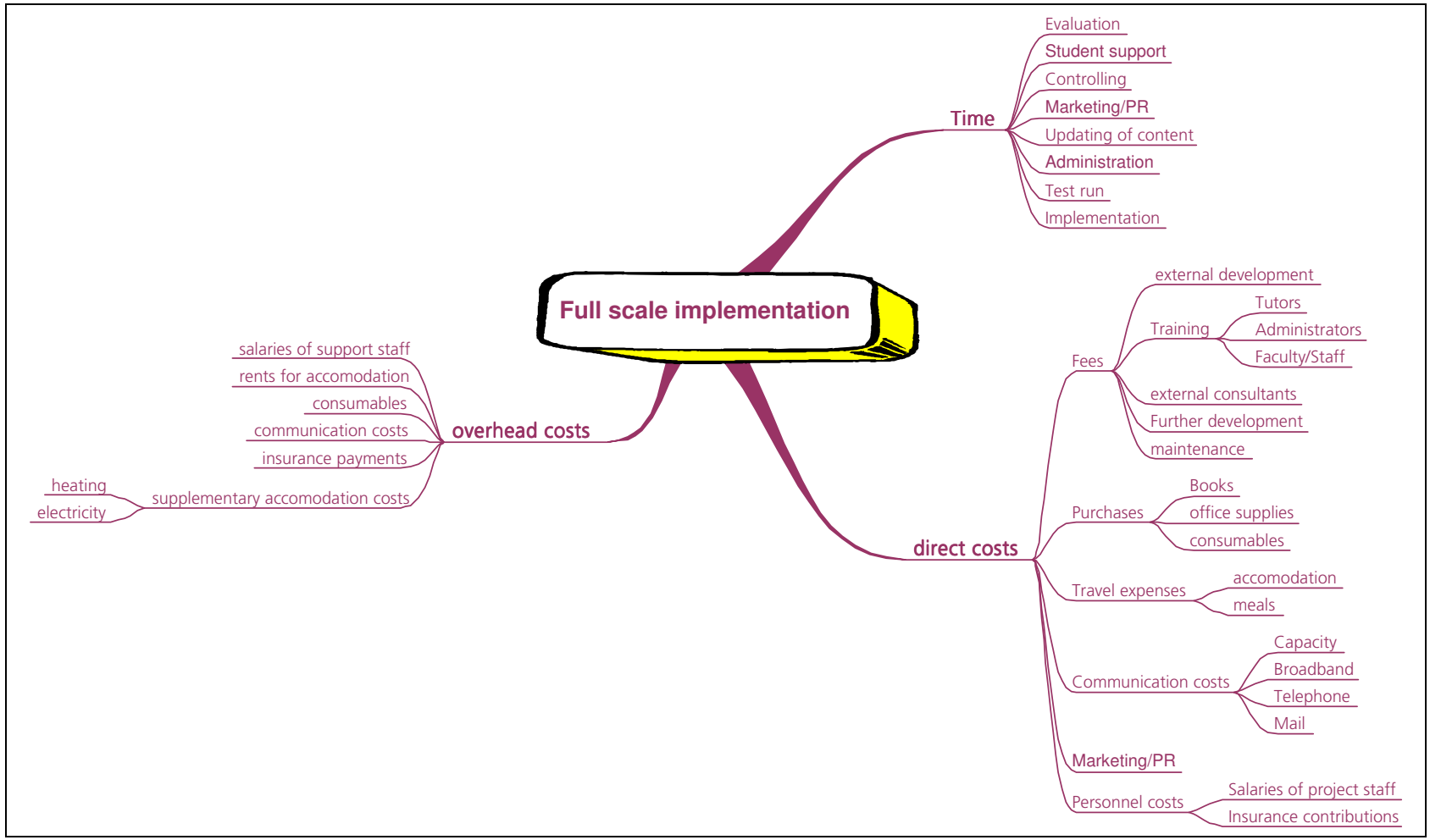
3. Pilot and full-scale implementation

The last steps, which will be summarised here, are the pilot phase and the full-scale implementation. The costing items are very close to that what we have presented so far, only adjusted to the particular duties. Picture 11 provides a summarised overview.

As usually, the major cost is the time required for conducting the several activities, evaluation, advice and support, content updating etc.

In contrast to most of the other phases, important costing items are

- fees for external staff, e.g. responsible for student advice and support,
- fees for training of staff, participation in conferences and fairs, etc.,
- travel and accommodation expenses,
- fees for development and preparation of websites, PR-folders, brochures,
- fees for advertisements and announcements,
- fees for exhibitions at fairs,
- costs of printing and binding brochures and study-books, etc.



Picture 11: The costing items of implementation

The aforementioned list of costing items can now be translated into an interview frame which are summarised briefly in the next section.

3.6.2 Interview frame: costs and financing of eLearning

1. Information about the institution and the online course(s)

2. Investments

A. Investment in land and ground

Purchasing land and ground

Additional expenses related to purchasing land and ground (e.g. rates, taxes, notary charges)

Recurrent costs resulting directly related to this investment (taxes, insurance contributions)

B. Investments in buildings

Purchasing or constructing buildings

Additional expenses

Office equipment

Additional expenses, immediately related to the investment

C. Hardware

Server

Workstations

Laptops

Printers

Others (CD-burners, scanner, audio-mixer, DCCam, DV recorder, etc.)

D. Software

Network software/operating system

Standard software (e.g. MSOffice, PDF-Writer)

Learning management system (e.g. LearningSpace, Clix, etc.)

Authoring tools

Production tools

User/front-end software (if appropriate or supplied)

E. Other investment

Office equipment

Working places for students

Infrastructure (as far as not already available)

Set up and installation work

3. Personnel costs (for personnel that is directly or indirectly involved in the project)[14]

Professors (tenure and associate)

Research associates

Back staff (students)

Other staff (e.g. clerks)

4. Direct, indirect and opportunity costs

Project planning (e.g. work definition, time planning, cost calculation etc) (direct costs: fees, travel expenses, communication costs; indirect cost: time input)

Preparation of the project application (comprising e.g. planning, writing, submission, and possibly presentation) (direct costs: fees, travel expenses, communication costs; indirect cost: time input)

Selection of co-operation partners (comprising e.g. planning, search for partners, decision making, contracting) (direct costs: travel expenses, communication costs; indirect cost: time input)

Development of a business model (comprising e.g. market analysis, conceptualisation, cost-benefit-analysis) (direct costs: fees (if external consulting), travel expenses, communication costs; indirect cost: time input)

Recruitment of (new) staff (comprising e.g. job description, development and advertisement of the announcement, contract negotiation, and contracting) (direct costs: fees for announcements, travel expenses; indirect cost: time input)

14 This covers all people who are regularly involved in the project, though not necessarily on a contract basis. For example, the professor who is supervising the project would be included here, in contrast to a professor who is a member of a faculty or university committee and, thus, involved in the decision making and discussion process.

Visiting conferences and fairs (direct costs: travel, accommodation and meals, attendance fees; indirect costs: time input,)

Consultations and selection of investment goods (comprising e.g. hard- and software, learning management system etc.) (direct costs: fees, travel expenses, communication costs; indirect cost: time input)

Preparatory talks at faculty or university level (comprising e.g. committee meetings incl. preparation, staff council, talks to colleagues and staff; indirect cost: time input)

Information gathering (e.g. reading books, brochures and documentation) (direct costs: books, communication costs; indirect cost: time input)

5. Development and adjustment of the online-course

Preparation of concept and design (comprising e.g. target group analysis, specification of their educational needs etc.) (direct costs: fees, literature cost, communication costs; indirect cost: time input)

Content development (direct costs: fees for external authors and copyright clearance, travel expenses, communication costs; indirect cost: time input)

Screenplay development (direct costs: fees, travel expenses, communication costs; indirect cost: time input)

Adjustment of learning management system and other software (direct costs: fees; indirect cost: time input)

Media development (depending on the media developed; direct costs: fees, costs for printing and binding, materials and consumables, etc.; indirect cost: time input)

Preparation of additional materials (comprising e.g. online library, search engine, glossary, assessment, annotation) (direct costs: fees; indirect cost: time input)

Training of staff (exclusively) for media development (comprising e.g. developers, administrators and other staff) (direct costs: fees for trainers or training institutions, travel expenses, communication costs; indirect cost: time input of trainees and internal trainers)

Preparation of manuals and tutorials (direct costs: communication costs; indirect cost: time input)

6. Full scale implementation

Training of staff and students (exclusively) for administrators and moderators/tutors, (direct costs: fees for external trainers and training institutions, travel expenses; indirect cost: time input)

Student advice and support (direct costs: fees for external staff, communication costs; indirect cost: time input of internal tutors and supervisors)

Controlling (direct costs: fees; indirect cost: time input)

Evaluation (direct costs: fees for external evaluation; indirect cost: time input)

Updating of content (direct costs: fees for external authors and for copyright clearance; indirect cost: time input)

Marketing/public relations (direct costs: fees for external agencies, cost for printing and binding of brochures, costs for advertisements and announcements; indirect cost: time input)

Maintenance and service of the system (direct costs: fees, travel expenses, communication costs; indirect cost: time input)

Project management and administration (direct costs: travel expenses, accommodation and meals; indirect costs: time input) [this task is not related to full-scale implementation only but to all phases of the project]

The activities presented so far can be sorted to the phases of the project. It can be assumed that not all costs can be specified for certain activities and phases but occur independently. These costs will have to be identified in a separate manner which looks at general recurrent expenditure.

7. Recurrent costs

Utilities (average costs per month/semester or year)

Rent and accommodation costs, incl. additional expenses (electricity, heating, waste disposal, cleaning, water)

Additional expenses (e.g. insurance payments etc.)

Maintenance and repairs

To gain an impression of the environment of the projects it is appropriate to identify also the overhead costs which allow adjusting and relating the costs which are directly related to the particular project. For example, if the project costs are relatively low this might be due to embedding in an appropriate environment.

8. Overhead costs

Costs for personnel

Recurrent expenditure for office supplies, stationery, consumables etc.)

Travel expenditure (incl. accommodation and meals)

Communication costs

Rent and accommodation costs, incl. additional expenses (electricity, heating, waste disposal, cleaning, water)

Having presented the questionnaire for the interviews we will now give an impression on how the interviews were conducted and how we proceeded.

3.6.3 Conducting the interviews

The interviews were conducted on the basis of the questionnaire presented in the previous section. However, as we relied on a computer-based tool some specification was possible. For example, the costs of development and implementation could be specified for the modes of delivery applied, i.e. we were in a position the specify the development costs for e.g. online tutorials and preparation of eBooks, respectively. The opportunities and the interview strategy will be presented in this section.

Generally, the interview started with some basic information on the project, e.g. regarding the approach and intention, the duration of the project and the number of students participating etc.

The second step covered information on the number and categorisation of staff. The categorisation is related to the qualification and tasks, such as professors, academic staff, student support staff, and administrative staff. On a second level they were grouped according to the salary scale, which is C2 to C4 for professors, BAT I to BAT IV for academic staff and BAT V to BAT VII for administrative staff. We had two separate categories for assistant researchers (wissenschaftliche Hilfskräfte) and students support staff (studentische Hilfskräfte). The corresponding salary scale was unified and generalised. The calculation of the costs is therefore independent from the particular person in charge of this position. The salary scale will be presented in chapter 4.1.

In a third step we identified the investments that were made and specified the costs as detailed as possible. However, this often meant that the information was generalised for certain items. For example, costs for software were € X and this comprised the following software programmes...

The fourth step was then to identify the costs of the activities related to preparation and planning. This could be done at two different levels based on the specificity of the data available. The first level was somewhat less detailed than the second.

Activity	Prof.	WMA	WHK	SHK	VWA	Other staff	Total costs
Project planning Preparation of application Selection of co-operation partners Development of a business model Organisational and structural adjustment Selection of investment goods Attending conferences, fairs etc. Preparatory talks/Committee meetings Staff recruitment Information gathering Project management and administration							

Table 1: Activity-based costing of preparation and planning

At the first level (see Table 1) we requested information on the basic activities to be undertaken. It did not allow for a more detailed specification of the tasks conducted. For example, if the information was that 10 days were spent on project planning we do not know whether this is for defining the tasks to be conducted during the project or for budget planning etc. Yet, such a specification was possible at the second level (see Table 2). However, in practice it proved extremely difficult to gather information that was so detailed.[15]

Activity	Prof.	WMA	WHK	SHK	VWA	Other staff	Total costs
Specification of tasks to be conducted Time planning Budgeting							

Table 2: Detailed approach for activity-based costing of project planning

In each of the tables we could enter the time required for conducting the particular task in relation to the qualification of staff that was responsible. The costs were then automatically calculated by interrelating each category of staff with the particular lump-sum daily fee rate. For example, if academic staff (WMA) were responsible for project planning we entered the number of days required for that task, e.g. five days, which was then automatically multiplied with the daily rate for a WMA, which is € 231. Thus, the costs for project planning arrived at € 1,155. This figure was presented in the right column.

This procedure enabled us to get very detailed information about the tasks conducted and their costs. However, it should be noted that it was a rare exception when we gath-

15 An approach that would enable such detailed information would be to accompany an eLearning-project from the beginning with a specified time schedule.

ered such detailed information. Only a few projects could provide us with somewhat more detailed information about their activities.

On this foundation we went through the preparation and planning phase and partially through the second phase of development and adjustment. As long as the activities were not directed at a special mode of delivery we applied one questionnaire. This questionnaire comprised activities such as content development, staff training, preparation of manuals and tutorials. Whenever activities were or might be related to a mode, e.g. eBooks and eMaterials, virtual seminars, tutorials etc. we were able to go into even more detail and to identify the costs separately for each mode. However, again this proved to be difficult because most projects could not provide us with such detailed information, especially when several modes were applied.

This differentiated approach could be applied also for the implementation phase where we also had a general screen summarising all activities conducted.

Summarising the computer-based interview tool we derive with the following key issues:

– the costs could be identified at a more general as well as a very detailed level, and
– if appropriate, the costs could be specified according to mode of delivery.

Thus, we were in a position to apply the most possible differentiation while being at the same time able to conduct the interview on a less detailed level. In any case we were dependent from the data our partner were able to provide.

Having described the methodology we can go on with presenting the findings of the interviews and case studies conducted so far.

4. Findings of the Case Studies

4.1 Introduction

In this section we will present the outcomes and findings of a total number of 14 case studies that were conducted from July to September 2002. However, this interim report will cover nine completed studies. Two more case studies (Master of Distance Education,

University of Oldenburg/University of Maryland University College,[16] and Virtuelle Fachhochschule[17]) will be presented in the next interim report, as they are not yet finished.[18]

The time spent on each of these interviews differed depending on their preparation by the interviewed persons and the availability and specificity of data. Furthermore, is has to be highlighted that the outcomes and findings were highly dependent on the willingness to co-operate and provide a picture that is as close as possible to reality.

However, not all interviews were like that, some interviews were clearly let by tactical and other reasons so that we did not get the necessary information. To ensure that the case studies presented do not have any negative and unexpected drawbacks for the projects we agreed that our presentation would be crosschecked by our interview partners. And, some case studies are anonymous to avoid such problems and to hinder competitors in drawing conclusions on the calculation of costs and revenues. Anyhow, we are very grateful to all who were willing to spend their time and to share their information with us. Without this preparedness this study would not have been possible.

Furthermore, the calculation of costs is based on the time input of the people involved. As all projects have already started to operate and were not informed at the beginning of their work that they would be asked regarding their time input they did not write it down. Therefore, the following figures are estimations, but very good estimates as becomes obvious when comparing the results of the case studies.

As presented in the previous section we asked for the direct and indirect costs of a number of activities. Even though the direct costs were generally mentioned first the major cost item is the time spent which is an opportunity or indirect cost. As already mentioned briefly, the time input is combined with the daily fee rate for the particular staff category. To allow for a better comparison, we have opted for a unified salary scale although this might lead to some distortionary effects in relation to the real costs of the projects. This can be of relevance if costs and revenue are compared. In this case we will

16 This case study is conducted by Thomas Hülsmann who is working at the centre. At the moment we have a preliminary version of this report. This interim report also provides some background information that is considered in this interium report at hand.

17 At the moment there is some uncertainty regarding the VFH because the responsible controller has left the university and needs to be replaced first. We will get in touch with the VFH in late October when the vacancy, hopefully, has been filled.

18 Out of the remaining three case studies one was broken off when we realised that interview partner was not in a position to specify the time input because he was only responsible for co-ordination but not involved in developing eLearning-programmes.
The findings of the other two case studies were insufficient due to the fact that the information we received was highly affect by tactical reasons which does not allow the presentation of data of appropriate specification and quality. Therefore, we decided to refrain from presenting these two case studies.

comment on that issue and highlight the differences. However, we think that using a unified salary scale is appropriate and eases the work a lot. It neglects the cost differences that arise due to age, marital status or number of children.[19] The unified salary scale is as follows

	Category	Gross Income	Social insurance contributions	Total costs per month	Costs per day
Professor	C4	7.000 €		7.000 €	422 €
	C3	6.500 €		6.500 €	391 €
	C2	6.000 €		6.000 €	361 €
	C1	5.500 €		5.500 €	331 €
Academic staff	BAT IIa	3.200 €	640 €	3.840 €	231 €
	BAT III	300 €	60 €	360 €	22 €
	BAT IV	2.650 €	530 €	3.180 €	192 €
Administrative and technical support staff	BAT VII	2.000 €	400 €	2.400 €	145 €
Assistant reseachers		1.900 €	380 €	2.280 €	124 €
Student staff		1.500 €	150 €	1.650 €	90 €

It is evident that there is space for discussion whether this or another salary should provide the foundation for the calculation but we think that the figures are quite realistic and appropriate.

A consequence of this procedure is that there will be a difference between the budget allocation and the costs and expenditure presented in this study. The spending calculated in this study can be higher or lower than the real figures. Thus, if figures are different this is necessarily the case and no reason to start arguing and discussing with the project manager etc.

There is also another reason for differences between the budget allocation and the costs presented in this study. This second reason is due to the fact that we rely on costs instead of expenditure. Therefore, it should be highlighted that the costs presented in this study are – in theory – higher than the project budget. In practice, our calculation was often lower than the budget allocation, which highlights the difficulty of identifying and specifying all the costs involved in detail. An important issue might be the difficulty to correctly estimate the time requirement of the different activities.

19 For those not familiar with the German pay system for civil servants is should be pointed out that the salary increases with age of the servant by approximately € 107, with being married by about € 102 per month and of about € 87 with every dependent child. The numbers are for West Germany.

From our point of view, the most important outcome of the project is the time input for the several tasks to be undertaken during such a project, while the costs are the result of the combination of time and salary or daily rate. Therefore, we concentrate equally on the time required to fulfil the particular activity and the corresponding costs.

The presentation of the findings will be separated for different kinds of projects because their costs are expected to differ heavily. The costs of preparing a course are fairly lower and different from the costs for projects intending to serve as a full study programme of four semesters. From our point of view it is therefore most appropriate to distinguish accordingly.

4.2 The costs of online courses

Course-related projects are directed at providing a semester course on the basis of new media. This can be undertaken in several forms that correspond to different time input and costs. The total costs of such project are usually in the range of less than € 100,000 where approximately 90 % of the costs are opportunity costs.

4.2.1 Investment cost

Small projects as courses correspond to investment costs that are so marginal that is inappropriate to speak of investments in the formal sense. All but one of the minor projects relied on university computers and equipment that was already available. Only for one course a server had to be procured with costs of € 1,600.

In most cases, only some software has to be purchased with costs of usually less than € 1,000. This amount of money is then spent on some html- or scanning software or for learning management systems and other authoring tools. However, the costs for each of these items are so low that it is inappropriate to speak of investment costs.

4.2.2 Costs of preparation and planning

For such small-scale projects it is often difficult to differentiate between the several activities. However, we will try to distinguish the activities as far as possible.

Project planning: Due to the small scale of such online courses the time input is very low with one to five days. As such courses are usually prepared by the responsible professor the costs are between € 400 to € 2,100 if specified as a separate activity. Furthermore, it was pointed out that there is not much difference between the preparation of a normal classroom-based course and an eLearning course. The only, but important exemption is that eLearning needs better planning and structuring than classroom courses.

If **project planning** is the only task related to preparation and planning is seems to be somewhat more time consuming. For example, in one case it was estimated that this activity required six days with corresponding time costs of € 2,500, while no other activity than project planning was carried out in this phase.

Thus, if we try to summarise the findings of the case studies, project planning requires only a few days on average. The corresponding costs are therefore in the range of less than € 2,000 and in most cases probably less than half that amount, depending on the person responsible.

For most of the projects this is the only cost arising for preparation and planning. Only one of the smaller projects reported that there are some more tasks that were conducted. Even though this appears to be an exception, it seems appropriate to briefly present these findings to provide the full picture.

One small-scale project **prepared an application** for funding. Due to the small amount of money applied for the time input was estimated to be some 2 days, costing (time) of € 850.

Also in contrast to the experience of the other small-scale projects, one professor spent much time on **selection of investment goods.** The estimated time input is five days, costing € 2,100. Another € 500 was spent on travel in this case. Furthermore, there are five days input of a university organisation with estimated costs of about € 1,250. The total costs, therefore, add up to € 3,850 in total, though the opportunity costs of the university organisation are to be considered as overhead costs from the viewpoint of the project.

Another distinctive feature of the this project is that even **preparatory talks** were conducted with an estimated time input of 10 days of the professor and 3 days for academic staff, adding up to roughly € 4,900. A further day was spent on **staff recruitment** adding another € 420 to the costs.

The final peculiarity of this project is the requirement of **project administration and management,** which may be due to the number of staff involved, that seems far higher than for the other small-scale projects. Three days were spent corresponding with costs of € 1,250. An administration officer for unspecified duties assisted for about 1.5 days. This adds € 220, adding up to less than € 1,500.

Conference and fair visits: Only in one of the small-scale projects 6 days were spent at several conferences and fairs. The time costs were approximately. € 2,500 supplemented by € 500 for travel and € 100 participation fees. In total, this amounts to € 3,100. An im-

portant question is whether these conference and fair visits were immediately and only related to the online course or would have been undertaken anyway.

Summarising this section, the costs for preparation and planning of small-scale projects are generally very small and are for most projects less than € 2,600 which is sufficient to spend a week on the several activities required. Under very special circumstances the costs will be higher if, for example, an application has to be prepared and project management and administration is necessary due to the number of people involved.

Only in one case the **total costs for preparation and planning** add up to nearly € 16,600. However, even this amount is mainly an opportunity cost, while the budgetary expenditure was € 1,100 for travel and conference fees and € 1,250 were an overhead cost of another university entity. Furthermore, there is serious doubt that the opportunity costs for conference and fair visits can be addressed to the development of the course. Thus, another € 2,500 can probably be subtracted. Taking into account all these reductions, the costs for this project would decrease to approximately € 12,000. However, this highlights that even smaller projects can be linked to serious (opportunity) costs though this is usually not the case.

4.2.3 Costs of the development of online courses

One of the first tasks to be done in relation to developing online courses is the **preparation of concept and design**, which requires usually more time than the whole preparation period. Based on the findings of our case studies the time adds up to 2 to 3 weeks, which often already includes the time for **didactical preparation**. The corresponding costs are between € 4,200 and € 6,300 if conducted by professors, which is the difference to medium and large-scale projects, where nearly all activities are conducted by academic staff. This corresponds to lower costs of about € 2,300 to € 3,500 for the preparation of concept and design if time input does not increase much.[20]

Depending on the environment of the project the costs for **preparation of concept and design** can decrease to zero. This is the case if they are not developed specifically for a certain course but were developed for an earlier project and is then uniquely applied to all subsequent programmes. Here, preparation of concept and design becomes an overhead costs for the course under consideration.

[20] It seems worth highlighting that costing professors time input is difficult as their salary does not include social insurance contributions. This might lead to lower costs compared to academic staff. However, in this study we assume that the salary of a professor is higher than of academic staff.

A number of other activities usually do not take place in small-scale projects, as for example, **system development.** Only if the department has developed the template it might have to be updated and optimised regularly. This may require approximately 3 to 5 days of the professor's time, if s/he has developed the template. The corresponding opportunity costs are € 1,300 to € 2,100 and if s/he is assisted by a student staff member the costs may be marginally higher.

The most important activity during the development phase is **content development** requiring most of this phase's time. Here, the time requirement differs according to the particular frame conditions of the project. For one project the time and costs are in the range of about 2 weeks with costs of about € 4,200 while for another project the costs added up to € 63,500. However, although the latter amount appears surprisingly high, it should be pointed out that approximately 75 % of the cost amounts to the non-monetary input of three students who wrote their final theses in relation to the project. And also the remaining input is based on the work of an assistant researcher and student support staff. Thus, the time input and opportunity costs of the professor are marginal.

Despite the latter example, the time requirement for content development should usually not exceed 10 to 15 days, with opportunity costs of less than € 6,300. In many cases the time will be less due to the fact that the content is already available and needs only to be prepared for the particular media.

When the content is developed or provided for the online course it has to be transferred to the particular media. Thus, we consider the costs of the **development of the media,** which we have to specify according to the particular media employed.

eBook

The time that is necessary for the **preparation of an eBook** heavily depends on the number of pages. For one of the smaller projects the preparation required roughly one week of academic staff and another approximately 12 days of student support staff. The corresponding costs are some € 2,250.

In another, though large-scale project, the time input differed in most cases between 51 hours for 86 pages to 226 hours for 359 pages. However, there is no clear linear relationship between the number of pages and the time requirement. There are several factors affecting the time necessary for the preparation of an eBook. We also find examples where only a few pages required 47 hours or some 40 pages 279 hours. The time will be affected by the tasks to be conducted and the particular specifications, for example the number of hyperlinks, multiple-choice questions, glossary items etc. If we try an approxi-

mation of the time required for the preparation of an eBook we arrive at 2 to 2.5 pages per hour, based on 19 courses the VIRTUS project. That translates into average costs of € 6 to € 10 per page, if this activity is conducted by an assistant researcher and of € 12 to € 15 in case of an academic staff (BAT IIa).

The costs of an eBook of about 150 pages would then be at around € 900 to € 1,500 in the first and between € 1,450 and € 1,800 in the latter case. However, there seems to be no real reason to deploy only academic staff with this duty, though it might be appropriate for some tasks. Therefore, the costs will probably lie in between.

In another project 600 pages had to be scanned, controlled and transferred into html. This required 8 days of student support staff with costs of about € 700. This could be considered as eMaterial instead of an eBook.

Based on the experience of the case studies conducted so far, it is difficult to specify exactly the time requirement and the costs they arise for the development of other media, because they are often a mixture of several forms where clear differentiation between the media employed is difficult. Thus, the following picture should be read carefully and not considered as the final figure but as an indication in what range the time input and the costs may be.

Preparation of a CD-ROM or a cassette for a wbt-tutorial

The **preparation of a CD-ROM or a cassette for a wbt-tutorial**, for example for a language course, a time input of roughly two months on a full-time basis is necessary per CD (module) for media didactics, preparation of the exercises and screenplay, media design and the production of the basic (prototype) CD. Other tasks are the dubbing of the texts (radio play) on the cassettes as Wave-Data files, cutting and pasting the radio plays onto the right position and compilation of pictures. For the two months which are estimated to be necessary for this task per module of 4 to 6 hours per week the costs are nearly € 10,000. Another € 900 have to be added for the speaker of the sequences. Thus, the total costs of preparing these wbt-tutorial are some € 10,900.

The development of **audio-files in combination with slides** for a cbt- and wbt-presentation was the aim of another project, which is not directly part of this study but from WINFOline I (Hagenhoff, 2002). In this project the lecture was initially recorded 'live' during the session but it was also re-recorded to improve the quality of the audio-presentation. The procedure of re-recording lasted about 45 % longer than the initial lecture, i.e. for a session of 45 minutes 65 minutes were required, for example, to repeat the text if fluffed etc. The audio-file was combined with a presentation of the corresponding

slides. The time input required 26 hours of the professor and an academic staff member each, and 54 hours of student staff. Based on the unified salary scheme applied in the study at hand we arrive at total costs of approximately € 2,850 for the preparation of the audio-file. Another 100 hours were spent by student staff to prepare the overhead slides. This translates in costs of € 3,000, so that the total costs for the development of the audio-files are € 5,850.

This module has been updated and improved to an **online tutorial** during the second phase of the project. Therefore, the **audio sequence** was combined with flash-animations, real-media and graphics. This required approximately 100 days based on the assumption that 1 day is required per flash-animation. However, the costs depend to the staff's qualification. If it is a student the costs add up to € 9,000, while an assistant researcher would cost € 12,400, if the higher qualification does not lead to efficiency gains.

The 'real media' were recorded in the previous project (see above) but the remaining applications had to be newly developed. This required approximately 60 days of student input for about 20 hours in total (€ 5,400). 10 more days were necessary for the preparation of the media. This was done by academic and student staff (€ 1,600). One quarter of the time was spent for reviewing the materials from the former project to catalogue its content and to translate/transfer it into a format that enables further development and adaptation. Another 50 % of the time was used to restructure and to apportionate the content etc. The final 25 % of the time was spent for preparing the html-pages, connecting the data and for the final montage of the lecture. Adding up the costs, the 're-development' cost some € 16,000.

Another media that can be employed but which has not been considered so far by a case study here is video streaming.[21]

The **preparation of (additional) materials** comprises online libraries, search engines, and glossaries etc. Thus, the time input differs depending on the material prepared. Generally, this activity is undertaken by student support where cost is not that high. For example, for the preparation of a glossary approximately 5 days are required, costing some € 450. For the other tasks which might require somewhat more input, 10 days may have to be spent, with costs of about € 900.

Staff training that relates to the development phase is for those who are involved in this activity. The requirement for training differs in relation to the tasks to be undertaken and the media to be developed.

21 We intend to conduct a case study on this media during the next phase.

For example, for more challenging developing tools and media, training time will be higher and e.g. in the range of five days per staff member. The corresponding costs depend on the particular staff and will be higher for academic staff (€ 1,150 per person) than for student staff (€ 450). However, if staff is trained than there is at least one other person who is the trainer. Generally it seems, that the trainer is an (internal) academic staff member, so that for a five day training, the costs will rise for about € 1,150, while participation fees are an exception as nearly all training is in-house. Based on the findings of this study, the number of trainees per group is usually in the range of 3 to 6 people, so that the costs are between € 2,500 and € 7,500 per group.

However, usually training time and costs for the development of eLearning-courses is close to zero. It is therefore assumed that no separate training takes place but is on the job. If at all, only one or two days maybe required for student or other staff. The costs add up to € 500 to € 1,000, where 80 % is the opportunity cost of the professor.

Another task that is usually conducted by student support staff is **preparation of manuals and tutorials**. The preparation of a comprehensive online help tool requires a time input of up to 50 (student) days with costs of about € 4,500.

The development of a documentation and tutorial requires far less time and can be prepared in about 20 days. However, if this is undertaken by academic staff, the opportunity costs are in the same range of about € 4,600, while student costs would be some € 1,800.

The development of an easy tutorial may require five days of student input, costing € 450.

It can be expected that the time spent on **project management and administration** is not much but in the range of up to five days. As we are referring to small-scale project this is generally done by the head of department, i.e. a professor, so that the cost is up to € 2,100.

However, we also investigated one project where the time input was estimated to be approximately 45 days including management, administration and particularly supervision. In this case the corresponding costs are nearly € 19,000. It can be assumed that most of this time is supervision, even though this still seems to be very much.

The total costs

Looking at the figures presented in this section the impression might be somewhat confusing particularly due to different media employed, which are linked to different costs. However, it is possible to provide the summary on the basis of a separation between

the costs that are similar for all projects and the costs that differ according to the media employed.

The following activities belong to the first group:

	Time input in days	Costs in €
preparation of concept and design	2	850
system development	-	-
content development	10-15	4,200-6,300
staff training	-	-
preparation of additional materials	5-10	450-900
- glossary	5	450
- online library	5-10	450-900
- search engines	5-10	450-900
preparation of manuals and tutorials		
- online help tool	50	4500
- documentation	20	4600
- tutorial	5-10	450-900
project management/administration	2-3	850-1250

The table provides an overview of the activities where the time input is similar for all small-scale projects, though this does not mean that each task has to be conducted necessarily. On the contrary, most of the activities are not part of each project but only of the one or other.

And it should be highlighted that the costs presented are approximations and are, generally, depending on the qualification of the staff. It should be clear; the costs arise only if the particular activity has to be conducted. In case that all activities are to be conducted and would require the higher time input, presented in the table above, this would costs somewhat more than € 20,000. In reality, the cost for many projects will be at around half that amount.

However, this does not comprise the costs for media development, which are presented in the following table. Yet, it should be understood that the figures presented here only provide an indication of what range the costs might be in. The costs presented are those for the development of a course lasting one semester with approximately two lessons of instruction per week.

	Time input in days	Costs in €
eBook (150 pages)	~10	900-2,300
cbt audio-files with slides		~6,000
audio-file with text etc.		~10-12,000
audio-file with animations		~16,000
video-streaming		nn

It is difficult to summarise to previous figures to an all-embracing statement of what the development of a course would cost. A careful approximation would be to expect the cost in the range of € 15,000 to € 35,000 per module or course and semester.

4.2.4 The costs of implementation

As for the costs of development also the costs for implementation depend to a large extent on the particular media employed.

For example, this is relevant for the costs of the replication of the media depend. Copying a CD-ROM costs only a few Euro (€ 3 to 6) with constant costs per CD-ROM while, on the other hand, the costs for replicating a study book depend on the number of pages. The average costs per page can be fixed at around € 0.05, so that a booklet of 150 pages would cost € 7.50. This has to be added with the costs of binding which are between € 6 and € 9. Thus, the average price for the preparation of a study might be in the range of € 13,50 to € 20 for 150 to 200 pages.

The costs for replicating CD-ROMs or cassettes are in the range of € 3 to € 6, each. Thus, the total costs for replication depend to a large extent on the number of participants and on the media to be replicated.

For courses relying on study books the costs will be higher than for CD-ROMS or cassettes and will be in the range of up to € 1,000, if not more than roughly 50 people participate.

On the same basis regarding the number of participants the costs for replicating CD-ROMs and cassettes will be between € 150 and € 300.

Some more costs might arise if the media have to be delivered by post mail to the participants. This would add another € 1.50 to € 2.25 per participant to the costs of replication and add up to some € 75 to € 115 on the basis of 50 participants.

The time requirement for **student advice and support** depends on what is covered by this activity and, particularly, which media is employed. The first understanding is technical and content-oriented support were time input is highly dependent on the familiarity and experience of students with computers and the particular software applied and its user-

friendliness. Here it seems that the time requirement has decreased in recent times as the participants are getting more experienced with computer and software technology and, thus, require less support.

A rough estimate arrives at half a day per week or approximately two days per month. It might be a bit more during the term and less during the remaining time. If the term lasts six months (incl. two months of vacation) the total time input would be 12 days. It can be expected that the responsible person is an academic or technical staff member of a similar qualification the corresponding costs are roughly € 2,800 per term. The time input is much higher if we are looking at online tutorials and virtual seminars where moderators or tutors come into play.

A crucial question regarding the costs for student advice and support or better moderation of virtual seminars is whether external or internal staff is employed. A solid finding of our case studies and other studies (e.g. Hülsmann, 2002) is that external staff is less expensive than internal as the payment does generally not correspond to the time input that is necessary to moderate the course. However, the conditions applied differ from course to course. We therefore will not summarise the findings but present an overview on the different models applied.

We found one approach where the fees were related to the number of participants the tutors are responsible for. The tutors are paid for one hour per week and student over a period of 48 weeks. Paying € 26 per student and week this adds up to € 1,250 per participant over the full course. If the group has eight participants this would add up to € 10,000 per course. However, at universities the term lasts only 12 to 15 weeks so that the costs would come down to € 310 to € 390 per student and term. For a group of eight students this would correspond to total costs per course of € 2,500 to € 3,100. If more students attend the seminar, for example 25, the costs would be € 7,750 for the summer term and € 9,750 for the winter term. However, it can be assumed that this approach is usually not applied in German universities for traditional higher education courses.[22]

Another approach would be to pay the moderators, for example, for two or four hours per week, depending on the particular online seminar. This model is based on the current system for external lecturers (Lehrbeauftragte). If the lecturer is paid a fee rate of, for example, € 25, the costs are € 50 to € 100 per week. The total costs for the summer term add up to € 600 to € 1,200 and for the winter term to € 750 to € 1,500 per moderator and group of students. In this case the crucial question is how many sub-groups of stu-

22 The programme that relies on this approach is funded by the German Employment Authority (Bundesansanstalt für Arbeit)

dents have to be established. This depends on the grade of interactivity and other factors. Based on a number of e.g. 25 students one may have one group or even three groups with total costs of € 600 (2 hours) to € 1,200 (4 hours) for one group for the summer term and € 750 (2 hours) to € 1,500 (4 hours) for the winter term. In case of three groups the costs would increase by factor three to € 1,800 (2 hours) to € 3,600 (4 hours) for the summer term and € 2,250 (2 hours) to € 4,500 (4 hours) for the winter term. However, it seems that courses for traditional higher education students usually provide only one course per semester, independent of the number of students, while further education institutions divide their groups whenever a certain number of participants is reached. It depends on the particular course what the number of participants has to be for division. The numbers we identified were 8 and 25.

We initially stated that the employment of external moderators might be less expensive than internal staff. Therefore, we will compare the figures now and translate the last example into an approach with internal staff. We will thus assume a course with two or four hours of instruction per week and a seminar of 25 students. The daily fee rate for the calculation of the costs is € 231 and based on a thirty year old and un-married staff member.[23]

A first approximation is the comparison of the daily rates for both groups. The daily rate for external staff is € 200 for eight hours of instruction while the costs are € 231 for internal staff. At first glance it is obvious that internal staff is more expensive. This is the more of importance as internal staff works 38.5 hours per week, which is 7.7 hours per day. Thus, the appropriate costs would be € 231 for internal and € 192.50 for external staff. Therefore, the deployment of internal staff would be less expensive and thus more cost-effective.

Based on the specifications presented here, the total costs for a full term would arrive at € 720 to € 1,440 for two and four hours respectively, per week in the summer term and € 900 to € 1,800 in the winter term if only one group has to be served. If three groups had to be established the costs would increase to € 2,160 or 4,320 and € 2,700 or € 5,400. Summing up, the deployment of internal staff is 20 % more expensive than external staff.

However, it should be taken into account that the outcome of such a calculation highly depends on the assumption applied regarding salary of internal staff and the fee rate of external staff. The reader is therefore advised to specify the calculation to his or her par-

23 The reader who wants to translate this approach to his or her personal situation may incorporate the corresponding monthly salary for the particular staff employed and calculate the total costs on thisbasis.

ticular situation. Yet, another crucial issue is whether the time specification is appropriate to the time input required by the course, in practice. Whenever the time input is higher than the official number of hours external contracting is less expensive than internal staffing. Even in this case there might be an exception if the higher time input is regarded as unpaid overtime.

Anyhow, the general recommendation of these findings is that virtual seminars should rely on external moderators rather than on internal. The crucial question to answer is how much time has to be spent per week. And the findings of this study suggest that it varies from two hours per week to 1.5 days per week, depending on the particular environment of the seminar. In the latter case the (opportunity) cost would increase to up to € 10,000.

Another form of online instruction is an **online tutorial**, where time requirement for the tutors appears to be higher than for the moderators of virtual seminars. In this study we investigated three online tutorials, so far. Here again, we found different approaches that shall be presented to provide not only a picture of the costs but also on the models applied.

For a number of 30 students participating in an online tutorial the estimated time input is 16 days during the winter term or one day per week of the professor, while another half a day is expected to be spent by an academic staff member, which adds up to 8 days during winter term. Thus, the costs for student advice and support are in total € 8,600. For purpose of comparison the 1.5 days per week translate into approximately 40 minutes per week and student.

A second approach hands student advice and support to an external institution that is paid on a lump-sum basis, which is only partially fixed in relation to the number of participants. In this particular case, for example, the number of participants is 38 and the payment has been agreed to be € 5,500. Here, this approach is less expensive than internal staff if the time requirement exceeds a total time input of 24 days per term or roughly 1.5 days per week. The corresponding time requirement per participant is on average approximately 30 minutes per participant and week. If time input is less it would be cheaper to employ internal staff.

The third model is applied for an online tutorial of about 100 participants when the online tutorial is offered in parallel with the presence lecture. The estimated time input of the tutor is one day per week during the term and one week for preparation and assessment. Thus, we arrive at 26 days in total or costs of about € 6,000. However, the weekly time input of 1 day for about 100 students translates into less than 10 minutes per week and

student. Although it is highly probable that not all of the students contribute every week the average time input per student is far less than for the other case studies.

In the same case study the time input is expected to decrease by one third if the number of students would go down, for example, to thirty students, if the online tutorial were offered without the parallel classroom instruction. Here, the average time input per student and week would increase to approximately 17 minutes. Under this assumption, the costs per semester would be € 4,800, assuming that the time requirement for preparation and assessment is left unchanged.[24]

Summing up, it appears that online tutorials require more time input than virtual seminars and are, therefore, more expensive. An important question that cannot be answered in the study at hand is thus, whether the outcomes of online tutorials are better than of virtual seminars, justifying the higher costs.

The next activity is **evaluation, which** is also understood in different ways. One issue is to consider it as part of the pedagogical evaluation, which usually takes place at the end of the course. As for the approaches to student advice and support we found here different approaches.

The first approach was to consider the evaluation not as part of the online course but as part of the traditional classroom instruction. Here, the marginal costs of online instruction are zero.

A second approach, which goes much further and into another direction, measures the effects of the course (outcome oriented). Here, the performance of the students will be measured at the beginning of the course, during the seminar and at the end. For the preparation of the test and its analysis a time input of one day of the professor and three days of student staff was expected. In this case, the costs of evaluation are € 1,100. However in fact, the cost of € 1,100 is a mixture of developmental and implementation cost.

The third general approach of the understanding of evaluation is related to quality assurance. In this case, evaluation comprises the introduction and the inspection of the corrections to be made and is estimated to be 30 days in total. This time requirement is divided between an academic and a student staff member but the exact division could not be specified. Assuming a relation of 2 to 1 for academic and student staff we arrive at costs of € 5,500 per semester. Anyhow, based on the 30 days the maximum costs would be nearly € 7,000 if only the academic staff provided input for quality assurance. Another day is spent for pedagogical evaluation of the course, costing € 230.

[24] This seems plausible as preparation and assessment can be regarded as independent of the number of participants.

Before moderators and tutors in larger projects can start with their tasks often some **staff training** is required. For the small-scale projects this is usually not the case as staff already involved in development conduct the courses. Therefore, staff training might only be required when new staff has to get acquainted with the modalities and the software.

In this case training will last no longer than one day so that the costs are some € 460, taking into account that two people are involved, the trainer and the trainee. If the trainee is an external staff member the costs might even be lower if the trainee's time input is incorporated in the lump-sum payment and not considered as additional time requirement.

The final task to be conducted in relation to online courses is **content updating** where time input surely depends on the frequency the content is updated and the course is run. If the course is provided every semester and the content highly current, then content updating might be necessary once or twice a year. However, the corresponding time requirement should be relatively small and not exceed five days and is, usually, probably even less. Thus, the corresponding costs will be less than € 2,100 if the professor is responsible for it and less than € 1,150 if academic staff is.

In other cases where content does not change that much as, for example, for language courses, updating will take place only every few years, so that the annual costs are most probably less than mentioned here.

Finally, the time requirement for **project management and administration** of such courses is marginal with about one or two days per semester due to the small number of staff involved. The costs are therefore less than € 850.

Thus, we can now summarise the costs of implementation of online courses. The costs are highly dependent on the mode and media applied.

The total costs of implementation

Again, as for the development costs the costs of implementation depend heavily on the media employed. And again, we have some components where time input and costs are similar for all courses. The latter applies to

	Time input in days	Costs in €
replication of media		
- study-book (per copy)		15-20
- CD-ROM (per copy)		3-6
- Cassettes (per copy)		3-6
Evaluation		200-1,000
content updating	2-5	850-2,100
project management/administration	1-2	400-850

Thus, the costs of implementation that are independent of the media are between € 1,500 and € 4,000, though most probably in the lower than in the upper range. The costs of replication depend on the media employed but will usually be in a range of less than € 2,000, probably less than € 1,000.

The cost for student support and advice depends to a certain extent on the media employed. Yet, the cost for moderation and tutoring highly depend on the question whether external or internal staff is employed with the latter being more expensive, usually.

The costs of external staff are often between € 600 and € 1,000 per group and 2 hours of (formal) instruction per week. How many hours are spent on the course depends on the moderator and his or her commitment. Usually, there is no additional time incorporated for preparation and assessment of the course.

The costs of employing internal staff are higher due to the higher costs per hour of instruction and the fact that the opportunity costs arrive for the full time of instruction which is often higher than foreseen for external staff. Here an approximation arrives at costs that are 25 to 50 % higher for internal than for external staff. Furthermore, the time of preparation and assessment has to be taken into account, particularly for online tutorials. For example, adding up one week each, for preparation and assessment the total costs of tutoring or moderation are adding up to € 2,300, roughly.

4.2.5 The total costs of online courses

The total costs of online courses depend on a number of factors that interrelate, making it difficult to arrive at clear figures. However, the costs of preparation are usually relatively low and are in the range of some € 1,000 per course. The costs of development can be divided into two groups. The first group is independent of the media employed and requires costs of up to € 20,000, though most probably in many cases at around half that figure. Another € 15,000 to € 35,000 are to be added for the second group, which is media development, that is fully dependent on the media employed so that it is, therefore, difficult to come up with a general figure.

The costs of implementation are between € 1,500 and € 4,000 for the activities that are independent of the media. Another € 1,000 to € 1,500 have to be added for virtual seminars, if conducted by external moderators, while internal staff usually cost more due to higher costs per hour of instruction and the fact that the full time spent is an opportunity cost. Furthermore, online tutorials conducted by internal staff require preparation and assessment that increases the costs by approximately another € 2,000 to € 2,500 per semester.

Summing up, the costs of an online course are in most cases between € 35,000 and 65,000, depending on the particular set-up and media employed. However, although the figures may provide some more or less concrete data, it should be highlighted that several factors affect on the costs of each particular course. Therefore, it is most appropriate to specify the costs in relation to the particular course planned.

Having presented an impression on the costs of small-scale projects that are usually online courses run over one semester and repeated more or less regularly we can now turn to the question of how they are financed.

4.2.6 The financing of online courses

Online courses usually rely to a large extent if not fully on normal budgetary expenditure so that the financing issue is not very important here. The resources employed are usually regular staff of the department and are paid by the university budget and, thus, by contributions from the budget of the particular state.

Only one small-scale project applied for and received further grants from university funds, though this covered less than 4 % of the overall project cost. Another € 10,000 were spent by German Research Association (Deutsche Forschungsgemeinschaft). However, this is an exception under the projects investigated and most probably for the small-scale projects in German universities.

In general we can, thus, conclude that such online courses do not require additional funding due to the fact that more or less no additional expenditure is required. Thus, the project costs are more or less only opportunity costs and with direct costs only to a minor extent.

4.3 The costs of medium-scale online programmes

After having presented the findings regarding small-scale projects we can now turn to medium-scale projects. Such projects combine a number of modules or courses to a de-

gree programme, often lasting approximately two years or four semesters. It can be expected that the costs will rise at three ends.

The first end where costs are expected to rise is that more modules are to be developed with costs depending on the particular construction of the respective programme. The programmes can be established with several courses of the same media, e.g. for example four (semester) modules of online tutorials or virtual seminars. It can also be conducted as a mix of several modes, e.g. tutorials and audio or video sessions etc. The total costs of the programme will then depend on the particular environment.

The second end is that the costs of administration and management will be higher as the number of stakeholders increases. For example, it may require more authors for the several sections where interfaces have to be clarified or the project requires project management to ensure that deadlines are met etc. Another cost-relevant issue is that for such projects more often applications have to be prepared to gain some funding.

The third end where costs may rise are investment costs which might be due to the fact that medium-scale courses may require a server or some other investments that are not worth for small-scale projects. For example, a server for several thousands of Euro will surely not be purchased for one course, but if it is required for a two-year programme that might gain revenue it surely will. This is the more valid if this two-year programme is the initial project where some other programmes might follow. However, in this case the programme related costs would be overestimated if this cost would fully be added to the costs of this particular project. Therefore, it can be expected that the overhead costs might come into consideration here.

On the contrary to the cost rising factors, one can expect two cost-decreasing factors. The first is the stronger involvement of academic staff instead of professors and the second is that certain activities have to conducted only once or twice and can be applied to a number of modules or courses. Here, we may have some economies of scale.

During our interview phase, we conducted four interviews (FIM/Uni Erlangen-Nürnberg,[25] ZFW Uni Leipzig and two anonymous interviews) that were immediately related to medium-scale projects. In another case, WINFOline II, we are able to estimate the some costs related to a medium-scale programme, although the interview was restricted to one particular course. We will therefore incorporate this case study to a certain extent in this section.

[25] The case study on FIM/Uni Erlangen is not yet presented in this interim report as our draft case study report contained a number of questions that need to be addressed before it is appropriate to present the figures.

As for the previous section we will present the findings of our case studies on the basis of the activities and phases to be conducted. But before, we will have a look at the investments of medium-scaled projects.

4.3.1 Investment cost

Surprisingly, the investment costs for the medium-scale projects are also very low which is due to the fact that the projects are embedded in an environment where nearly all of the required computer and office equipment is already available.

The only project with investment in hard- and software of more than a few hundred Euro is WINFOline II, where total investment costs were € 15,000. Yet, this investment is part of a large-scale project so that it would be inappropriate to incorporate the figures here.

Thus, the investment costs of medium-scale projects are negligible.

4.3.2 The costs of preparation and planning

If we start the cost calculation with the time requirement for project planning on the basis of the several case studies we will see that the time requirement differs very much depending on the particular project.

However, to summarise the findings for project planning the time requirement is in the range of three to five days for most of the medium-scale projects. It may sometimes be a little bit more if the structure of the project is somewhat more challenging. As project planning is to a large extent the duty of academic staff the costs are between € 700 and € 1,150 for most projects. Another issue that has to be taken into account is that project planning is often interrelated with the **preparation of an application**.

Based on the amount of money applied for the formal requirements are often not that high so that the time needed corresponds with this, while the time input of large-scale projects for this task will be much higher (see chapter 4.4.1).

For medium-scale projects, we arrive at a time input of 10 to 15 days for the preparation of the application. This corresponds to costs of € 2,300 to € 3,500 because this task will be conducted to a large extent by academic staff. If we take into account that the responsible head of department, usually a professor, will have to review the application, we may add another day or two, costing between € 400 to € 850.

In extension to this figures it should be noted that time requirements for the preparation of application may also be much higher if certain conditions are met. For example, we investigated one project that is funded by the German Employment Authority (Bundesan-

stalt für Arbeit) and their local extensions. The process of conducting the course under the framework of SGB III (the former Law for the Support of Labour) requires that the Employment Authority consider this programme as appropriate for the training of unemployed people so that the course can be supported. The second step is that the local Employment Authorities agree to provide funding for each single participant. Having some 200 participants the costs of preparing an application may strongly increase. In this case, the initial costs for the first application are said to add up to some € 300,000 with marginal costs that on average may be based on some 30 min. per participant. The latter would add up to 100 hours or 13 days, costing some € 3,000 per course. Thus the major costs for preparation of the course are the estimated at € 300,000. The costs per course are then depending on the question of how often the course will be run. Assuming that the course will run five times would mean annual costs of about € 60,000. Would the courses run ten times the annual costs would decrease to € 30,000. Including the marginal costs the total costs per course would be € 33,000, in the latter case. However, this project is a real exception, though appropriate to present an impression of what is possible and where market provides opportunities for university entities.

Having described the time input for project planning and preparation of applications we have already considered the most important activities of the preparation and planning phase. Due to the scale of the project, usually there is no need to **select co-operation partners** etc. However, if this seems necessary or advisable for a certain project, the time requirement will be in the range of three to five days with input from the professor or head of department and the responsible academic staff. Thus, the costs will be in the range of € 1,500 to € 2,500.

Also the time input for **staff recruitment** is negligible as, generally, most of the staff is already available. Here again, if there is new staff to be recruited the time requirement will be marginal, i.e. in the range of up to two days with costs of usually less than € 500 and € 1,000, respectively, if the professor is involved.

Another task that is only of relevance for some project is **organisational and structural adjustments.** Out of the case studies investigated regarding medium-scale projects only one reported that this was necessary. And here, it was said to be very time-consuming, to a certain extent, with about 10 days for meetings and preparation of regulations etc. so that the costs add up to some € 2,300.

Finally, we have to consider the time that is required for **project administration and management,** which is not that much for the preparation and planning phase of medium-scale projects, as only a few staff members are involved.

Thus, if we add up, the **total costs of the preparation and planning phase** were in the range of € 3,000 to € 5,000 for most medium-scale projects. In certain cases, for example, when co-operation partners have to be identified or staff to be recruited, the costs may rise by about another € 1,000 to € 2,500. In the same range are the (opportunity) costs if organisational or structural adjustments are required, for example, if the study and examination regulations need revision.

4.3.3 The costs of development

The time requirement for **preparation of concept and design** strongly depends on the design of the programme and the media applied. However, it seems that total time input is for two reasons less than in relation for only one course. The first is that the concept and design is usually prepared for the whole programme and if this relies on only one media this can be applied for all modules. Thus, there are some economies of scale incorporated in this approach.

This is confirmed by the following statement we received during an interview: The time input for **preparation of concept and design** is an overhead costs from the viewpoint of each course (or module) because this is not developed specifically for a certain programme or course but once developed and then uniquely applied to all programmes. Furthermore, it is said that the general approach is further developed on a continuous basis.

To present somewhat more concrete figures, we may rely on the figures of WINFOline where the **preparation of concept and design** was carried out for all courses of the programme together. The time needed added up to some 15 days of academic staff with costs of about € 3,500.

If we compare this figure with the time requirement and the corresponding cost of preparing concept and design for just one course (see chapter 4.2.3) we see that the time input was between 10 and 15 days and costs of € 4,200 to € 6,300. The cost is higher than the respective costs for a medium-scale project because this activity is often the responsibility of the professor in case of one course while in bigger projects handed over to an academic staff member. Thus, there might be a double impact leading to (some) cost reduction in medium-scale projects. One reason is that the time requirement does not increase much, if at all, and the second reason is that academic staff conducts this task at lower costs than professors. Thus extending the programme reduces the relative costs of such projects.

However, the time needed for this task may increase if, for example, the authors need detailed information on what to do and what the expected outcome is. Furthermore, they

might be demanded to specify in detail which sources are used to reduce the burden to clear the copyright and to get the licences for reprint. This would increase the time needed by approximately one day per module or course and the costs per course by about € 200 to 250. The total time requested then depends on the number of modules. For example, if such a two-year programme consists of 8 to 10 courses the corresponding total costs increase be € 2,000 to € 2,500.

If a **screenplay** has to be prepared that contains information about the material to be selected and its content and the media to be applied the time requirement will increase as well. In one project this demanded some 40 days that were spent in total by academic staff with (time) costs of € 9,200. The issue of designing a screenplay may comprise the development of the design of the programme or module based on ergonomic and learning psychology aspects. Another step was to generate specifications, so that the design could be developed externally. These specifications comprised information about the general layout, the specification of screen and media objects and a specification of the navigation and guidelines for use. However, so far, there are not many case studies where the latter two tasks were conducted so that it, obviously, depends on the programme to be developed.

In contrast, most projects included a **didactical preparation of the media**, although this is sometimes conducted in association with media development. In this case it is very difficult to specify the time input for didactical media preparation. However, if we try to approach the time requirement for this task we can rely on two case studies. In the first study, which corresponds to WINFOline, the didactical preparation of media comprised, for example, the development of a model of learning targets incl. types and levels of complexity of learning targets. Furthermore, instructions were generated as to how these learning aims/targets should be formulated etc. For the specification and definition of learning aims approximately 20 days were spent. The modification of the design and specification of tools required another 25 days. This adds up to 45 days with costs of some € 10,400.

In a second case study, the media-related didactical preparation comprised the development and realisation of the media and took 2 to 3 weeks per module and covers approximately 100 pages (DIN A 4). The didactical preparation is done partially internally and partially externally. The costs are estimated to be on average € 3,000 per module though in detail depending on the size of each module.

Thus, we may conclude that the didactical preparation of the media could be considered as a cost-driver of online instruction. However, this needs to be clarified during the next phase of the project that will also include some more case studies.

If we look at medium-scale projects it does not seem appropriate that they will design and develop their own **system**, particularly if this includes the development of a platform, because this would strongly increase the project costs. However, the development of a platform would be a real cost-driver for any project.

For example, ILIAS required roughly an input of 800 days of academic staff and 1,900 days of student staff assistance. Thus, the total costs add up to € 355,000. Another € 28,650 have to be added for external staff involved in system development. If we compare this cost with the total costs of 'normal' medium-scale projects, system development could raise the costs by more than 100 %, so that it would be a very inefficient approach to develop a platform for one medium-scale project only.

A more appropriate approach might be to adjust an already developed platform to the particular requirements of the project. This might require some 5 to 20 days depending on the particular adjustments to be made. Depending on the qualification of the staff involved this may correspond to costs of about € 1,000 to € 4,500.

If the particular programme is part of a further education centre system, development can become an overhead cost due to the fact that the centre offers a number of online courses and courses with online elements, respectively. But even in this case the question has to be addressed whether it would be more appropriate and efficient to buy or rent an already established platform.

The major cost-driver, though one of the most important activities of all online courses and programmes is **content development**. However, as for the small-scale projects, it seems that quite a number of projects investigated relied on content that was already available.

In the other cases where content had to be developed it seems to be fairly often handed over to external staff which is considered as less expensive and, thus, more cost-effective than internal development. We already highlighted this topic in the previous chapter when investigating the costs of developing online courses (see chapter 4.2.3).

If we look at the costs of external content development we arrive at costs between € 2,500 to 5,000 per module. The costs for the whole programme depend on the number of modules, which fairly often seems to be in the range of six to ten for two-year programmes under consideration here. Based on this assumption the costs arrive at € 20,000 to € 50,000 for the whole two-year programme, but the more important figure is the cost per course or module.

An interesting finding is that all medium-scale projects investigated relied on external content development. This might be due to the fact that they are all related to revenue gaining and (at least) cost-covering programmes which request cost-effective and efficient development.

An important issue that is related to content development is copyright clearance, for which costs are difficult to specify because they depend on a number of influencing factors. So far, we have not been able to arrive at clear costs for this issue, which is due to the fact that only one case study highlighted this issue. We will therefore give only an indication on the basis of this case study and try to gain more evidence during the next phase.

In the one study the costs of copyright clearance and content evaluation for this purpose are between € 2,400 and € 4,000 per module. The costs added up to € 24,300 for all eight modules. This expenditure comprises the assessment and correction of materials, contacts to the author if things are unclear or need to be clarified (from the viewpoint of the German reader and learner), copyright clearing, contacts to publishing companies, preparation of content for printing and evaluation of the CD-ROM. Taking into account the activities covered by the fee rate it appears that copyright clearance is only a minor issue.

The costs for licence fees are about € 1,300 for all eight modules as far as this was necessary for each of them.

If content is developed one can turn to the development of the particular media to be applied. The corresponding costs and their structure are heavily dependent on the media employed but correspond also to the number of modules. At the end, the total programme costs can be derived from the previous chapter where we investigated the costs per course. However, to provide a more comprehensive view we will provide some other insights as well.

If we start with those media that have high economies of scale we will have a look at eBooks and eMaterials.

eBooks and eMaterials

As presented in chapter 4.2.3 the costs for providing eBooks and eMaterials differ depending on the number of pages and the add-ons, such as multiple choice questions, glossary items and (hyper-) links etc.

If we take into account the costs of preparing eBooks, the time input differed between 51 hours for 86 pages to 226 hours for 359 pages. However, there is no clear linear rela-

tionship between the number of pages and the time requirement. There are several other factors, which affected the time necessary for the preparation of an eBook. We also find examples where only a few pages required 47 hours or some 40 pages 279 hours.[26] The time will be affected by the tasks to be conducted and the particular specifications. If we try an approximation of the time required for the preparation of an eBook we arrive at 2 to 2.5 pages per hour, based on the 19 courses of the VIRTUS project. This translates into average costs of € 6 to € 9, if prepared by student staff, and € 12 to € 15.00 per page, if conducted by academic staff. However, there might be some reasons to involve academic staff but there seems to be no reason to rely only on academic staff. Thus, the average cost to calculate with might be between € 9 and € 12.

If we assume a programme with 8 to 10 courses with eBooks and eMaterials and 150 to 200 pages, each, the average cost per eBook arrives at approximately € 1,350 to € 2,400. The total costs for 8 to 10 eBooks add up to € 11,000 to € 24,000. A major advantage of eBooks and eMaterials is that the recurrent costs of implementation are relatively low, if we neglect the costs of content updating (see chapter 4.3.4). A little bit more expensive is the development of study books, for example, often providing the foundation for virtual seminars and online tutorials.

Study books

The costs for the development of study books comprise the transfer of the text into a booklet, where costs can be reduced by preparing a special format that contains all styles. In this case the first cost-item is the preparation of a template for the format. However, the time input should not be very high and require only one or two days. Thus, the costs add up to some € 200 to € 500. The remaining activities of preparing a study book are then covered by the costs for content development on the one hand and costs of replication on the other hand. Furthermore, the provision of a template becomes an overhead as it can be applied to all study books.

The time input for the preparation of CD-ROMS and cassettes with text exercises includes several sub-activities as, for example, media didactics, preparation of the exercises and screenplay, media design and the production of the basic (prototype) CD is estimated to be two months (full-time) per module. Other tasks are the dubbing of the texts (radio play) on the cassettes as Wave-Data files, cutting and pasting the radio plays onto the right position and compilation of pictures. For the two months which are estimated to be

26 The figures presented here are from the VIRTUS-project.

necessary for this task per module the costs are nearly € 10,000 per module, adding up to € 80,000 to € 100,000 for eight to ten modules.

If cassettes or audio-based CD-ROMs are to be prepared then the costs for the speaker has to be taken into account, if internal staff at an appropriate quality and time input does not do this. If external staff has to be employed for this task, the direct costs for the fees will depend on the time that is necessary for it. In the particular case study in this investigation, for example, the average costs of each module were at € 900 so that another € 7,200 (for 8 modules) have to be added to cover the costs of the speakers of the cassettes.

Thus, the total costs for the preparation of CD-ROM and cassettes, including some other activities are at around € 11,000. This adds up to approximately € 88,000 for the whole programme of eight modules. In case of ten modules the costs would go up to € 110,000.

Finally, we should briefly highlight that the development of a CD-ROM or a cassette may also comprise the preparation of a cover. However, we are not in a position to specify the respective time input, which most probably is marginal.

The second media to be presented here is the development of online tutorials **(cbt and wbt) with audio-files and slides**. As presented in chapter 4.2.3 the costs per course are at around € 6,000, so that eight to ten modules would cost some € 48,000 to € 60,000.

Improving the features for the tutorial by incorporating animations the costs may go up by about € 16,000 per course, though this comprises some tasks that were related to reviewing the first development. Thus, a more appropriate approach might be suggest the costs at around € 10,000 to € 11,000 for the inclusion of the animations.

Adding up the costs for the wbt- and cbt-features we arrive at some € 15,000 to 16,000 per module. This would lead to € 120,000 to € 150,000 for eight to ten modules that might be required for a two-year programme.

In many cases the **preparation of (additional) materials** does not depend on the number of courses or modules but is conducted once for the whole programme. Therefore, the costs are the same for the whole programme than for one course.

For example, for the preparation of a glossary a student staff member may spend some 5 days (€ 450). For other tasks which may require somewhat more input, 10 days may have to be spent, with costs of about € 900.

The costs for **staff training** for development depends more on the number of staff involved than on the size of the project, though the need to train staff will definitely in-

crease with its size, but to a certain extent an advantage might be that training can be conducted in groups of, usually, up to five people. In most projects the staff is trained for three to five days each. Thus, even though we can identify some economies of scale this is usually limited to the 'optimal' size of a group. Another interesting issue in this respect is that training is generally conducted by internal staff. Therefore, neglecting exceptions, the only cost of staff training is time.

If we calculate the total costs of training we have to specify the margins. If training is conducted for about five days and for (five) student support staff this adds up to time costs of some € 2,250. Another € 1,150 has to be added for the trainer who is regarded as academic staff. The upper limit is when this training is held for five academic staff. Here, we arrive at € 7,000 (incl. trainer).

Another area where we can identify some economies of scale is the **preparation of manuals and tutorials**, particularly if they can be applied for several modules. And this is very often the case in medium- and large-scale projects.

One task might be to generate an online help tool what can be done by student staff. This activity may require a time input of up to 50 days with costs of up to € 4,500.

The costs for the preparation of documentation and a tutorial may require some 10 to 20 days. The corresponding costs depend on the qualification of staff. For example, 10 to 20 days of academic staff cost between € 2,300 and € 4,600, while the same number of student support staff cost € 900 to € 1,800.

If manuals and tutorials are prepared for more than one programme the respective costs can be either considered as overhead or distributed between the programmes relying on it.

Finally, we arrive at the last and more embracing activity which is **project management and administration** where the following figures will provide evidence for the assumption that this activity does not correspond to economies of scale. In contrast, this is one of the items where cost seems to increase progressively.

The responsibility of project management and administration is usually handed over to one staff member who acts as project manager. The time requirement can then put in relation to the total workload of the particular person. Depending somewhat on the scale of the project the time spent for this activity is between one quarter and one third of the total workload of the project manager. This adds up to 5 to 8 days per month or costs of about € 1,150 to € 1,850. This adds up to some € 7,000 to € 12,000 per semester. The total costs than depend on the duration of development period. However, it is difficult to

provide some general figures on the total administration costs as they depend on the duration of the particular period.

We investigated also projects where project management and administration comprised the full workload of the project manager but included also other duties than this in the narrow sense. Other tasks covered were supervision of the moderators and the discussion forums etc. If we would be able to specify the time input for these duties as well, we are quite sure that we would arrive at figures that were close to those specified above.

The total costs of development

The cost of development for a full study programme of about two years or eight to ten modules vary strongly in dependence from a number of factors. However, we will try to summarise the findings of the previous section and the several case studies.

An important issue is that a number of activities can be conducted once but applied for all modules or at least all modules that rely on the same mode of delivery. The costs of other activities depend on the particular media employed or the duration of the development phase.

The first group of activities are those activities that are usually conducted only once and can be applied to all subsequent modules. These activities are summarised in the following table:

	Time input in days	Costs in €		unit
		lower limit	upper limit	
preparation of concept and design	10-15	2.300	3.500	programme
screenplay	30-50	7.000	11.500	programme
media didactical preparation	30-50	7.000	11.500	programme
staff training	3-5	1.400	2.300	programme
preparation of additional materials	5-10	450	900	programme
- glossary	5-10	450	900	programme
- online library	5-10	450	900	programme
- search engines	5-10	450	900	programme
preparation of manuals and tutorials				programme
- online help tool	30-50	2.700	4.500	programme
- documentation	15-30	3.500	7.000	programme
- tutorial	5-10	450	900	programme
Total	143-250	26.150	44.800	

Even though the total time is estimated to be between 140 and 250 days and corresponding to costs between € 26,000 and € 45,000 it should taken into consideration that this is only valid if all activities are to be conducted for such a programme. Another issue is, for example, that the time and costs of training depend on the number of staff (and groups) to be trained. Thus, the training costs might be higher or even lower.

However, more important for the total costs of development are the costs of content development and project administration. The time requirement for project administration covers between one quarter and one third of the workload of the project manager, so that the monthly costs are between € 1,100 and € 2,000 per month. The total costs for the developmental phase depend on its duration. A careful approximation would possibly arrive at € 13,000 to € 48,000, assuming a development phase of one to two years.

The time requirement of content development depends on the question whether content is already available or has to be developed. In the latter case the time depends on the particular course to be developed and who is responsible for development. An approach that might save costs is to rely on external staff who receive a lump sum of, for example, € 2,500 or € 5,000 per module. On the other hand, the time input for content development should be in the range of 15 to 30 days of academic staff and correspond to costs of € 3,500 to € 7,000. Whether it is more or less expensive to rely on external or internal staff depends on the particular conditions. According to the findings of this and other studies (e.g. Hülsmann, 2002) it is most probably less expensive to deploy external staff.

The final item, though an important one, to be considered here is media development. Relying on the costs per module as presented in chapter 4.2.3 we would arrive at the costs that are provided in the following table:

	Costs in €	
	lower limit	upper limit
eBook (150 pages)	7.000	24.000
study books	incl. in content development	
cbt audio-files with slides	48.000	60.000
audio-file with text etc.	144.000	160.000
audio-file with animations	80.000	100.000
video-streaming	nn	nn

However, in interpreting the figures in the previous table the reader is advised to carefully read the particular section in this chapter and to take into account that the figures rely on eight to ten modules employing the same media. Whether it is a realistic presentation depends on a number of factors, for example, the costs of the development of the particular media, the funding and the intention and structure of a certain programme.

If we summarised the costs of the several activities and media employed we would arrive at a range of € 65,000 to more than € 300,000 for a complete study programme. However, this result cannot be considered as being of real importance, thus it seems to be advisable to refrain from it but we advise the reader to take into account the factor affecting the final costs as mentioned in this chapter.

4.3.4 The costs of implementation

The costs of implementation that to a large extent are recurrent costs depend heavily on the media employed. We will therefore have to rely on this issue for the presentation in this section. The first activity to be considered here is the replication of media.

The costs for the **replication of media** depend on the particular media employed and have to be considered as a variable cost depending on the number of participants.

If we have to replicate a **CD-ROM** the first task is to copy the cover of the CDs which costs only a few Euro, usually between € 3 and € 6. The costs for replicating cassettes are of the same size.

The costs for the replication of **study books** were already presented more in detail above and are between € 13.50 and € 20.00, depending on the number of pages and the costs of binding. The total costs per programme depend on the number of participants. For example having some 50 participants per semester, this adds up to € 650 to € 1,000. For a programme of about four semesters the total costs are between € 2,600 and € 4,000.

The final cost is the time required for preparing the mails and for postage (€ 1.50 to € 2.25). For 50 participants the costs for postage are some € 75 to € 115 per semester or € 300 to € 450 for the whole programme.

However, an approach to forward the costs of replicating study books would be to provide pdf-files or eBooks on the web. Another advantage might be there low costs of recurrent costs for **student support and advice.**

eBooks and eMaterials

The costs for student advice and support are marginal for eBooks and eMaterials, which have high economies of scale. However, one may question the advantages of e-Books and eMaterials when not combined with virtual seminars and online tutorials, though they do not necessarily need to be linked to eBooks and eMaterials.

Virtual seminars

In the virtual seminars investigated we experienced that it seems to be general practice to rely on external moderators who are paid on a lump-sum basis that most probably does not correspond to their real time input. The approaches we identified were either based on a fixed number of hours per week or a combination of time input and number of students. A third approach is to negotiate a contract every semester where the lump sum

reimburses all activities. However, in the latter case it was stated that the price does only partially correspond to the number of participants (see chapter 4.2.4).

However, from the case studies we gained the experience that the costs related to student advice and support differ heavily in relation to the overall project budget.

For example, we investigated one project were approximately one third of the overall project budget of more than € 1 mill. was spent on this task.[27] And even though the costs were really important it appears highly probable that part of the opportunity costs is forwarded to the tutors who are paid a lump sum based on a fixed time input of one hour per participant and week. However, it should be noted that this programme lasts approximately 48 weeks (ca. 880 hours) and has nearly 200 participants at the moment. Formal 'contact time' is one hour per week and participants, which is, more than foreseen for other university courses and programmes (see above chapter 4.2.4).

Another, similar approach is to hand over the tutors' duties to an external agent that is paid on a lump-sum basis which is only partially fixed in relation to the number of participants. For example, at the moment 38 participants are to be catered for and the payment has been agreed to be € 5,500. For the whole programme of eight modules (incl. two special modules) this would add up to € 44,000, though this based on constant numbers of participants which are expected to increase somewhat when the last module has been developed. For this amount of money the agent is paid for all activities that are to undertaken in respect to the participants, i.e. email contact and discussion, advice by telephone etc. However, the latter is not used that much because the participants obviously feel it to be too difficult for them. If we put the costs of € 5,500 in relation to the overall project costs this arrives at around 50 % of the recurrent costs and less than 10 % of the total costs.

Another cost arises for the moderators of the email discussions who are paid on their time input which is written down. The fee rate is € 16 per hour for a maximum of 10 hours per semester. Thus, the maximum fee rate is € 160 for all groups. An important issue here, and which was reported also for other projects, is that the students do not rely much on e-mail discussions and communication, although this is initiated and suggested regularly.

In virtual seminars, the time requirement for **student advice and support** is depending on the number of students, their requests, i.e. the number and quality of messages and

[27] This particular case study is not presented in this interim report as we are still waiting for review of the draft case study.

contributions posted and the commitment of the (external) moderator. In one of our anonymous interviews the time requirement was estimated to be on average 2 hours per day over 7 days per week during the 5 to 6 weeks of the course. This adds up to 14 hours per week or 70 to 84 hours per module of 5 to 6 weeks. Based on a fee rate of € 25 per hour the costs per module for student advice and support would be about € 1,750 and € 2,100, respectively.

However, as already mentioned above the moderators are only paid for about four hours per week with costs of about € 500 to 600 for the 5-6 weeks. Thus, the costs would increase by factor 3.5 if internal staff conducted the course. This can be considered as a huge difference between the costs and expenditure of the centre and the private costs of the moderator.

The total costs of the programme depend on the number of seminars to be moderated. Whenever the number of participants exceeds 25 another group is established, so that the costs of moderation double. Having only one group and eight to ten virtual seminars we arrive at costs of € 4,000 to € 6,000 in total. If all seminars had to be divided into two subgroups the recurrent costs for moderation double to € 8,000 to € 12,000.

Summarising the findings of the three case studies related to virtual seminars their costs differ heavily and may arrive at one third of the overall project budget though usually the costs are far less.

Another important feature is that all of the institutions providing virtual seminars have to recover their (marginal) costs for it and are, thus, interested in working on a cost-covering basis. This may have let to the approach to rely on external agencies and tutors to moderate the seminars which surely is more cost-effective than internal tutors would be.

Online tutorials

As for virtual seminars **student advice and support** is also the most important and time-consuming task during the implementation phase of online tutorials and also partially dependent on the number of students participating. For example, for an online tutorial with 100 participants it is estimated that the tutor spends one day per week on online tutoring. Another five days are spent at the beginning of the tutorial on preparation and another week at the end on assessment. Thus we would arrive at 26 days for the online tutorial. On this figures the marginal costs for the online tutorial are € 6,000. Having eight to ten such courses for a whole programme, the total cost arrive at € 48,000 to € 60,000.

The time requirement would also be less if the number of participants were less, though it does not decrease in a linear manner. For example, if only 30 students participate the time expenditure would only go down by one third to € 4,000. This is due to the fact that some tasks have to be done anyway and that the number of students contributing every week may not decrease in the same fraction. In this case the programme's cost for tutoring would be in the range of € 32,000 to € 40,000.

If we translate these figures into a two-year programme this may comprise eight tutorials. If the costs per semester are in the same range for all modules as presented a careful approach would be to suggest the costs for student advice and support of online tutorials per semester to be about € 10,000, which obviously assumes one each, so that this would lead to costs of some € 40,000 for four semesters. However, as should be obvious, the total costs for tutoring highly depend on the number of students participating. Per course the costs are between € 4,000 and € 6,000.

As for the costs of **evaluation** presented in the previous chapter for small-scale projects the costs of evaluating programmes are related to the understanding of what is considered. If we consider pedagogical evaluation this has to be undertaken for every single course, so that the costs can be derived by multiplying the figures of the previous chapter with the number of courses. If, for example, the programme consists of eight courses the costs for evaluation might be in the range of € 10,000.

Considering evaluation as quality assurance and the introduction and the inspection of the corrections to be made this may add up 30 days per course. This corresponds to costs of € 5,500 to € 7,000 per semester, depending on the category of staff conducting this activity. If the costs are similar for each course the total costs arrive at € 45,000 to € 70,000. However, it seems that such high costs for evaluation are an exception.

The costs of **staff training for implementation** depend mainly on the number of new staff that is deployed for the implementation of the programme. This is, for example, the case if courses rely on external moderators or if administrators have to be trained. According to our impression of the case studies the latter is usually not the case. Another issue to be considered here is that staff training may increase the costs of staff replacement.

It appears that external moderators come into play for online tutorials and virtual seminars. On average, the training requires half a day or – in an extended version – one day. Thus, the costs comprise the time of the external moderator who is usually not reimbursed for that training, and the internal trainer, adding up to costs of € 110 to € 230. If the moderator or tutor is internal staff the opportunity cost will double.

Public relations and marketing is an issue where the costs differ in relation to the online courses that were presented in the last chapter. However, although PR and marketing is of relevance for acquiring participants, university institutions are comparatively reluctant with it. However, the following figures may provide an overview of what could be done and what the costs would be.

As far as we were able to identify such costs they did not exceed € 10,000. And, even more surprisingly, in this case the investment was not directed at new participants but on the acquisition of new donors.

However, the total costs of PR and marketing split up into € 4,200 on design and print of flyers, half of it spent on printing purposes and on general PR/marketing tasks which are not specified here. Another € 2,050 was directed towards the development of the project's web site. The preparation of the presentation of the project on fairs cost some € 4,000.

An activity in another case study was announcing the programme in an advertisement with a number of other programmes so that the costs could be divided between all programmes advertised. Thus, the programme related costs were some € 1,000.

Another marketing activity is participation in trade fairs, e.g. Learntec. The costs for personnel are some € 1,150 every year for this five day event. This has to be added by travel and accommodation costs, here in this particular case, some € 500 arises for travel to Karlsruhe and accommodation.

Thus, in reality costs for marketing and public relations are usually at around € 1,000 to € 1,500, which highlights the low consideration of activities which are addressed to gain customers or participants.

Another minor activity also for programmes is **project controlling**. We identified only two projects where time input could be specified and for one project this was due to the particular environment of the project so that this will not be presented here. In a second case study some five days are spent, costing approximately € 1,150. In some other case studies this task is covered by the programme manager but the time input cannot be specified.

So far, none of the projects can provide real figures about **content updating** as they are developed in recent times so that this is not yet necessary. In the previous chapter 4.2.4 we provided estimated figures for courses or modules. The time needed for that was estimated to be two to five days every year, so that the costs would be between € 400 and

€ 1,150 if conducted by academic staff.[28] If we extend this figure to cover the costs of programme updating we would arrive at costs of € 3,200 to € 11,500 for eight to ten modules.

Finally, we can specify the costs for **project management and administration** for the implementation phase. However, the time requirement and costs for this activity differ heavily between the projects under consideration here. For example, in one project the estimated time needed for this is approximately 20 days per semester (or 40 days per annum) while in another one-year programme the time input is half of the working time of the project manager, i.e. 110 days a year with corresponding costs of € 25,400. In the former example the costs would arrive at around € 9,000.

And, in a third programme project management and administration is the major duty of the project manager whose only responsibility (more or less) is to care for the study programme. However, the project manager's duties comprise a number of different task but which proved difficult to estimate. If we would assume that half of his time is directed at project management and administration corresponding to implementation we would arrive at the same figures than above, i.e. some € 25,000.

Thus, a realistic figure may arrive at costs of about € 10,000 to € 12,500 per semester.

Having provided the figures for the several tasks we can present the total costs of implementation of medium-scale projects.

The total implementation costs

The costs for the implementation of online programmes depend on a number of factors that to some extent relate to the number of participants as, for example, the costs of the replication of the media and their delivery. The same applies to the number of seminars and tutorial, though here is more flexibility on what the limit is for dividing groups of students/participants. Therefore, we present to settings where is first is based on 50 and the second on 100 participants, which will most probably be appropriate for many programmes. However, the case studies related to medium-scale projects cover an even broader range from 20 to approximately 200.

We will start with the cost of replication and delivery of the media, i.e. study books, CD-ROMs etc. which are presented in the following table and are between € 150 and

28 When we considered content updating in relation to online courses this was usually done by the professors themselves, wich is not realistic for the programmes under review here.

€ 2,000 without delivery. If the media are delivered by post another up to € 230 may be added.

	Costs in € (for 50 participants)		Costs in € (for 100 participants)	
	lower limit	upper limit	lower limit	upper limit
- study-book (per copy)	500	1.000	1.000	2.000
- CD-ROM (per copy)	150	300	300	600
- Cassettes (per copy)	150	300	300	600
costs for delivery	75	115	150	230

However, to reduce this costs some course providers have started to forward these costs to the participants by providing pdf-files for print by the customers or web-based programmes, though this cost does not highly affect the total cost of implementation.

The second group of activities is directed at the environment of such a programme and covers, for example, evaluation, content updating or project controlling and marketing. The costs are summarised in the following table:

	Time input in days	Costs in € (per module)		Costs in € (per programme)	
		lower limit	upper limit	lower limit	upper limit
Evaluation (pedagogical)	10-15	2.300	3.500	18.400	35.000
Quality assurance	10-30	2.300	7.000	18.400	70.000
content updating	5-10	1.000	2.500	8.000	25.000
PR/marketing				500	1.500
project controlling	2-10			450	2.300
project management/administration	110-150			25.000	35.000
Total	143-250	5.600	13.000	70.750	168.800

However, it should be noted that the figures provide an indication which activities might be related to implement online programmes but are not necessarily related to each programme.

Finally, we have to present the last activity, which is the core activity of most online programmes, i.e. student advice and support. Here the costs depend on the mode applied and the number of groups served.

For virtual seminars the moderation is usually handed over to external staff with costs of about € 1,000 to € 1,500 per semester course and group. Having eight to ten such courses we arrive at costs of € 8,000 to € 12,000 per programme and group of participants to be served. Assuming 50 participants one would at least offer two seminars so that costs would double to € 16,000 to € 24,000, while costs would increase by factor four to € 32,000 to € 48,000 in case of 100 students. It appears that smaller groups are usually found in further education programmes, which sometimes even establish a new group whenever the number of participants exceeds eight or ten.

In contrast, it appears that online tutorials are more conducted for 'normal' higher education programmes with groups of up to 100 students, and sometimes even more. Yet, it can be assumed that a number of students is registered but does not participate actively. However, this means that only one tutor would be employed, with a time input of some 25 days per course and semester. The corresponding costs would add up to approximately € 6,000. Having eight to ten courses per programme the costs would arrive at € 48,000 to € 60,000.

If the number of participants were less, the necessary time input would go down a bit, so not linearly. Serving only 50 students requires some 20 days of the tutor's time, costing approximately € 4,600. The programme's cost would go down to € 37,000 or € 46,000, for eight and ten courses, respectively.

To sum up, to total recurrent costs of online programmes differ between € 80,000 and € 230,000 for programmes with up to 100 participants and consisting to a large extent on cost-intensive online tutorials which are based on content delivery with animations etc. Probably, this can be considered as high-quality approaches of online learning. However, in reality it is not really probably that the costs will be that high as presented in this chapter. The costs presented in the several case studies are far lower than presented here. In consequence, the figures presented at the upper range should not be considered as representing the reality of eLearning at German universities but only as what might be the cost under certain circumstances.

4.3.5 The total costs of medium-scale projects

If we look at the figures presented in the previous section we arrive at impressive amounts of money. The most expensive (two-year) programme would cost more than half a million Euro, with roughly € 300,000 spent on development and approximately € 230,000 on the delivery of online tutorials. However, such high costs would apply only to programmes with a very high share of animation and audio-files etc. Furthermore, all activities that are generally identified and possibly conducted would have to be carried out. And only if both conditions are met the costs might be that high. As far as we are able to establish so far neither of the projects investigated so far conducts all activities nor do they apply only very expensive media. If we are not misled, only one project might arrive at costs that were close to such high costs – and this requires further investigation as we have considered only a part of this project, so that it is difficult to derive such a conclusion yet.

Furthermore, one programme that is not yet incorporated in the case studies of this interim report has a budget of more than one million Euro but this due to some circum-

stances that do not apply to other courses. One quarter of this amount is spent on computer investments for the 200 participants, roughly 40 % is spent on moderators at several levels, while the remaining one third is the cost of the other activities including administration and management. This example highlights that the figures presented in this chapter are part of the reality, though not necessarily the average project at German universities.

At the lower end, the total costs of such a two-year programme are at around € 150,000, but even here some conditions are to be met. However, some medium-scale projects investigated in this study arrive at costs in that range and even somewhat higher.

4.4 The costs of large-scale projects

In this chapter we will concentrate on programmes that go beyond the scope of two years. This may comprise several approaches as, for example, networks of several universities to develop knowledge basis or comprehensive programmes. However, so far we have conducted only one case study that would fit into this category (technical informatics). The consequence would therefore be to repeat the findings of this case study, which is not appropriate, but there are to other case studies that can be considered as large-scale projects.

The one is VIRTUS where we gained interesting insight into a number of issues and the second is WINFOline, though both case studies do not fully fit under the headline 'large-scale projects' for several reasons. In relation to VIRTUS this is a project with only one institution involved, the Economics and Social Science faculty of the University of Cologne and it does not comprise a full study programme but is directed at supporting traditional learning approaches by providing eBooks and eMaterials.

Regarding WINFOline, we considered only the costs of one course at the University of Göttingen. Even though it would be possible to extend the investigation to all courses conducted at this university we are not in a position to gain a comprehensive insight into the costs of the full programme because our interview partner could only provide information regarding the time input of their own institute but not of the others.[29] Obviously, it generally proves difficult to get insight in time matters from other institutions although co-

[29] To avoid misunderstandings, it was also not the intention at that stage to gain insight in the whole project. Is has to be discussed whether this is an interesting feature that should be investigated in the next phase. With respect to the impression and findings of this summarising chapter it could be one of the more expensive approaches of eLearning in German universities. Furthermore, it employs medial approaches that differ from other projects.

operating in the same project.[30] Therefore, we would have to interview all the other stakeholders at the other universities.

Another issue which is of importance is that the figures presented in this case study are to a large extent planning costs but not real figures. This is more or less valid for all large-scale projects at German universities as they started to operate less than two years ago. It seems therefore appropriate to refrain from presenting findings or even conclusions. Yet, what can be done here is to provide some insight into interesting features that were gained during some other interviews where we concentrated on one programme or even course but which was embedded in large-scale projects.

What is worth highlighting is the impression that a great deal of time and of the direct costs is directed at management, administration and co-ordination. In this and in some other respects there seem to be important "diseconomies" of scale. Yet, we will start with one issue in relation to the costs of preparation and planning.

4.4.1 The costs of preparation and planning

For the technical informatics project (see case study 5.7), the first three steps, **project planning, preparation of application and the selection of co-operation partners** were undertaken as a joint effort so that the time input cannot be specified for each of these tasks. In total, 70 days were spent, 10 days of a professor and 60 days of academic staff, adding up to nearly € 13,900. The travel expenses which were around € 1,840 in relation to these three tasks can only be specified for staff of the University of Rostock. However, the project comprises 11 partners so that the total travel expenses for these preparatory meetings were much higher. Even if they are not that high for the other partners it appears to be realistic to expect them to be in a range of € 8,000 to 10,000.[31] Thus, the total costs for these three activities are in the range of € 20,000 to € 25,000. In comparison to the medium-scale projects this is approximately ten times the cost, even though one has to account for the fact that project funding is about € 3.2 mill. and thus, again, much higher than for the medium-scale projects. Therefore, the preparation and application costs are less than one percent of the project budget.

30 We gained this insight in a number of projects where several institutions where involved. In one case breaking off the interview was the consequence as we were not in a position to get appropriate information to conduct this study. And, very important, that this was not due to the unwillingness of our interview partner, but to the impossibility of getting information about the time input by co-operation partners.

31 We have assumed that the average costs per meeting are € 250-300 per university. The number of meetings was three.

In the same range is the time requirement for project planning of WINFOline, although this was an already existing and working co-operation. Here, the time requirement was estimated at 63 days for project planning and development of the business plan. Due to the already existing co-operation with the other three universities there was no need to look for other partners. However, new partners shall be involved in the future. The costs of the time requirement of 63 days for the application preparation are some € 14,550.

An even far higher time input was estimated for project planning in another large-scale project. For VIRTUS the time input for project planning was estimated to be 240 days of academic staff (category BAT IIa), which is in total a bit more than a year, resulting in costs of € 55,440. Putting this in relation to the project budget of € 1.2 mill. this is nearly 5 %.

To this time input, another 60 days have to be added for **preparation of the application**. As this total time was split up by 1:2 between the responsible professor and academic staff, the costs add up to € 16,750. And, another 10 days of the professor were directed at finding co-operation partners. The respective opportunity costs are € 3,760. If the figures are only approximately correct, the costs for preparation and planning are at around € 75,000 which is 7 % of the budget allocation for the project of VIRTUS.

Another issue that is more or less unimportant for small- and medium-scale projects is **selection of investment goods**. In one case some 80 days were spent on the consultation procedures and selection of investment goods, resulting in costs of € 10,000, and another 5 days for visiting conferences and fairs (€ 1,150). In another case time input was stated to be high but impossible to be specified.

In contrast to small and medium-scale project even **staff recruitment** may become an issue, due to the number of staff involved. However, this depends on the particular environment.

This time spent for this activity is between 6 and 20 days, adding up to costs of € 1,400 to € 4,600.

Another cost driver is sometimes **preparatory talks**, which may comprise co-ordination tasks as for VIRTUS where six professors met regularly to co-ordinate the project activities. It is assumed that they met 6 times during the first year of the project for one hour each. The total time input thus is 36 hours or 4.5 days, opportunity costs are some € 1,800 in total.

Another relevant issue in this respect are faculty workshops where staff members were informed about the progress of the projects and its requirements. Such workshops took place every 3 to 4 months and lasted for 2 hours on average. The number of participants

differed between 20 and 40. For the calculation of the time input we assume that on average 30 persons took part. Thus, total time input was 30 days of academic staff, resulting in costs of € 6,930.

Furthermore, reporting and decision making in university or faculty committee meetings might become an issue of concern for large-scale projects. This may particularly be the case if the eLearning-project results in amendments or changes of the study and examination regulations. As far as only the development of the project has to be reported and discussed in faculty committee meetings, the time input will not be that much. For example, in a monthly professorial meeting, consisting of 52 to 56 professors, where attendance is obligatory the time requirement adds up to about 7 days with costs of about € 2,740. However, time requirement might increase a lot if adjustments of the study and examination regulations are necessary and some of those participating in such meeting oppose the intention of the project.

Total costs for these different meetings add up to € 9,100, which is some 1.5 % of the total project costs. The possibility of opposition or hindrance against such project might be more important than the cost aspect, but it shows some insight, at least.

Finally, we will present an important topic in relation to the costs of eLearning, **project administration and management**. Large-scale projects rely heavily on administration and management and on co-ordination, particularly if it is a co-operation project of several partners. During our field phase we visited several projects with different approaches. For example, if a faculty project requires internal co-ordination this might be time-intensive, but it does not require additional costs for travel and accommodation. In contrast, if a project has a number of co-operating universities and/or external partners, this will increase the cost of administration and management a lot. In this case the big number of participants requests a meeting from time to time to discuss the further process and to co-ordinate the activities. In one case, where 11 co-operation partners are involved, the costs for such meetings are estimated to be at around € 280,000, including travel and opportunity costs. This is nearly 10 % of the project budget, though the opportunity costs arise outside the project to a large extent.

The second part of this activity is day-to-day project administration and management, which is often handed over to one responsible person, usually the project manager. The time input for the responsibility differs between 20 % of the working time of the project manager. For the six month during the preparation and planning phase this adds up to 52 days or costs of € 12,000.

The total costs of preparation and planning

If we add up the costs of the several activities to arrive at the total costs of preparation and planning, this is much more than for the smaller projects. Even if we only account for the costs of project planning and preparation of the application we arrive at a time input of approximately three months, sometimes a bit less sometimes more. This seems to be a surprisingly stable figure. The corresponding costs are some € 15,000. However, for one project this cost was far higher with about € 55,000, which might be due to the fact that it was one of the first eLearning projects at a German university.

Some of the biggest cost-drivers of large-scale projects are coordination or preparatory meetings, where we quickly arrive at opportunity costs of approximately € 8,500 and travel expenses of some € 3,000 (incl. accommodation).

Even if day-to-day management may not require that much attention at this time of the project, some 10 to 20 % of the project manager's time can be estimated for that.

Thus, to sum up, the total costs of preparation and planning are some € 25,000 for the basic activities. Other costs of up to the same amount of money may arrive under certain circumstances presented above.

If we compare these figures with the cost of smaller projects, the impression arises that there are jumping fix costs when moving from small and medium-scale projects to larger ones. The total costs of preparation and planning are at least five times more expensive than for the medium projects. However, if we put this in relation to the project budget, this is less than five percent and usually in the range of one or two percent.

4.4.2 The costs of development

One of the first activities where large-scale projects may have a comparative advantage may be **preparation of concept and design** which can possibly conducted once for all modules or courses. However, the figures of the case studies are somewhat confusing and differ strongly from some 15 days to more than 100 and sometimes even more than 200. Yet, in the latter case this may be due to the large number of 150 separate modules, while in the first case this relatively low time input may be due to the experience of a previous project. Thus, due to costs that differ between € 3,500 and some € 50,000 it is not yet clear whether there are advantages of scale.

Also the figures for **didactical preparation** provide no clear picture. This might be due to a different understanding of the term 'didactical preparation' or due to different experience of the project staff. However, the time spent differs between 45 days and 24 months. Thus, the costs may also differ between € 10,000 and € 120,000.

In past projects an important activity was **system development**, which should no longer be really an issue due to the existence of a number of platforms, though there might be exemptions under certain circumstances.[32] The time requirement for system development would be high, leading to (opportunity) costs of about € 355,000. Another € 28,650 was spent on external staff involved in system development. Therefore, the total costs are approximately € 385,000.

In contrast, there should be much more evidence on the time input and costs for **content development** as every project is necessarily active in this respect. Yet, a surprising finding is that, so far, even many large-scale projects rely on already existing content, reducing the corresponding costs a lot.

So far, there is only one project that spends much time on content development. Here, a total number of 9,900 days is planned to be spent on this, adding up to 45 years or total costs of approximately € 2,3 mill. However, it is difficult to specify the tasks conducted and their extent as the responsibility for the specification of each module is handed over to those preparing and developing it. This is a major drawback in this respect.[33] However, it seems plausible to assume that this time input comprises more that 'only' content development, but also media development. Yet, even here it cannot be specified at the moment.[34]

However, if we try to sum up, the costs of content development are either close to zero or extremely high, which leaves the question open what the 'average' figure would be.

For example, for the **development of 51 eMaterials and eBooks** the estimated total time input corresponds to approximately 1,050 days of an assistant researcher, costing some € 130,200. This is approximately 11 % of the total project budget (expenditure) and the costs accounted for in this study. However, it should be noted that this figure relies on an estimation based on the input presented by v. Kierdrowski and Preu (1999), for about 19 eBooks. Therefore, 2458 hours were spent, which is a time input of approximately 320 days of an assistant researcher (WHK).

32 For example, one project was not able to identify an appropriate platform. Thus, in consequence, a platform will have to be developed during the next project phase.

33 The difficulty of getting adequate information about the activities of co-operation partners is a stable finding of a number of case studies conducted at German universities. As already mentioned, one interview was broken off when realising that our interview partner was not in a position to provide figures on the time input for several activities.

34 It should be noted that we have addressed a number of questions in the draft of the case study which have not yet been addressed due to the fact that the interview partner is out of office at the moment. Thus, the case study is still open for amenDM ents.

Another activity where large-scale projects may have a minor comparative advantage compared to small-scale but not to medium-scale projects is **staff training** due to the opportunity of building groups of e.g. five people. Thus, the opportunity costs of training depend on the number of people and groups to be trained. To a certain extent it is also difficult to specify the amount of training for development, and separating this from training for implementation.

Training is often in the range of five days per staff, sometimes more but usually less. Per group of five people and one trainer this adds up to some € 1,500. Thus, if, for example 25 (50) people have to be trained the total costs are approximately € 7,500 (€ 15,000), based on the assumption that academic staff is trained. The costs for training student support staff are approximately € 2,500 per group of five trainees and one (academic) trainer. A somewhat surprising finding is that training is usually internal.

It should be taken into account that training is an important activity whenever staff has to be replaced. In this case, economies of scale will usually not arise, as mostly only one person has to be replaced. This would lead to cost of € 1,400 per trainee, including the opportunity costs for the internal trainer.

As already pointed out, another area with possible economies of scale is **preparation of manuals and tutorials** which usually is conducted once for all media applied.

The costs of developing an online help tool requires approximately some 50 days of student support staff with costs of about € 4,500. Around half that time is needed to provide documentation and a tutorial. If input is provided by academic staff the costs are about € 4,600. An interesting question, though not to be answered right now, is what the cost effects of replacing academic staff by students.

Finally, we have to refer to the time requirement for **project management and administration** where we expect large "diseconomies" of scale.

Day-to-day administration is considered to cover one quarter to one third of the working time of the project manager who sometimes receives some assistance by other faculty staff. Based on this figure the monthly costs for management and administration is approximately € 1,300 to € 1,600 per institution involved. In projects with many cooperation partners the overall project manager may even spend more or less the whole time on this task.

However, the total costs depend on the duration of the development phase. The annual costs are between € 15,000 and € 20,000.

In addition, large-scale projects often require co-ordination meetings where all people involved review the process and discuss future planning. In one project the total costs for such meetings added up to some € 280,000, which is approximately 10 % of the project budget.

Anyhow, as already mentioned, this example should provide an example and should not be confused with all-embracing evidence that co-ordination costs are generally that high. However, it appears that there is evidence regarding diseconomies of scale in this respect.

The total costs of development

From the figures presented in this section it appears that there are two important cost-drivers of large-scale projects. One is content and media development, though it is sometimes difficult to distinguish clearly between these activities, and the second is project administration and co-ordination.

This first is usually due to the number of modules developed and the employment of the particular media while the second is related to comparatively very high costs for co-ordination meetings while day-to-day administration is in relation to medium-scale projects.

To provide some summarising facts, in one project content and media development covered 70 % of the budget allocation, while co-ordination meetings required approximately 10 %, though to a large extent not related to the budget but opportunity costs. Finally, if we try to estimate the cost of day-to-day project administration and management we arrive at another 10 to 15 %. Adding up, the latter two figures arrive at 20 to 25 % of the budget allocation are for administration and management, though it should be highlighted that the costs for the meeting are opportunity costs of professor which do not account for the budget. However, these figure provide some evidence on the high costs of administration and management.

Also, for another project, approximately one third was spent on the development of the platform and only a bit more than 10 % on media development. In this project the costs of content development were zero as it was already available. Here, project management, administration and co-ordination arrived at around 15 % of the budget, though, again, not necessarily relevant for budget allocation.

4.4.3 The costs of implementation

The aim of this section to provide summarised findings on the cost of implementation for large-scale projects has to fight, so far, with the fact that the major project investigated in this study has neither reached the implementation phase nor any planning figures for this phase. In consequence, we cannot present any evidence or even facts on this issue.

The second project is not really related to an implementation phase in the narrow sense of the general understanding within this study as no online courses were provided. One aim of this project was the development of eBooks and eMaterials, which are not linked to implementation costs. The second was the development of a platform, which is not the major interest of this section. Thus, we will refrain from presenting any figure in this respect.

4.4.4 The total costs of large-scale projects

As we do not any clear figure about the costs of implementation the findings regarding large-scale projects are somewhat incomplete. However, we will briefly summarise some results.

Large-scale projects seem to have two real important cost-drivers compared to small and medium-scale projects. The first is content and media development[35], which requires up to 70 % of the budget and the second is co-ordination and project administration and management with direct and indirect costs of about 20 to 25 % of the budget allocation, though to a large extent opportunity costs.

In one project one third of the budget allocation was spent on system or platform development while only 10 % was spent on media development.

Another interesting topic is the time input for project planning and the preparation of the application which increases by factor five to ten, compared to medium-scale projects.

35 In contrast to other projects we were not in a position to gain detailed information on the time input for content and media development, respectively.

5. The Case studies

5.1 University of Cologne: VIRTUS

5.1.1 Project description

VIRTUS is an intra-faculty project at the Faculty of Economics and Social Science (Wirtschafts und Sozialwissenschaftliche Fakultät) at the University of Cologne which was largely funded for about 4 years (1997 to 2001) by the Bertelsmann Foundation. A second source of funding was the third Hochschul-Sonderprogramm (HSP III). It was aimed at improving teaching and learning at the faculty by providing learning materials on the Internet.

Even though the application to the Bertelsmann Foundation comprised several approaches, only two developments proved feasible in practice. Firstly, the provision of learning materials as eBooks or eMaterials on the Internet, and secondly, supporting learning and teaching situations with audio-visual media. As the latter is to a large extent considered to be a separate project (WI-Pilot) to be presented as a separate case study this will not be comprised by the following section. The online media were prepared for students in the first two years of their studies (foundation study) mainly due to the assumption that standardised materials can be more easily prepared for this group of students than for students in higher semesters.

The learning material was prepared in different forms for presentation on the Internet. Sometimes the script for the lecture was placed on the platform, sometimes some other additional information was added and finally, sometimes an eBook was developed. The general approach was to avoid sets of slides by reworking them as an improved learning unit. This was possible due to the control of the VIRTUS project.

The only approach to present a virtual seminar by relying on video-streaming and other technologies was the WI-Pilot project that was conducted by the Department of Business Informatics of Prof. Seibt. As already mentioned this is planned to be presented as a separate case study.

Phase I contained an intense evaluation while it was reported that the project ran out of money in phase II. It was highlighted that the initial calculation for the project was 6 to 7.5 mill. € (12 to 15 mill. DM) while the allocated budget was approximately € 1.2 mill. (DM 2.35 mill.).

The learning units were provided by the authors via the ILIAS-platform which could be used by all students of the University of Cologne to supplement the traditional study approach which remained the general basis for studying. VIRTUS did not intend to replace this approach (partially) so that there was no need to consider changes of study and examination regulations (Studien- und Prüfungsordnungen). In consequence, traditional lectures, seminars and tutorials were still in place. Students who were interested could get additional information and materials via the Internet platform.

This might be a major reason why the project did not prove successful in the long run (see next section). Preparing materials for the Internet is considered as an additional task by lecturers and support staff but not as an approach to reduce workload by replacing traditional teaching and learning. Therefore, their interest in serving the improvement of VIRTUS is limited.

Yet, students had the opportunity to substitute traditional classroom learning, although this depended heavily on the quality of the materials. The project approach remained that the students in general should rely on traditional courses and support their study by using Internet materials. However, there was no guarantee that the materials provided over the Internet were equal to that what was learned and taught in traditional courses which were the basis for examinations. Thus, there was and is no real incentive for students to replace classroom learning by online learning.

The approach presented here is considered a low-cost approach while professional supplies were regarded as being more or less high-cost approaches.

The online courses (eBooks and eMaterials) can be used by all students of the economics faculty. Since November 1998 a total number of 12,500 users was registered. The number of active participants is estimated to be 2,000 to 3,000 each semester, although nobody knows the real figures. Contact hours or student learning hours cannot be estimated as this depends on the particular course and the personal use of each student, as its use is voluntary.

Project evaluation

From the viewpoint of the project manager Mr. Kunkel, the project was successful as long as funds were available and the production of learning materials could be supported through project staff, comprising academic staff [wissenschaftliche Mitarbeiter (WMA)] and student support staff [studentische Hilfskräfte (SHK)]. After the end of the funding period this was no longer feasible and as the chairs of the faculty were not in a position to

produce the learning materials on their own because they had none or insufficient resources for this duty.

While running the project, information and support went quite well but 'dreams' of interdisciplinarity were neither realised nor started. In total, providing learning materials via the Internet leads to a stronger school-based approach and concentration. Somewhat surprising at first glance, is the impression that students' major intention was to get the necessary information and knowledge to successfully pass examinations.

An important drawback of the project seems to be that their first approach to get the project running was to convince professors and lecture staff to participate. Although this proved successful to a large extent, it was a drawback that students were considered only at a latter stage. This might have supported the impression that their interests were insufficiently met. Mr. Kunkel highlighted his general impression that administering shortages came first and then the customer.

Financing modalities

The project was funded by several sources. Two can be clearly identified: the Bertelsmann Foundation spent 0.51 mill. € (1 mill. DM) and another 0.69 mill. € (1.35 mill. DM) came from the Ministry of Education and Science of North Rhine-Westphalia through the HSP III-programme. The former was mainly used to finance materials while the latter was for mainly personnel expenditure. An application submitted to the Bertelsmann Foundation, to fund a second project phase was rejected.

5.1.2 The costs of VIRTUS

In this section we will present the costing of the project which is mainly to prepare e-Books and eMaterials for web-based usage of the students. The costs will be presented separately for investment and recurrent costs. The recurrent costs are subdivided into the costs for the three phases: preparation and planning, development and implementation

5.1.2.1 Financing and budget expenditures

The project consisted of the following number of staff:

One academic staff (BAT IIa) member was employed for the whole 48 months of the project, costing € 50,880 annually or € 203,520 over the four years. Another four faculty staff on the same salary scale were employed for less time, from 18 to 36 months, adding up to 2,3125 staff on average over the 48 months. Costs were in total € 470,640. The daily rate for this group of faculty staff was € 231.

3 assistant researchers were deployed for 18 months each, adding up to 1,125 faculty staff over 48 months, resulting in an annual expenditure of € 12,960 per person, and in total costs of € 58,320. Furthermore, 5,375 students were hired for assistant work, resulting in annual expenses of € 4,620 each or total costs of € 99,330.

Administrative or technical support staff were not hired for the project itself but wer provided (without additional pay) by the university, thus it would have to be considered as overhead. Due to insufficient information, neither time input nor costs of administrative and technical support personnel can be estimated.

In total, budgetary expenses for personnel were € 831,800 or, on average, € 208,000 annually. However, it should be taken into account that this amount might differ from the real budgetary allocation due to the fact that for the purpose of comparison in this study we rely on unified salary figures.

If we would go one step further and include the (opportunity) costs of Prof. Leidhold's input the costing figures were higher than presented. It is estimated that 15 % of his average weekly working time is directed to the project. During the first phase of the project it was more than in the later phases. The 15 % results in total costs of € 51, 700 over four years or € 9,300 annually. However, this is a cost and not an expenditure, as Prof. Leidhold gained no monetary income out of the project budget. As the time input of personnel that was involved in the project but not paid by the project is taken into account in this study, the total costs calculated here will necessarily differ from the budget allocation for the project for a second reason.

It should also be highlighted that the time input was not written down so that the following calculation is a rough estimate by the responsible project manager. However, the following figures have to considered as good proxies based on the best of the knowledge of our interview partners.

The total expenditure for personnel and investment adds up to roughly € 1,000,000, which leaves space for other costs and stationery. The latter was estimated to cost € 300 per month – in total € 13,500, while the former is roughly € 43,000. However, the total budgetary expenditure for the project is some € 1,006,500, which is less than the budget allocation, meaning that a little bit less than € 200,000 has not been allocated in this study so far. Furthermore, it should be noted that some operational costs were borne by the university, such as telephone and communication costs, and would have to be considered as overheads. As we do not have any figure about the overheads the real total costs of the project would be higher than presented in this study. On the other hand, neither universi-

ties nor the faculty do include this in their cost calculation as this is allocated whether this particular online project is conducted or not.

5.1.2.2 Investments

Hardware investments comprised 1 server costing € 41,000, 12 workstations costing € 2,600 each, 3 laptops costing € 3,000 each and 3 printers costing € 2,000 each. Thus, total expenditure for computer equipment was € 87,000. Depreciated over the four years the costs are € 21,750 annually.

Expenditure for other equipment was € 18,660 for a DV-camera, 4 scanners, 1 LCD-projector, 1 kiosk-system, and 1 audio-equipment, even though the latter was mainly used by a separate project (WI-Pilot by Prof. Seibt). Depreciating the expenditures over 4 years results in annual costs of € 4,665.

Software expenditure was € 2,600 in total for standard and graphic software. Separating the costs for these two bundles is not possible and too time consuming. Another € 2,600 each were spent on office equipment and network equipment. Some € 1,055 was spent explicitly on installation work, although most of this is done by university staff where costing is impossible due to lacking time adjustment.

In summary, investment expenditure adds up to € 120,000. Depreciating this expenditures over 4 years, the project period, the annual investment costs are € 30,000.

5.1.2.3 Budgetary and non-budgetary costs of the project

For the following calculation of the costs of the project this is divided into three phases and a number of activities.

Project phases

The project started on April 1, 1997 and lasted until March 31, 2001. From April 1 until September 30 1997 the project structure was established and planning and research took place. This is considered as the preparation and planning period of the project. However, it is evident that this is not the full planning phase which would have to comprise also the preparation of the project application for the Bertelsmann foundation and the planning that took place in relation to this activity. Furthermore, also the identification of and the talks with possible co-operation partners and within the faculty would have to be considered. As our interview partner was employed at the beginning of the official project period we are not in a position to gain all information about the pre-starting phase of the

funded project. However, as Mr. Kunkel was involved in project application etc., he was in a good position to estimate at least some of these input figures.

During the second half of the planning phase content was conceptualised. This period lasted until the end of September 1997. On October 1 1997, on the one hand the development of the prototype ILIAS began and on the other hand the needs of the faculty chairs were retrieved. Some of the development tasks lasted until the end of 1999, while on the other hand implementation took place much earlier. For example, advice and support of students began in November 1998 and also some evaluation took place at that time. Thus, there is some overlapping and time input and costs cannot be assigned clearly to the two phases of development and implementation.

The following section is directed towards calculating the costs for the several activities on the basis of time input estimations. Thus to be clear, what we are imputing are to a large extent (opportunity) costs instead of expenditure.

1. Costs for preparation and planning

Project planning: During the interview it was estimated that the time input for project planning was 240 days of academic staff (category BAT IIA), which is in total a bit more than a year, resulting in costs of € 55,440.

Application preparation: For the preparation of the application time input was roughly 20 days of Prof. Leidhold and 40 days of academic staff. The costs add up to € 16,760. Another 10 days of Prof. Leidhold were estimated to have been spent on the tasks directed at finding co-operation partners. The respective opportunity costs are € 3,760. However, Mr. Kunkel highlighted his difficulty to really estimate the figures on a solid basis, as he was not involved in this matters.

Some tasks, possibly part of the preparation and planning of such a project were not undertaken. For example, neither a business model was developed nor were organisational or structural procedures adapted. The latter would comprise, for example, the integration of the eLearning materials into the study and examination regulations. For VIRTUS this was not necessary, as the materials were not thought of as being part of the normal study but as additional material. Therefore, the eBooks and eMaterials did not replace traditional courses and were therefore – in themselves – optional for examinations etc. However, professors might refer to the eBooks and eMaterials for certain parts of the course and concentrate on others but they were not accepted (by regulations) as a replacement of the traditional course.

Selection of investment goods: 80 days were spent on the consultation procedures and selection of investment goods, resulting in costs of € 10,000; and another 5 days for visiting conferences and fairs (€ 1,155). Other costs related to conference and fairs visits, such as travel and accommodation cannot be specified here, as this would take up too much time.

Preparatory talks: An interesting, although not necessarily very important feature is the time spent on talks in preparation of the project, such as university and/or faculty committees and project meetings.

VIRTUS was a faculty project so that six professors met to co-ordinate the project activities. It is assumed that they met 6 times during the first year of the project for one hour each. The total time input thus is 36 hours or 4.5 days, opportunity costs are some € 1,800 in total.

Another relevant issue is faculty workshops where staff was informed about the progress of the projects and their requirements. Such workshops took place every 3 to 4 months and lasted for 2 hours on average. The number of participants differed between 20 and 40. For the calculation of the time input we assume that on average 30 persons took part. Thus, total time input was 30 days of academic staff, resulting in costs of € 6,930.

Another sometimes time-consuming activity might be reporting and decision making in university or faculty committee meetings. This may particularly be the case if the eLearning-project results in amendments or changes of the study and examination regulations. For VIRTUS, only the development of the project was reported and discussed in faculty committee meetings, so that time input was not that much. Furthermore, the time directed to VIRTUS can only be guessed. It is assumed that in a monthly professorial meeting, consisting of 52 to 56 professors, where attendance is obligatory. Thus, at least 52 people talked about the project for about 20 minutes over a three month period. Thus, the time input added up to 7 days (for about 54 professors on average) with costs of about € 2,740 which is not that much, although time input for such meetings should not be neglected as it may be much higher if adjustments of the study and examination regulations are necessary.

Total costs for these different meetings add up to € 9,100, which is some 1.5 % of the total project costs.

Staff recruitment: Another task that might be time consuming is staff recruitment. For VIRTUS, time input was estimated to be 6 days at the beginning of the project. The costs were € 1,400.

Project administration and management: Finally, general administrative and project management and co-ordination duties consumed 20 % of the working time of the project manager. For the six month during the preparation and planning phase this adds up to 52 days or costs of € 12,000.

In total, the costs for preparation and planning added up to € 98,450, which is about 15 % of the total costs.

2. Costs for development of online courses/materials

The development phase started in July 1997 and lasted until the end of 1999, even though there was some overlapping with implementation. We should therefore point out that the costs couldn't be assigned to this phase clearly and without any difficulty.

Preparation of concept and design: Usually, one of the first tasks undertaken for the development of online courses is the preparation of concept and design. Time input is estimated to be 20 days of Prof. Leidhold, 105 days of category academic staff and 42 student days. The respective cost are € 35,855.

Didactical preparation: The appropriate didactical preparation of the content for new media deployed one full-time faculty for about 27 months. Deducting the time for holidays this adds up to 513 days and costs of € 118,500. In comparison to most of the other projects this is much more than they spend for this purpose.

System development: The major duty of this project phase was the development of the platform ILIAS which required roughly an input of 800 days of academic-staff and 1,900 days of students' assistance. Total costs add up to € 355,700. Another € 28,650 have to be added for external staff involved in system development.

Content development: There was nearly no time input for content development as this was already available from the viewpoint of the project. Content was developed for traditional classes and, thus, provided by staff of the involved departments. However, it should be kept in mind that content development is usually a major issue what will be specified by other case studies, if it is prepared especially for online learning.

Development of eMaterials and eBooks: The time input required for the preparation of eMaterials and eBooks will be presented on the basis of two example studies that were published in an early project report[36]. The first example is the eBook of the learning unit " Staatstätigkeit und Staatsfinanzen" (Public activity and public finance) of Prof. Kitterer. The preparation of this eBook of about 144 pages required in total 287 hours of time in-

36 von Kiedrowski, Preu, 1999, p. 69-70.

put by the multimedia operator (MO). The second example is the learning unit "Grundzüge der Beschaffungs-, Produktions- und Absatzwirtschaft" (Foundations in Procurement, Production and Marketing) for which 361 hours were allocated to provide 141 pages.

Before presenting the example we will have a short look at the tasks to be fulfilled by the multimedia operator (MO). S/he has to support the departments in preparing the learning units, which comprises the whole production process from planning through realisation to control. This is described in detail in Table 1.

Production phase	Duties of the multimedia operator
Planning	Demonstration of the functionality und the possibilities of ILIAS for the staff of the chairs involved
	Inspection of the existing learning materials
	Assisting staff and heads of the faculty chairs in implementing the learning content in an appropriate manner for multimedial use (structuring, methodological realisation, visualisation of content)
	Preparation of a draft version
Realisation	Transfer of available content into ILIAS in a digital manner (introduction of text and glossaries per copy paste, formatting of screens)
	Preparation of hyperlink-structures
	Scanning and conversion of graphics
	Generation of graphics
	Compilation of multiple choice tasks
Control	Test of functionality (Checking of hyperlinks structures, multiple choice tasks etc,)
	correction of failure

Source: v. Kiedrowski/Preu, 1999, p. 61

Table 3: Tasks of the multimedia operation in the production process

The MO is scaled as an assistant researcher (WHK) with a daily rate of € 124. The distribution of time input for the several tasks to be fulfilled for the preparation of a learning unit is presented on the basis of two examples. The following tables (2 and 3) provide a picture of the time input in hours (second row) and the time input in percent (first row) while the third row calculates the costs of each activity.

Based on v. Kierdrowski and Preu (1999), 2458 hours were spent on the provision of 19 learning units although five units did not require time input of the multimedia operator. This is a time input of approximately 320 days of an assistant researcher (WHK). The total costs for these 19 units, but also for the 14 courses prepared with the involvement of the MO, were approximately € 39,600. The average time input is

	Kitterer: LU Staatstätigkeit und Staatsfinanzen		
Preparatory talks and feedback with the chairs	10,7%	30,7	475,99 €
Preparation of picture material	23,4%	67,2	1.040,95 €
Introduction of text and pictures	26,3%	75,5	1.169,96 €
Inspection of material and structure	8,3%	23,8	369,23 €
Test of functionality and corrections	21,0%	60,3	934,19 €
others	10,3%	29,6	458,20 €
	100,0%	287	4.448,50 €

Source: v. Kiedrowski/Preu, 1999, p. 61

Table 4: Time input and distribution for the preparation of an eBook for the learning unit "Public activity and public finance"

	Koppelmann: "Grundzüge der Beschaf-fungs-, Produktions- und Absatzwirtschaft		
Preparatory talks and feedback with the chairs	12,4%	44,8	693,84 €
Preparation of picture material	0,8%	2,9	44,76 €
Introduction of text and pictures	39,2%	141,5	2.193,44 €
Inspection of material and structure	16,4%	59,2	917,66 €
Test of functionality and corrections	18,4%	66,4	1.029,57 €
others	12,8%	46,2	716,22 €
	100%	361	5.595,50 €

Source: v. Kiedrowski/Preu, 1999, p. 61

Table 5: Time input and distribution for the preparation of an eBook for the learning unit "Foundations in Procurement, Production and Marketing"

Based on the findings of the interview, a total number of 51 units were prepared, but detailed information about the time invested by the MOs is only available for 19 courses. Out of this, 5 did not rely on the MOs. We were told that these were the only projects not requiring an MO while all others made use of the MO. If we assume that the time input for the 46 courses is the same as for the 14 requiring MO input (out of the 19 with detailed information on time invested), this corresponds to approximately 1,050 days of an assistant researcher, costing some € 130,200. This is **approximately 11 % of the total project budget (expenditure) and the costs accounted for in this study.**

Preparation of (additional) materials: Time input for preparing an online library, a search engine etc. cannot be specified and is, therefore, covered in the time spent for system development.

Staff training: Time input for this task cannot be specified for the different phases of the project. It is estimated to be five days per person over the whole period of the project, although most of it is related to the development phase. To ease the calculation we consider it therefore totally as part of development. Training is estimated to be five days per staff, i.e. in total 25 days for academic staff, 15 days for research assistants and 45 days

for students support staff. Total opportunity costs are € 11,685 over the total project period. The training was conducted for an academic staff member working with the didactical group. Assuming that the 85 training days in total were conducted in groups of five people we arrive at 18 days spent by the trainer which are to be added, then the costs amount to € 15,850.

Preparation of manuals and tutorials: an online help tool has been developed by a student. This required a time input of 50 days so that the cost are € 4,500. Furthermore, a documentation and tutorial was prepared for those working with ILIAS, requiring 20 days of academic staff. Costs are about € 4,620. Thus, costs for preparing manuals and tutorials are € 9,120 in total.

Project management and administration: General managerial and administrative duties are considered to cover one third of the working time of the project manager and some assistance by other faculty staff. In total, time input for project management during the development phase is estimated to add up to 480 days over a period of more than two years. Administrative costs are therefore nearly € 111,000.

Adding up all costs for the development of VIRTUS we arrive at € 814,230 over a period of more than two years. This is roughly 60 % of the total costs of the project and includes € 28,650 of fees for external staff, involved in system development.[37]

3. Costs for piloting and implementation

Student advice and support: The implementation of ILIAS started in November 1998 and at the same time students had to be advised and supported. It is estimated that this required 4 hours per week or 3 days per month. Over the remaining 29 months of the project this added up to 87 days of academic staff, costing € 20,100.

Evaluation of the platform took place during the second half of 1998 and the first half of 1999. It was carried out by external staff who were paid separately. This task comprised usability test of the author's environment, online interviews of users, user tracking and analysis of the protocol data. The costs were € 81,810.

Staff training for implementation: 36 staff were trained for three days each, which is 108 days in total. Another 12 days were spent by the trainers. Though this is budgeted partially outside the project budget, the (opportunity) costs are € 27,700 for staff training.

37 However, it should be noted that this percentage is based on the assumption that all 51 learning units need time input by the multimedia operator. Yet, if not all units require MO-input the share might go down a bit, although not much.

Including the costs of training presented as part of the development costs, training costs are in total close to € 40,000 or 4 % of the overall project budget.

Public relations/Marketing: To a large extent, costs for public relations and marketing are separate costs, because this is done by external agencies and are thus no personnel but other costs. In any case, they shall be presented here.

Costs for design and print of flyers were € 4,200, half of it spent for printing purposes and for general PR/marketing tasks which are not specified here. Another € 2,050 was directed towards the development of the project web site. The preparation of the presentation of the project on fairs cost some € 4,000. In total costs for marketing and PR were € 10,250 which seems to be not that much, compared to other projects. On the other hand, it might be a lot in relation to another group of online courses which do not require external presentation. It was pointed out the marketing was mainly to acquire new funding opportunities and thus more directed towards presentation of the project than towards content and new students. Therefore, it might be appropriate to consider this as overhead costs instead of costs of the courses.

Project controlling is part of the project manager's duties and cannot be specified but is implicitly covered by the time input for administration and project management.

Maintenance of the system was part of the normal further development of the system and cannot be specified separately.

System administration: Time input for system administration is calculated to be 4 days per month over a period of 3,5 years, i.e. it is partially part of the development phase. As it is not possible to divide this into the two phases because there is no clear demarcation line, this is regarded as being part of the implementation phase. This adds up to 168 days or costs of € 38,800.

Content updating: During the whole time of the project content was not updated so that these costs are zero. Furthermore, as specified above, content development was not done separately but was part of the normal duties of the departments involved. Thus, there is neither time imputed for content development nor for content updating. Obviously, this will be different from many other projects and case studies presented in this investigation.

Project management and administration: The costs for project management and administration during the phase of implementation are already covered by the particular costs calculated as part of the development phase.

Other recurrent costs

There are also some other recurrent costs which cannot be specified for the several project phases. For example, € 500-600 are spent every month on stationery and office supplies. Another € 1,800 were spent on telephone (mobile phones) and communication, even though most of these costs are generally borne by the university and can, thus, not be specified separately here. This is also valid for the monthly rent for the office rooms etc.

In difference to the other case studies, € 1650 was spent on legal advice and a fee of € 265 on the patent to register ILIAS as a trademark.

However, it should be taken into account that neither overhead costs nor much of the other recurrent expenditure can be specified here because they are financed out of the universities budget and there is no cost-centred budgeting at the University of Cologne so far. On the other hand, some costs presented in this study at hand are funded out of the normal university budget. That means, that part of the costs is underestimated while the expenditure of the project is less than presented here. However, the reader should be aware that it is very difficult to estimate the time spent by project staff after years.

This may partially explain why there is a difference between the money allocated for the project which was € 1,2 mill. and the costs directed at all the different tasks which added up to roughly € 1,1 mill.

5.2 Technical University of Chemnitz: Course "Learning with new Media"

5.2.1 Project description

The course "Learning with new media" is a 'blended-learning' solution where online learning is combined with traditional classroom-based instruction. At the moment, Prof. Koring offers 7 or 8 sessions per semester where each contains enough content for a learning session of 2 hrs. per week. In total, is is expected that students spend 3 hrs. per week and, additionally, four hours for face-to-face instruction. The 4 units of face-to-face learning are thought as preparation for the course and the final examination. For the rest of the course the students have to rely on the materials which are placed on the net

Each semester, Prof. Koring offers 2 virtual courses with 20 to 30 students each. The following consideration is based on a seminar "Learning with new media". In this seminar students have the opportunity to select a number of sessions out of a total of 20 units.

As already mentioned, the course is a face-to-face seminar for which the structured material is placed on the Internet and where links to other sources are added. Communication between students and professor is generally via e-mail. The course relies to a large extent on questions and exercises that are sent to the students. Their answers are re-sent to the tutor who comments on it. Therefore, the online is not to be considered as a virtual seminar, which Koring thinks is not requested by students. If the seminar were a virtual seminar it would have to be moderated where resource input would be very high in relation to the present input. In the course presented in this case study, the information is available in a structured manner and it is assumed to be more than an eBook because of a didactical approach.

The course was applied from 1995 to 1998 for the first time. At this time Prof. Koring worked at the TU Chemnitz. He left then for two years for the University of Erfurt where a feasibility study was conducted. A share of € 10,200, out of a total budget of approximately € 153,400 (DM 300,000), was used to develop the tool which is still in use today. This tool is an empty template and the introduction to it for new users, usually students, lasts only 3 to 4 hours.

Based on his experience, Prof. Koring thinks that students prefer face-to-face classes, based on their assumption and intention to get certificates more easily. Therefore, the number of students participating in online courses is less than for traditional classroom-based seminars. On the other hand, Mr. Koring expects that the students in eLearning-

classes are more motivated that others and that these are students for which the need to study at their own time schedule is highly important.

5.2.2 The costs of the course

In this section we will present the costing of the project which is mainly to prepare the materials to be placed on the web for the usage by the students. The costs will be presented separately for investment and recurrent costs. The recurrent costs are divided into the costs for the three phases preparation and planning, development and implementation. Before going into the details of the costing approach we will briefly refer to the funding and the additional budget allocation.

5.2.2.1 Budgetary expenditure

The funding of the development and implementation comes from the general budget allocation for the state ministry to the technical university. Thus, there is no additional funding involved.

The project involves only personnel that is already employed at the Technical University of Chemnitz, so that no additional costs arise. However, as staff is paid out of the budget of the TU it is fully funded by public sources. Except for the software, no expenditure arises for the TU.

As well as Prof. Koring, two students are involved in developing the course. One student is deployed for about four hours a week and is responsible for scanning texts and proof reading over a period of four months. A second student is responsible for programming, which requires three hours per week also over a period of four months.

5.2.2.2 Investments

As the course relies on equipment that is already available, there is no investment taking place. Only a new version of Frontpage and of Omnipage was purchased, costing together some € 350.

5.2.2.3 Budgetary and non-budgetary costs of the project

For the following calculation of the costs of the project this is divided into three phases and a number of activities. The intention is to present the costs based on these activities.

Project phases

There is no clear cut between the several project phases except for the final implementation period. In total it is estimated that the project demands a total time input of six weeks full time involvement. This figure translates the time that is spread over the year of part-time deployment into a phase of full time deployment. These six weeks are divided into one week for preparation and planning, four weeks of development and one week of implementation.

4. Costs for preparation and planning

There is not much difference between the preparation of a normal classroom-based course and an eLearning course. The only exemption is that eLearning needs better planning and structuring. Therefore, **project planning** is the only task to be mentioned in this section requiring six days. The corresponding time costs are € 2,600, arising at the beginning of the project.

This is the total cost during the preparation and planning phase.

5. Costs for development of online courses/materials

Most of the following tasks are carried out by Prof. Koring, only if there is another person involved will they be mentioned.

Preparation of concept and design: The didactical preparation of the course required 14 days or (opportunity) costs of approximately € 5,900.

Preparation of the screen:

System development: The template has been updated and optimised regularly. Each semester this requires 3 days of the professor's time. Opportunity costs are € 1,250. He was assisted by a student staff member who spent another 1.3 days with (time) costs of € 120. Thus, total costs for system development were nearly € 1,400.

Content development: The preparation and writing of the required text consumed roughly 14 days or costs of € 5,900.

Development of the media and preparation of (additional) materials: For the preparation of a list of sources 600 pages with quotations that are of relevance for the tutorial were scanned. Furthermore, the scanned pages have to be proofread and transferred into html. To conduct this task a student was deployed for about 10 hours per month over a

period of six months, which adds up to nearly 8 days of full-time employment and costs € 720.

Project management and administration: Even though this is a comparatively small project, management and administration demanded three days and (opportunity) costs of € 1,250.

Adding up all costs for the development of the online course more than € 15,000 in form of time were necessary. This is about three fourth of the projects' total costs.

6. Costs for piloting and implementation

Most of the timely input during the implementation phase is required for communication and contact to students. **Student advice and support** takes place during the semester term while the course is running. According to Prof. Koring there is not much e-mail communication involved because the students do not get in touch with him. Therefore, the timely input is relatively small and estimated to be two hours on average per week during term. This adds up to 4 days of costs of approximately € 1,700.

Evaluation of the course is undertaken in the final session and requires, thus, no additional time input.

Content updating: Content is updated every year requiring three hours of student support staff each semester. Another input of 2 days will be done by Mr. Koring himself which costs € 850.

Project management and administration: Some minor administration duties are to be done by a student to prepare a list of and for the participants. The time input is estimated to be 3 hours per term while Prof. Koring spends one day. The costs are therefore a small € 460.

5.2.2.4 Total costs of the project

The overall costs of the project add up to less than € 21,000 which is the smallest amount and the smallest project in this study. Roughly 75 % of this sum is spent on development, the remainder distributes by half over the other two phases. Due to the comparatively low costs it seems that this approach might be in a position to replace classroom teaching – or better to add online instruction to classroom learning – due to its very small time requirements.

However, during the interview, it was highlighted that an online course requires much more input and time by the professor than a normal classroom-based course. This is particularly due to the fact that it has to be better structured, planned and prepared. Some papers have to be written, materials prepared and questions developed. On the other hand, if the course can be repeated, this will lead to a decreasing time requirement. Mr. Koring estimates that the time input goes down to 1 hour per week on average. In this case such a seminar ought to be an interesting approach to replace traditional courses by online instruction.

5.3 University of Göttingen: WINFOline

5.3.1 Project description

WINFOline is a project that started several years ago in 1997 as a co-operation of 4 universities of Göttingen Kassel, Leipzig und Saarbrücken.[38] The first phase until 2001 was funded by the Bertelsmann Foundation and by the Heinz Nixdorf Foundation.

This case study will only consider the second phase of the development of courses for the overall project that started on June 1, 2001 and will last until the end of 2003. During this phase each of the 4 co-operating universities develops two courses that are based on their already existing (presence) courses. The online courses are offered either as online tutorials in addition to the presence courses, when the face-to-face-course is provided, or the online course is offered as a replacement in terms when this is not the case. In Göttingen, where this case study takes place, the number of courses could be increased by 20 % due to the introduction of online courses. The provision of each course in each term is one of the major aims of the project.

The intention of the second phase is the acquisition of funds for further development of the programme. The number of co-operation partners is to be increased and the developed materials are provided for exchange with the other partners. Furthermore, new study programmes for further education are to be developed, for example, a Master of Science in Information Systems.

As the online courses can be considered as a replacement of the traditional courses it is assumed that the students' time input is more or less the same. Otherwise, there would be no economic rational for the provision of such courses. However, requirements for administration and coordination are higher as students from other universities are to be supervised. In general, the observation is that the time requirement is not higher but that the division is different. More time needs to be invested in the development of the course while the time required during the term is less.

In the following section, we will consider one module that consists of 6 hours per week. The module is divided into 2 hours each for lecture, practical instruction and tuto-

38 For further details see, for example, the annual reports of WINFOline.

rial.[39] The content can be appropriated in three different ways: as an eBook, as an audio-streamed replication of the lecture in combination with text provided in html, and as an online tutorial. The target group are students in their stage II studies (Hauptstudium).

The number of students requesting online instruction differs. If the course is offered as face-to-face lecture as was for example, the course "Development of application systems" (Entwicklung von Anwendungssystemen) in summer term 2002 then approximately 100 students take part. If the course is not offered in parallel with a traditional course, as usually in winter terms, then only 30 students of the University of Göttingen participate. Because there are also students from other universities which cannot be observed directly it is difficult to provide the full picture. Sometimes, students participate but do not register correctly and are therefore difficult to identify and to count.

The number of students that are registered for any of the online courses at all four universities is about 600 per semester. It appears that students often participate in the presence session and, additionally, register for the online course to improve their learning performance. However, it seems that the performance of students in examinations does not differ.

5.3.2 The costs and financing of WINFOline II at the University of Göttingen

In this section we will present the costing of the second phase of the project WINFOline at the University of Göttingen, solely, which comprises three different developments or forms. The first form is the preparation of the eBooks and eMaterials for web-based usage of the students. The second is the audio streaming and the third is the online tutorial. It should be highlighted that we concentrate on one course only and not on the whole project which is also to develop the Master of Science in Information Systems programme. Due to this decision it is not appropriate to conclude from the costs presented here on the total project cost.

The costs will be presented separately as investment and recurrent costs. The presentation of costs is divided into the costs for the three phases: preparation and planning, development and implementation.

[39] However, there is the impression that the timely input of the students for the online courses might be more than two hours but this was never measured.

5.3.2.1 Financing and budgetary expenditure

Before going into the details of costing, we will give a short overview on the financing of the project. The second phase is funded by the Federal Ministry of Education and Research and its programme "New media in higher education" with an allocation of about € 2,045 mill. (DM 4 mill.). This amount is spread over the four universities and each gets the same share.

As already briefly mentioned the first phase was funded by Bertelsmann and Heinz Nixdorf foundation with about € 512,000 for a period of 4 years and 4 locations.

5.3.2.2 Investments

In addition to the investments that were made on the basis of the new project funding for the second phase there is much more equipment that is used. This additional equipment is either provided by the university or funded by other projects, e.g. WINFOline I.

Within this study and for WINFOline II, this equipment would have to be considered as overhead costs which would be very high. However, within the limits of this project and due to restrictions that lie in the controlling of the project it is not possible to estimate these overhead costs.

The new investments which are funded by the project comprise hardware of approximately € 11,300. In detail, computer investments comprise one server of about € 5,100, one workstation (€ 2,550), incl. monitor), one laptop (€ 2,500) and a printer of about € 200. In addition one DV-camera (€ 800) and a scanner of € 100 were purchased.[40]

Software investment was € 3,835 in 2001 and 2002, incl. e.g. Macromedia and an Adobe license about € 500. It should be taken into consideration that WINFOline cost less, as there was a reduction for universities.

The authoring tool is a 'special development' from a faculty staff member working at the co-operating University of Kassel and is used at the University of Göttingen without any payments. This tool VLEG was developed during WINFOline I which was funded by the Bertelsmann and the Heinz Nixdorf Foundations though it is not developed especially for WINFOline (Schellhase, 2001).

40 It is assumed that the other universities have more or less the same investment costs. However, this would mean that total hardware investment would be approximately € 40,000 which is about 2 % of the total budget allocation.

5.3.2.3 Budgetary and non-budgetary costs of the project

For the following calculation of the costs the project this is divided into three phases and a number of activities.

As we are concentrating on the second phase of WINFOline the question arises how the developments of the first phase should be accounted for. In principle, the courses and materials developed in the first phase would have to be imputed with their depreciated value. However, there are a number of reasons to refrain from this approach. The first reason is that according to the interview the materials and courses that were developed in the first phase were completely newly designed for use in the second phase. It was reported that the expenditure is more or less the same for newly developing courses and materials or for re-designing them. The second reason is that it is nearly impossible to calculate the value to be depreciated due to the fact that there is no real controlling system in place that allows the costs of the development to be specified. And, even if all courses and developments were re-designed the question would be what should be the basis for depreciation. Should the depreciation rely on the total costs (or expenditure) of the project or should we take into account only the marginal costs or expenditure? And, how long is the time the course might be used in future. Thus, whatever we would decide for we would get the wrong picture and it seems most appropriate to refrain from this and concentrate on the costs of the second phase.

Project phases

The second phase of WINFOline started on June 1, 2001 and will last until the end of 2003. However, as our approach includes also the preparation of the application and other preparatory tasks the period taken into account is longer than these 2 years and seven months.

1. Costs for preparation and planning

The major activity during the first phase was the preparation of the application to be submitted to the funding agency. However, it should be pointed out that this comprises more than the preparation and writing of the application itself in this case study. The approximately 63 days which are estimated to have been spent covered also the **project planning** and the **development of the business plan**. Due to the already existing cooperation with the other three universities there was no need to look for other partners. However, new partners might be involved in the future. The costs of the time requirement of 63 days for the application preparation are some € 14,550.

Anyhow, it should be taken into consideration that the application necessarily had to be prepared and submitted before the project could be awarded by the federal ministry. Therefore, the funding of this activity is either by university resources or comes from another project, for example, the WINFOline I project funded by the Bertelsmann and Heinz Nixdorf Foundation.

Organisational and structural adjustments which were made at that time were not due to WINFOline but for the restructuring of some study programmes. Therefore, the costs related to WINFOline are zero.

Staff recruitment: Here, this was a minor activity because the new staff was already selected before the project started and this was done without much additional activity. It is estimated that half a day was spent with costs that can be neglected.

The time requirements for **project administration and management** cannot be specified for this project phase. However, due to the fact that WINFOline is a co-operation project between four universities is can be expected that administration and management of the project has taken place and probably consumed a lot of time. Yet, it might have been included in the time requirements for the preparation of the application. We therefore refrain from presenting any figure here. Another important issue is that the project partners work mainly on their own and that much of the necessary agreements have been made during the first phase that is out of the scope of this study.

Some **other costs** might have arisen, particularly travel expenses, but these cannot be specified here.

If we add up, the total costs of preparation and planning are some € 15,000 which are related to the overall project but not to the course under investigation alone. Furthermore, these costs do not incorporate the time for administration and management.

If we considered the costs of preparing and planning the particular course under consideration they were marginal. For the remaining chapter we will restrict ourselves to the course.

2. Costs for development of online courses/materials

The following presentation of the costs of developing new media courses relies on a course that is called "Development of Application Systems" which comprises two hours each of a lecture, practical instruction and tutorial. To replace the lecture an eBook is pre-

pared for use as cbt and wbt. As always the time requirements are presented on the basis of activities.

The **preparation of concept and design** has been done for all courses together that are to be developed at the University of Göttingen and required some 15 days of academic staff time. The costs are a little bit less than € 3,500.

A **screenplay** was prepared that contained information about the material to be selected and its content and the media to be applied were fixed. Furthermore, the sources to be used were defined. For these tasks 40 days were spent in total by academic staff with (time) costs of about € 9,200. The major issue was to develop the design based on ergonomic and learning psychology aspects. Another step was to generate specifications, so that the design could be developed externally. These specifications contained information about the general layout, the specification of screen and media objects and a specification of the navigations and guidelines for use().

Didactical preparation of media: For the specification and definition of learning aims 20 days were spent. The modification of the design and specification of tools required another 25 days. This adds up to 45 days with costs of some € 10,400. This task comprised, for example, the development of a model of learning targets incl. types of learning targets and their levels of complexity Furthermore, instructions were generated as to how these learning aims/targets should be formulated etc.

System development. In this project, for the further development of the 'old' platform and its adjustment 5 days each of academic and student staff were necessary at the University of Göttingen. This costs € 1,150. Another 20 days were invested by the University of Saarbrücken so that the total costs of system development and adjustment were € 5,800.

Content development: As the course is already existing most of the content was already available. Only some selected papers and texts had to be written, the exercises to be selected and developed and indexes to be prepared. However, although this sounds like a lot of work, according to our interview partners only 15 days were spent for this with costs of approximately € 3,500.

The **development of the media** comprised flash animations, real-media and graphics that were introduced. Per flash animation 1 day had to be spent, adding up to a total of 100 days of student staff (€ 9,000). The 'real media' were recorded in the previous project but the remaining applications had to be newly developed. This required approximately 60

days of student input for about 20 hours totally (€ 1,800). Another 10 days were necessary for the preparation of the media which was carried out by academic and student staff. Assuming a relation of 1:1, the corresponding costs are € 1,600. Adding up, the costs for developing the media add up to approximately € 12,400.

One quarter of the time was spent on reviewing the materials from the former project to catalogue its content and to translate/transfer it into a format that enables further development and adaptation. Another 50 % of the time was used to restructure and to apportion the content etc. The final 25 % of the time was spent on preparing the html-pages, to connect the data and on the final montage of the lecture.

It should be taken into account that even though based on the old course material the new course has to be designed more or less from the scratch. Therefore, it can be considered as the development of a new product and time input for re-engineering is roughly the same.[41]

Replication of media: The cover of the CDs was prepared at the University of Kassel and is provided as an off-line version for project staff. The replicated CDs are prepared by a separate production company. The costs are either forwarded to or directly paid for by the students. Thus these costs are negligible.

Preparation of (additional) materials: A glossary was prepared by a student investing 5 days (€ 450). To some extend the already existing entries from the former WINFOline project were still available and could be used. The search engine works automatically and was also developed during the first WINFOline project. The time that was necessary to develop this tool could not be specified during our interview.

Staff training: Student and academic staff were trained on how to apply the authoring tools etc. In total 10 days were spent for this, costing € 1,600.

41 On the basis of Hagenhoff (2002) we are in a position to provide some input on the development of the audio files. Though the lecture was recorded 'live' it was also re-recorded to improve the quality of the audio presentation. This procedure lasted about 45 % longer than the initial lecture, i.e. for a session of 45 minutes 65 minutes were required, for example, to repeat the text if fluffed etc. The audio-file was combined with a presentation of the corresponding slides. The time input required 25 hours of the professor and an academic staff member and 54 hours of student staff. Based on the unified salary scheme applied in the study at hand we arrive at total costs of approximately € 2,850 for the preparation of the audio-file. Hagenhoff calculates with different prices and arrives at € 2,650. Another 100 hours were spent by student staff on preparing the overhead slides. This translates in costs of € 3,000 (Hagenhoff: € 3,300), so that the total costs for the development of the audio files are € 5,800 (Hagenhoff: € 6,100). For a more detailed description of the development process see Hagenhoff, 2002 p. 62ff.

The preparation of manuals and tutorials required some 10 days of student and academic staff time with costs of € 3,200. To a certain extent manuals and tutorials that were prepared in the first project could still be used. However, calculation the time input and costs and imputing the depreciated value is not possible.

The time requirements for **project management and administration** cannot be reconstructed in detail. However, it is estimated that one month was spent for this task. The corresponding costs are € 4,850. Due to the size of the project one month seems to be not that much, for example, compared to the VIRTUS-project which received a bit more than half of the funding that was awarded for the second phase of WINFOline. On the other hand, much co-ordination work is related to the overall project and might not be that important for the projects developed at the University of Göttingen.[42]

Adding up all costs for the development of the online course "Development of Application Systems" we arrive at costs of nearly € 57,000. With respect to the calculation of the full costs of the project WINFOline II at the University of Göttingen it should be taken into consideration that a second course is to be developed. According to our interview partner the amount of content is around two thirds of that of the course presented here in detail. However, the question which cannot be answered clearly is what this means for the costs and whether they decrease at the same rate. If the costs declined at the same rate this would mean that the costs for developing the course "Information processing in service companies" would be at around € 38,000. The total costs of developing two courses will therefore be approximately € 95,000. If costs for developing the second course were approximately the same as for the first course, the development costs for both courses would be at around € 110,000. However, most probably the 'real' costs will be somewhere in between.

Other costs than costs of personnel could not be specified for this development phase, it is therefore assumed that they are negligible.

3. Costs for piloting and implementation

It should be noted that most of the following costs arise every semester when the course "Development of Application System" is offered and requested by the students.

[42] It should be highlighted that only the costs of the particular course 'Development of Application Systems" are presented here. If we referred to the Master-programme, for example, the time requirement and costs for administration and management would be much higher. In this case the time requirement is estimated to about 3 months for administration and management.

Student advice and support is the most important and time consuming task during the implementation phase, though partially depending on the number of students taking part. The following figures are based on a number of 100 participants. For the tutors' preparation and for the discussions with the students in the online sessions an estimated 70 days are required.

To provide some impression what student support and advice includes we will give a short insight in this process: The course programme as presented comprises approximately 12 sessions, in winter terms a bit more. For each session exercises have to be developed and formulated before they can be placed on the web. The students are working on these exercises in small groups. Having solved the problem they can have a look at the sample solution and send their solution to the tutor via e-mail. The tutor controls the home assignments and provides each group with individual feedback. General information and discussion statements are communicated in several discussion forums where students not only have the opportunity to ask for the dates of the final (course) examinations but also to discuss with members of other working groups. Students who are very communicative can also place their contributions and discuss them in a chatroom.

Based on the roughly 70 days what the time input was estimated to be the (opportunity) costs of this time input are nearly € 16,200 per semester. However, it should be taken into account that this comprises also the time for general preparation of exercises and its control that would also have to be undertaken if the course were a traditional face-to-face session. Thus, the marginal costs of online instruction might be less. Here, estimation is one day per week and one week of preparation and assessment each. Thus we would arrive at 26 days for the online tutorial. On this figures the marginal costs for the online tutorial are € 6,000.[43]

The time requirement would also be less if the number of participants is less, though it does not decrease in a linear manner. For example, if only 30 students participate the time expenditure would go down by one third. This is due to the fact that some tasks have to be done anyway.

Evaluation: The time input for quality assurance and the introduction and the inspection of the corrections to be made is estimated to be 30 days in total. However, this time requirement is divided between an academic and a student staff member but the exact

43 The second course that is not considered here in detail has 20 students and requires a time input of the tutor of about 10 days with corresponding costs of € 2,300. Each participant has to solve five exercises (case studies) in co-operation with other students.

division could not be specified. To be on the safe side we assume that 20 days are from academic staff and only 10 days from a student. This would add up to € 5,520 per semester. Anyhow, based on the 30 days the maximum costs would be nearly € 7,000 if the academic staff would only provide input for quality assurance. Another day is spent for evaluation of the course.

Staff training for implementation: Does not take place in this phase. We have specified some training in the previous section and this includes possible training during the implementation phase.

Public relations/Marketing is only a minor activity for the project where an estimated five days are spent for participation in the Learntec fair. The costs for personnel are some € 1,155 every year. Some more costs of about € 500 arise for travel to Karlsruhe and accommodation. Therefore, the total costs of PR and marketing are around € 1,650 per year. However, as the presentation at the fair will cover all activities of WINFOline the costs cannot be specified for the particular course but for the whole project.

Although **project controlling** is part of the project the activities have not been very successful so far. Obviously, it proves difficult to demand that project staff at the four universities involved prepared time sheets. In a number of interviews we heard that particularly professors reject the request to write down their time input spent for different activities. Therefore, even within the project itself it is obviously rather difficult to provide appropriate and detailed figures on the costs of eLearning, although this task is part of the awarded project application. However, some five days have been spent, costing approximately € 1,150. The preparatory work for project controlling is the PhD-thesis of the project manager Svenja Hagenhoff (2002).

Content updating: Has not taken place that much as the project has only started in June 2001 and the course was fully updated in the meantime. However, in the future the content will have to be updated but time requirements are difficult to estimate. During the interview it was estimated that the necessary time for content updating would be only two days. Updating of the content in only 2 days might be feasible if this is done every semester and can be kept small due to the fact that the responsible academic staff members are continuously involved in further education activities that are to be considered as overhead for further developing the course. Anyhow, the two days would lead to costs of € 460 per semester.

The time requirement for **project management and administration**: Could not be specified on a detailed basis. It is estimated that 10 % of the project manager's time is for di-

rect project management and administration activities although this seems to be a very low proportion compared to other projects. For example, in the case study VIRTUS the time input is estimated to be more than one third of the project manager's workload. Anyhow, over the 31 months of the project the 10 % add up to € 14,320.[44]

Adding up the time and the costs of the several activities the **total costs for the implementation** phase are about € 39,000 as presented in this section. Yet, it should be noted that not all costs considered were immediately directed at delivering the one course under consideration.

To a certain extent the activities referred to are not related to one course but to the overall project. These costs have to be eliminated to calculate the direct costs of delivering one course. Thus, we have to deduct the costs of public relations and marketing (€ 1,650) and for controlling (€ 1,150), adding up to € 2,800. With respect to the costs of course development and delivery also project administration and management are to be considered as overheads. Therefore another € 14,320 can be deducted, so that the total costs for offering and running "Development of Application systems" are therefore approximately € 21,900 each semester the course is delivered. The remaining € 17,100 are overheads that are distributed by half to each of the two courses with development. Thus the total implementation costs of the course "Development of Application Systems" is € 29,500.

If the time requirements for the second course are approximately the same as the first the total (recurrent) costs per semester are about € 44,000. If it requires only two thirds of the time that is necessary for the first course this would be around € 33,000.[45]

Other recurrent costs such as travel expenses are not related to the development and provision of a certain course and are, therefore, not specified in detail here. However, the allocation for the other recurrent expenditure is less than applied for.

44 It should be referred to the fact that we concentrate on the development and implementation of one course only. The responsibility for the overall project is at the University of Saarbrücken. If we would consider all packages that were dealt with at Göttingen University the time input for management and administration would be around 15 months, which is 16 % of the total time budget. To provide a more detailed overview, Ms. Hagenhoff spends 30 % of her time for WINFOline. One third of it is related to management and two thirds for the development of the further education programme. Additionally, some of the time input by Mr. Kamin is directed at project management, though it is impossible to specify this more in detail.

45 Based on the far lower time requirement for student advice and support (see above) the lower costs seem more appropriate.

5.3.2.4 The total costs of WINFOline II (Göttingen)

The following summary has to distinguish between the direct costs of developing and providing the course "Development of Application Systems" which was the main topic of investigation in this case study. The second level of consideration is the full cost of WINFOline II at the University of Göttingen which includes a second course called "Information processing in service companies".

The total costs of WINFOline II are a combination of the costs of developing the courses and the activities to be undertaken either in relation to the WINFOline project at the University of Göttingen or within the overall project of the four co-operating universities.

If we look at the costs of developing and providing the course, the costs of developing are approximately € 57,000 and the costs of delivery are about € 22,000 in every semester the course is provided. Thus, the total costs for delivering the course once add up to nearly € 80,000, with development amounting to 73 % and provision to 27 % of the costs.

An important question is what would happen to the costs when the course is delivered for a second time. The answer depends heavily on the preparation that the tutor needs for the second session. A big share of the time requirements for student advice and support was the preparation of the tutors for this course (70 days) while the time for communication with students was estimated to be only 16 days. If a new tutor has to deliver the course for the first time s/he would have to prepare himself or herself but if the course is tutored by the same person this costs will not arise. Therefore, in the first situation the costs will be another € 22,000 while in the second situation the costs would go down to around € 9,500.

If a second course was developed and provided for the first time where costs are in the same range, another € 80,000 could be added for the first time. However, the amount of content of the second course "Information processing in service companies" is approximately two thirds of the other course. If the costs decreased by the same share, the costs would come down to € 57,500. Most probably the 'real' figures are somewhere in between. Regarding the costs of repeating the course for a second and third time the same issues arise as discussed above.

If we now turn to the costs of the whole WINFOline II project in Göttingen, we have to add the 'overhead' costs from the viewpoint of the course. This includes the investments (€ 15,130) and the preparation of the project (€ 14,700) and the costs of controlling, public relations and marketing and project management and administration. The costs of the-

se three activities add up to about € 17,000 for the whole project duration. To sum up, the "overhead costs" are approximately € 47,000.

To estimate the full costs of WINFOline II at the University of Göttingen, a crucial issue is how often the courses are to be delivered during the project phase. If the course "Development of Application Systems" runs four times and the second course "Information processing in service companies" three times and the costs of development and provision are approximately the same we have the following costs:

	1. time	2. time	3. time	4. time
Investments	15.132			
preparation and planning ("Overhead	14.669			
development of 1. course (DAS)	56.937			
development of 2nd course (IPSC)	56.937			
provision of 1. course (DAS)	22000	22000	22000	22000
provision of 2nd course (IPSC)	22000	22000	22000	
project management etc.	17000			
Total costs	**314.674**			

Table 6: Total costs of WINFOline II (Göttingen)

For those who are now starting to combine the costs specified in this study and the full grant for the project of approximately € 2 mill. it should be highlighted that course development is only the minor task of the project while 60 to 70 % of the budget is spent on other tasks, for example the establishment of the network (50 person months), development of organisational structures, cost-benefit-analyses etc. Thus, the different levels of the project should not be mixed up.

Furthermore, we can divide the total costs in fixed and recurrent costs. The recurrent costs arise every time when a course is delivered. Based on the figures presented in the previous sections the recurrent costs of course delivery are approximately € 22,000 per semester that the course is provided. These costs approximately double when a second course is delivered because this amount covers only the direct costs of course provision and running during the semester. Thus, the recurrent costs are the € 22,000 per course provided, i.e. € 152,000 in total.

To be clear, the € 39,000 (12.4 % of the total costs) that are presented in Table 7 as the costs of implementation comprise also the costs for controlling, public relation and marketing and project management and administration. The costs of these three activities add up to about € 17,000 over the whole project duration.

	preparation and planning		development		implementation		total	
	in €	in %	in €	in %	in €	in %	in €	in %
Investments	15.132	12,0 %		0,0 %	0	0,0 %	15.132	12,0 %
personnel costs	14.669	11,7 %	56.937	45,3 %	39.015	31,0 %	110.621	88,0 %
non-personnel costs	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %
Total	29.800	23,7 %	56.937	45,3 %	39.015	31,0 %	125.752	100,0 %

Table 7: Total costs of providing one course in WINFOline II (Göttingen)

The fixed costs are by far the highest share of the total costs of the development and provision the course "Development of Application Systems", even if hardware and software investments are left aside. They arrive at a value of approximately € 150,000 without investments and thus are just below 50 %.

5.4 Centre for Distance Education at the University of Leipzig: French

5.4.1 Project description

The study "French" is a comprehensive further education course that builds up on some basic knowledge in French, i.e. even the first module is not appropriate for real beginners. The programme contains at total of eight modules out of which seven modules are already developed. Each module contains content for one semester of 4 to 6 hours per week. The content of one module is sub-divided into 16 sessions and, in total, 350 pages. At the moment, from the developed modules five are on general language courses (allg. Sprachliche Module) and two are for special subjects (French for business and secretarial purposes). The final module for French as a general subject is in development at the moment.

The process of developing a module is as follows: a French native speaker generates the self-study books augmented by audiocassettes, and focuses in particular on interculturality. In a next step the content is revised by a German native speaker with a Romanist background who checks for understanding etc. Finally, a CD is prepared containing the whole content with the texts, the audio clips, the interactive exercises etc. The co-operation between a French native speaker and a German proofreader has proved to be very successful and is, thus, highly recommended.

The participants meet twice during the semester in Leipzig for a face-to-face-seminar and the students are advised to participate at least in one of them. In the meantime the students study the content and work on their home assignments. While preparing these exercises the contact between students and tutors is via email and telephone. In addition the students are announced to moderated e-mail lists. A real time chat is not yet available. Surprisingly, the opportunity to contact the tutor via telephone twice a week by speaking French has not been accepted yet. It seems that students have difficulty with phone calls in French.

The examinations are not part of the study programme but the aim of the course is to prepare the students for one of the following examinations:

– UNICERT examinations, that are language certificates which can be sat at a number of universities and colleges, including Leipzig, under the same examination conditions
– DELF and DALF qualifications

– Certificates of the Chamber of Industry and Commerce in Paris, particularly the Certificat de français du secretariat and the Diplôme de français des affaires, DFA 1.

The examinations can be taken at the University of Leipzig, at the Institute Française in Leipzig, because the local Institute Française is the co-operation partner of the study programme, but also at other institutions in Germany.

The development of the course is the result of earlier experiences with language courses in distance education since 1990. A number of ministries of education of the new laender in Germany had a contract with the French Centre for distance education which was then directed at the training of teachers. This programme was administered by the University of Leipzig and relied on the materials which were developed in France.

Due to this responsibility they were contacted by people from other groups who were interested in such programmes which were not available on the market at that time. Furthermore, the centre developed a study programme in French for employees in small and medium enterprises. The experiences with the course programme and the requests from other groups highlighted that there is sufficient demand for such a programme.

One of the members of the teacher project was interested in further developing the materials for other occupational groups. Due to financial support from the State Ministry of Education, she could be employed as an external staff member on basis the of a service contract. As no funding for personnel costs was available the whole material had to be developed on the basis of such contracts.[46]

The first module began in summer term 2000 with 7 participants. Since a total number of 67 people has participated in the programmes. In each of the last two terms 38 participants were enrolled in the courses at the same time. The participants are from all over Germany.

Based on an entrance examination students were grouped to the seven modules. The maximum capacity is about 50 participants per semester in total. Therefore, the optimal number of participants for each module is seven. The learning time is between four and six hours per week depending on the studying speed.

The students can choose which learning material (CD-ROM or booklet) they want to study. Some students work with the CD-ROM only which contains eMaterials, an eBook

46 For those not familiar with higher education funding in Germany, funds for contracted services are regarded as costs of materials.

(tutorial) and audio elements, others work only with the booklet (traditional book), and some rely on both materials. The web is used only for asynchronous discussions with the students and for the work which need marking but not for web-based delivery.

5.4.2 The costs and financing of the study programme "French"

In this section we will present the costing and financing of the project which is partially to prepare self-study books, eBooks and eMaterials (CD-ROM) and audio sessions for computer-based usage by the students. The costs will be presented separately for investment and recurrent costs. The costs are divided into the costs for the three phases preparation and planning, development and implementation.

Before we consider the costs we will have a short look at the financing of the study development.

5.4.2.1 Financing and budgetary expenditures

Initial funding was by the third Hochschulsonderprogramm (HSP III) (a special programme for higher education development) with a total amount of € 19,940 (DM 39,000) spread over three years: € 5,625 (DM 11,000) in 1997, € 9,200 (DM 18,000) in 1998 and € 5,113 (DM 10,000) in 1999, although the original application had a budget of roughly € 204,500 (DM 400,000).

As this amount was not sufficient to finance the development of the whole study programme, in consequence, the project was mainly financed by university resources. Dr. Nieke, who is the responsible project staff member, is financed by the funds for distance education of the state of Saxony.

The study programme is part of the further education programme of the University of Leipzig. So the students have to pay a tuition fee (in accordance with the Saxonian Regulations of fees for higher education). At the moment this fee amounts to € 179 per semester.

In the last two semesters 38 participants were enrolled in this study in each term (winter term 2001/02 and summer term 2002), so that the revenue from it was € 6,800 every term. If the number of participants does not change the total revenue would be € 13,600 in 2002. The maximum revenue would be € 18,900 per annum.

The revenue from the course fees remains at the university and is used to finance the costs of the Institute Francaise for the corrections and the presence sessions and also to

finance the marginal costs of the study programme, for instance for binding the books etc.

The basic costs of developing the study programme are funded by the HSP III and in addition by the states' distance education funds. As we will see in the costing chapters, the funds of these two sources are not sufficient to fully finance the total costs of the study programme. Therefore, additional funds are necessary. Cross-subsidisation comes from the fees paid by so-called guest students, which are handed over to the Centre of Further Education by the University. These funds are used for financing further developments of the programme.

In the next sections we will provide an overview of the total costs of developing and running the study programme.

5.4.2.2 Investments

The only hardware 'investment' was a recorder for cassettes and CDs costing € 125. However, this recorder is used only partially (80 %) by the project so that the project costs are € 100.

Another € 1,100 were spent on an authoring-tool called ToolBook which, in the meantime, was updated once with unknown costs.

5.4.2.3 Budgetary and non-budgetary costs of the project

For the following calculation of the costs of the project we rely on an activity-based costing approach which sub-divides the development and provision of the study programme "French" into three phases with several activities.

Project phases

The development phase of the project started on October 1, 1997 and the final module will be developed by the end of March 2003. Before that starting date, October 1997, several project applications were prepared for gathering funds, e.g. Bund-Länder-Commission for educational planning and research promotion (BLK) and the third Hochschul-Sonderprogramm (HSP III). Both phases of development and implementation run parallel, to a large extent, because some modules are already running while others are still to be developed.

1. Costs for preparation and planning

Project planning and a**pplication preparation** took place at the same time. Several applications were prepared for different funding agencies but were more or less unsuccessful. According to our interview partners the time requirement for the preparation of the application was 15 days, costing € 3,450.

However, this seems to be a comparatively low time input for the preparation of several project applications compared to other projects which prepared only one, even though the first application provides the foundation for the others.

Selection of co-operation partners: Initially, 2 or 3 days were spent on identifying and selecting co-operation partners. The major co-operation partner is the local Institute Francaise but a major issue was the identification of the authors for content development. Based on time input of 2 to 3 days, the costs were some € 450 to 700 at that time.

Another 1 to 2 days were spent on identifying and selecting new co-operation partners each semester with costs between € 230 and € 460. However, during the interview it was pointed out that it was difficult to estimate the time input for searching co-operation partners after years. Compared to other projects this seems to be not that much.

Development of a business model: Such a model was not really developed. The decision to develop such a study programme was made on the basis of the requests in combination with their experiences from the previous projects.

Organisational and structural adjustments: The initialisation of the study programme at the university proved to be very time-consuming because there were many bureaucratic and administrative obstacles. In total, it took more than half a year to satisfy all the requirements of the committees regarding study regulations and meetings etc. The estimated time input was 10 days for meetings and preparation of regulations etc. so that the costs add up to some € 2,300.

Staff recruitment: The major recruitment is directed towards external staff and which is considered under the topic "selection of co-operation partners".

Project administration and management: During the preparation and planning phase administration and management did not require much time involvement and is covered by the other activities.

Adding up, the **total costs of the preparation and pre-development phase** were nearly € 7,000 in the mid 1990s. In relation to the total funds that were gathered successfully (approximately € 20,000) this is 35 % of the funding which seems to be relatively high.

Furthermore, it seems that the estimated time requirement as estimated during the interview is not that high. In other settings they might be higher.

2. Costs for development of online courses/materials

The development phase started in October 1997 and is not yet finished, as the final module is still to be developed. On the other hand some courses have left the development status and are in place since 2000. However, even if there is some overlap, we will try to specify the costs on the basis of an activity-based approach that is linked to the project phases.

The **preparation of concept and design** is said to be very time consuming at the beginning of the project, as the authors need detailed information what to do and what the expected outcome is. Furthermore, the authors are requested to specify in detail which sources are used to reduce the burden to clear the copyright and to get the licences for reprint. However, in the meantime, the time requirement has decreased to one day per module. Based on a number of 8 modules the total time input should be some 12 to 15 days, costing between € 2,750 and € 3,500.

Didactical preparation: Is to some extent part of the content development process and to another extent part of the media development process and can, thus, not be specified here.

Content development: To a large extent, content development is done by an external staff member who is paid on the basis of a contract for services. The costs for content development differ for the modules and are between € 2,800 to 4,600 per module. Thus, for all eight modules the costs add up to approximately € 30,000 and can be specified as follows:[47]

47 The costs for the preparation of the cassettes (€ 7,200 for all 8 modules) will be specified and costed under media development (below).

Costs for the service contracts with the authors	
Module 1	1.406,00 €
Module 1, learning units 3-4	1.534,00 €
Module 2	2.812,00 €
Module 3 +Secretarial.	8.692,00 €
Module 4	2.812,00 €
Module Economics	3.579,00 €
Module 5	4.601,00 €
Module 6	4.500,00 €
	29.936,00 €

But there are also some other costs in relation to content development. For example, one author did not specify in detail which (re)sources were used. In consequence, high expenses were necessary to identify all sources used and to clear the corresponding copyrights. Anyhow, this is an important issue that was insufficiently taken into account in advance. Therefore, new regulations had to be prepared containing more and more detailed information as to how the authors have to prepare their materials. For example, in recent times they are not allowed to rely on other teaching and learning materials where copyright might have to be cleared. The costs of copyright clearance and content evaluation for this purpose are between € 2,400 and € 4,000 per module. The costs add up to about € 24,300 for all eight modules. This expenditure comprises the assessment and correction of materials, contacts to the author if things are unclear or need to be clarified (from the viewpoint of the German reader and learner), copyright clearing, contacts to publishing companies, preparation of content for printing and evaluation of the CD-ROM.

The costs for licence fees are about € 1,300 for all eight modules as far as this was necessary for each of them. Thus, they are not very high.

Development of the media: The preparation of the CD-ROM is undertaken by Ms. Nieke who has a part-time position of about 50 % of the normal workload. Her workload is estimated to be distributed by 2 to1 for this task, preparation of the CD-ROM, and project administration (see below). Thus, although the time required for CD-ROM preparation per module is about six months and covers media didactics, preparation of the exercises and screenplay, media design and the production of the basic (prototype) CD, we arrive at two months of full-time employment for this activity. Other tasks are the dubbing of the texts (radio play) on the cassettes as Wave-Data files, cutting and pasting the radio plays onto the right position and compilation of pictures. For the two months of full-time deployment

which are estimated to be necessary for this task per module the costs are nearly € 5,300 per module or € 42,500 for the whole study programme.[48]

Another € 7,200 (for all 8 modules) have to be added for the costs of the speakers of the cassettes.

The preparation of the cassettes is carried out by a university-owned, media centre which is paid for by the university while the Centre for Further Education is not charged for that. Therefore, the costs of this exercise are unknown due to the fact that the input of time and materials are unknown.

Staff training: In total 2 days of training were involved for an academic and external staff member. The direct costs were € 250 for travel and € 175 as participation fee per participant. This adds up to € 850. Another indirect cost arises for the time spent. For two days per training and person this amounts to € 920. Thus, the total costs for training add up to € 1,770 per training.

Preparation of manuals: A manual was written by external staff. As the fee rate is included in the costs for evaluation and, therefore, the costs cannot be specified directly, the time input of 2 days is only a rough estimate. Translating this into costs would arrive at € 400 to 500, depending on the fee rate. The shadow price of an academic staff member for the two days would be € 460. Anyhow, the real costs are covered the costs for evaluation and are therefore not accounted for separately.

Project management and administration: is to a certain extent considered as an overhead and part of the duties of the head of the centre and of Ms. Nieke, whose time input was partially accounted for media development as she spends her time on project administration and CD-ROM development. A rough approximation of the time spent for both activities comes up with a relation of 1:2 (administration and CD-ROM development. Taking into account that she is working part-time, one month – or 21 days are spent per semester for administration with costs of about € 5,000. However, it should be understood by the reader that this is just an approximation of the time shared between the two activities of Ms. Nieke. Even if this estimation was not correct the total costs of the project would not be affected, but the costs of development would as far as administration is related to the implementation of the study programme. If the relationship was one to one,

48 In reality, the costs are less because Ms. Nieke is paid on the basis of the salary scheme for Eastern-Germany which is lower the scheme for Western-Germany.

the costs of development-oriented administration would decrease to approximately € 2,500. This is the cost of project administration for development.

Adding up the **costs for the development of a module** which could be specified in the previous section comes up at around € 13,500. The development costs for all eight modules add up to € 112,800. Those who compare the two figures will realise that there is a difference of about € 4,400 which is due to the costs of administration and staff training that are to be considered as an overhead for each module. Dividing this cost by the number of eight modules we arrive at around € 14,000 as developmental costs per module. However, it has to be taken into account that at least the time input might be split between development and implementation, so that the cost of development would decrease to € 75,000. On the other hand there might be some minor costs that cannot be specified, due to the fact that they arise at other parts of the University of Leipzig. Thus, the costs of € 14,000 and € 113,000, respectively, might have to be added by the same unknown costs arising at other university entities.

3. Costs for piloting and implementation

Replication of the media: The tutorial books are printed by university resources and were not invoiced separately so that the costs for the project are, nominally, zero. Only binding is done by an external company. The costs for binding per student and module are between € 6 and 9. As these costs arise every semester they are to be considered as recurrent cost of implementation. As the number of participants was 38 each for the last two semesters, the total costs for binding per semester is approximately € 230.

This cost has to be supplemented by the costs for printing although they disappear in the overhead costs of the centre and the university, respectively. Assuming that the printing costs per page are € 0.05 we arrive at costs of € 7.50 to € 10, assuming that each study book has between 150 and 200 pages.

This adds up to € 300 to € 400. Having 38 participants this sums up to replication costs of € 550 to € 650 for the study books per semester.

The replication of the cassettes is carried out by a university-owned, media centre which is paid for by the university while the Centre for Further Education is not charged for that. Therefore, the costs of this exercise are unknown due to the fact that the input of time and materials are unknown. An approximation of the replication costs would probably arrive at € 3 to € 5. For 25 cassettes per semester, the costs would arrive at € 75 to € 125. In the same range will be the costs for the replication of the CD-ROMS.

To sum up, the costs for replication are probably between € 700 and € 900.

Student advice and support: is part of the duties of the Institute Francaise which is paid on a lump-sum basis which is only partially fixed in relation to the number of participants. For example, at the moment 38 participants are to be catered for by the institute and the payment has been agreed to be € 5,500. For this amount of money the Institute Francaise is paid for all activities which are to undertaken in respect to the participants, i.e. corrections of the students' work, face-to-face seminars including renting the rooms and advice by telephone etc. However, the latter if not used that much because the participants obviously feel it to be too difficult for them.

In addition, there are costs for the external staff overseeing the grammatical sessions during the face-to-face seminars. The fee rates depend on the qualification of the particular person and are on average € 16 per lesson of 45 minutes. The total number of lessons per presence session is 14 (a 45 min.). This adds up to approximately € 225 per presence phase which is twice per semester and, thus, the costs are € 450 per semester.

Another cost arises for the moderator of the email discussions who is paid on the time input which is written down. The fee rate is € 16 per hour for a maximum of 10 hours per semester for all modules. Thus, the fee rate for the moderator is € 160 per semester. It should be pointed out that the students do not rely much on e-mail discussions and communication, although this is initiated and suggested regularly.

Furthermore, one staff member is responsible for the assessment of the students' entry-level tests. She is paid € 6 per interested person. Per semester on average 15 people are interested so that the fee rate adds up to € 90 per semester.

Evaluation: the courses (modules) are evaluated before they are launched as regular courses. The costs of evaluation are therefore assessed in the previous section.

Public relations/Marketing: Marketing activities are of minor importance, so far. For example, one talk was held at the CEBIT in Hannover. Other activities are advertisements in newspapers. One advertisement was placed with a number of other institutions cost € 5,000 in total. Sharing the costs with the other institutions and course programmes, the costs for this particular study programme are € 1,000. It has appeared that advertisements in newspapers and magazines are not a good strategy and that the most impact comes from advertisements on the Internet.

Flyers which are prepared by the centre itself do not cost much and posters require only the costs for print which is also not much.

In general, it was stated that the centre would be interested in doing more in this respect but that they consider themselves as too inexperienced for that.

Content actualisation has not been undertaken so far as the first modules have just been developed a couple of years ago by latest.

Project administration is part of Ms. Niekes' duties. As already pointed out it is difficult to specify the time input that is spent on this task. However, in the previous section we estimated that the time requirement for administration is one month per semester and divided by half on administration for development and administration for implementation. Based on this assumption the costs for project administration during implementation amount to approximately € 2,500.

The other recurrent costs are very difficult to estimate as they do not appear but disappear in the overall recurrent expenditures of the centre and are therefore to be considered as overhead costs. Thus, the total costs of the study programme are probably underestimated, which is most probably the same for all of the projects under investigation in this study.

If we sum up the **costs of the implementation phase**, we have to be aware of the fact that most of the costs are no more specified for each module but for each semester. The major costs are the fees for the Institute Francaise (€ 5,500). The other costs arrive for the presence sessions (up to € 450) and e-mail discussions (up to € 160) and some € 90 for the assessments of the entry-level tests. The costs for replication of media (printing and binding of study books; copying of cassettes and CD-ROMs) are probably between € 700 and € 1,000, though they cannot be specified clearly as they disappear in the university budget and are not paid by the centre. Furthermore, € 2,500 have to be added for administration. This adds up to approximately € 10,500 per semester.

5.4.2.4 The total costs

Based on the figures presented in the previous sections we can now calculate the cost of the whole programme. Nearly all costs we were able to identify in this programme were costs for personnel whether internal or external.

Neglecting the small investments in software, the costs of preparation are € 7,000, the costs for development are € 113,000 and the recurrent costs of implementation are (on average) € 10,500 per semester. This adds up to fixed or investment costs of € 120,000 for developing all eight modules of the whole study programme and to recurrent expendi-

tures of € 10,500. Breaking the full costs down to each module we would arrive at development and investment costs of (on average) € 15,000 and recurrent cost of € 1,300 on average.

As for many other programmes the costs of development make up the major share of the total costs. However, this is the programme where the share of the recurrent expenditures (costs) is less than 10 % of the development costs.

The question is whether the recurrent costs per semester are recovered by the revenue. The recurrent costs of the programme add up to € 10,500 per semester, while the revenue is € 6,800 on the basis of 38 participants. Thus there would a loss of € 3,700.However, some of the costs must not necessarily be recovered by the revenue. For example, the costs of administration are reimbursed by another programme, so that € 2,500 can be reduced.[49] Furthermore, the direct replication cost for the centre are less in reality, as they are partially not reimbursed by the university. Thus, another € 450 to € 650 can be subtracted. The same may apply to the costs of marketing which can be considered as an overhead.

To sum up, the costs that have to be recovered are at around € 6,500. Relating this amount to the revenue of about € 6,800 the direct costs of the programme are recovered by the fees. However, the situation would improve a lot, if the finalisation of the final module would lead to an increase in the number of participants. For example, if the maximum capacity of 50 participants was reached, the revenue would increase to € 9,800 per semester. Here, the full recurrent costs could be nearly recovered. Anyhow, costs of updating content have not been taken into account, so far.

49 Furthermore, it should be noted that the costs of administration are less in reality than calculated in this study. This is due to the fact that we have calculated on BAT II (West) while payment is made on the basis of BAT III (East). Due to this difference the real costs would come down by approximately 15 %, i.e. € 320. However, this does not change that much.

5.5 Distance education unit at a University

In this section we will describe two different courses relying on two different approaches or environments. The first is a classical distance education course with course materials where a virtual seminar allows discussion between students and moderator while the second course is a newly developed course with eBooks/eMaterials and virtual seminars.

The motivation to introduce eLearning courses at the distance education unit was the impression that eLearning would be a major requirement for survival in the future. And it is considered as improving the quality of teaching and learning. Interaction between students and instructors or tutors can be realised much easier than with traditional media (course materials and telephone or written correspondence). In summary, eLearning is considered as a technology-induced improvement of distance education.

A preliminary finding of online courses is that the interaction with students has increased immensely, even though the students are not forced to rely on online courses. Instead, in a number of courses or study programmes online learning is (only) one possibility while another is the traditional distance education approach. It is possible to get a certificate at the end of each course.

The concept of moderation and the input of the moderator is of crucial importance for the success of the eLearning approach. The didactical approach is directed at an active participation of those who participate in a course. Therefore, students are more motivated and their input is higher. In consequence, online learning is more effective and more efficient and builds on the other media (course materials). The fact that the development of online seminars can build on already existing materials leads to relatively low costs for the preparation of the new online approach.

A major advantage of this approach is that students do not feel left alone but have the opportunity to communicate with other students and the tutor/moderator. This personal interest is more satisfying than the approaches applied so far. This is different from earlier approaches.

Communication between students and with the moderator is generally asynchronous. Students appreciate courses which are well structured and moderated. This leads to improved learning effects so that students know what they have learned.

5.5.1 Virtual seminars as part of traditional distance studies

5.5.1.1 Project description

The distance study program we investigated in this section is a study programme of 4 semesters, each with a certain number of modules, in total 11. The courses are embedded in study and examination regulations. For certain modules online seminars are offered every semester, while it is not offered for other modules. Students can get a credit. However participation is not compulsory, students can also get credits for (traditional) examination via home assignments.

Since its introduction 3 years ago, each course of study has one or two online seminars which are well accepted and frequently utilised by the students. Roughly one third of all students enrolled in this study programme participate in virtual seminars. However, this means that two thirds of the students rely on the traditional approach only.

The programme under consideration is a post-graduate study programme that takes part in parallel job activities so that distance education is a necessary pre-condition for the utilisation of this offer. In general, the modules are of 5 to 6 weeks duration, whereas students learning time cannot be specified exactly. However, it is expected that the workload for the students is higher than for traditional courses which are assumed to have an average workload of approximately 12 to 15 hours per week. It should be pointed out that the real work load by the students is generally difficult to observe, whether in traditional distance education courses or in online courses; some students might learn for about 25 hours per week while others learn for about 8 hours only.

If a student decides to participate in a certain course, some assignments are a prerequisite for examination at the end of each module and this requires a regular look at what is going on in the seminar. Messages have to be read and contributions need to be written and posted. If the number of messages is, for example, 300 per week it should be obligatory to take a look at the bulletin board every day. Though the major input by students comes during the evening hours and at the weekends, and less during the daytime, the 24/7-approach is applied.

In the last semester in summer 2002 two modules were online. The first was "Contract and working law" and the second "Organisational consulting".

The general structure is the same for all programmes, the course materials are available and are delivered by normal post mail. The virtual seminar is then related to and based on

this material. In addition, further resources can be placed on the web which is sometimes the case. Experience shows that these additional materials are seldom used by the students. For all courses, a standard feature of about 10 html-pages, containing some information about the moderator and the "rules" of participation or FAQs regarding technical matters is prepared. As this is a standard feature, it is prepared once and then just updated for new courses so that the time input by the moderator is comparatively high for the first time but low for the remaining. The first preparation might have lasted five to ten hours, while up-dating lasts only a few minutes. With respect to such activities the question was raised whether this is an additional task to be undertaken due to online learning or whether it has to be done anyway. The interview partners pointed out that for traditional courses the moderator or instructor would have to do something else. This may be briefly discussed on the basis of some topics.

The courses are run by an external moderator who develops the concept for each module and applies it. The project manager is 'only' responsible for advising and coaching the moderator. However, this takes much of his time. Another task to be considered as permanent duty of the project manager is staff training.

The time input for content development is low as the content is already available and has been used for earlier courses as well. Preparing the html-pages was a time-consuming activity when materials were prepared initially but is rather low now.

The replacement and/or additional supply of online courses has led to a higher time input for student support and advice instead of administration. Time input for communication with students has grown while paper work has become less.

The time input increases when online courses are introduced but after a certain time, when work becomes more and more routine, time input decreases. Online or virtual seminars require more time for preparation and planning as well as support and advice to students when the course is running. As already mentioned, training of, advice and coaching of the moderator is another time consuming duty.

5.5.1.2 The costs of the virtual seminar

In this section we will present the costing of the project which is mainly to moderate and run the virtual seminar. A minor duty is the immediate preparation of the eBook which is to a large extent already available as study material that has to be prepared for web-based use. The costs will be presented separately for investment and the personnel

and other ('recurrent') costs. The latter are subdivided into the costs for the three phases: preparation and planning, development and implementation.

5.5.1.2.1 Financing and budget expenditure

The basis of the project "distance study programme" is a traditional distance education programme of the University where the virtual seminar can be considered as an add-on. Therefore, the whole programme is financed by the normal budget of the distance education unit and is 're-financed' by tuition fees that have to be paid by all students enrolled. Each student pays a fee of € 600 per semester whether s/he relies on the virtual seminar or not. Thus, there is no direct additional revenue due to the supply of a virtual seminar or the usage of the students. However, indirectly there might be some additional income if students enrol due the fact that the course is online and who would not have enrolled if the course was only a traditional distance education programme.

Roughly one third of the students request the online seminar. The number of participants in the virtual seminars is between 20 and 60, depending on the total number of students enrolled. If more than 25 students enrol in a virtual seminar this seminar is divided into two sub-groups.

Most of the following presentation is based on the assumption that only one virtual seminar is provided so that the costs of a semester or year will have to be calculated separately. This is not valid for the preparation of the eBook/eMaterial.

The external moderator is contracted for 4 hours a week (over the 5-6 weeks term) which is two more than for traditional courses, i.e. the expenditure is € 500-600, assuming a fee rate of € 25 per hour. However, the marginal costs of the online courses are € 250-300 because of the two hours which were contracted anyway. Another incentive for the moderators is that they are trained as (certified) online trainers. Yet, the estimated time expenditure of these moderators is one to two hours a day (see below) meaning that they are expected and obviously willing to spend three to nine hours a week without being paid for.

5.5.1.2.2 Investments

As this virtual seminar is only one programme out of several courses there was no need to invest in hard and software.

5.5.1.2.3 Budgetary and non-budgetary costs of the project

For the following calculation of the costs of the project this is divided into three phases and a number of activities. However, due to the existence of an established programme for traditional distance education the first phase of preparation and planning is more or less irrelevant. Another issue in this respect is that the centre has been developing such programmes for a long time, so that there are synergy effects making it often very difficult to clearly define the beginning of a new project. In contrast to many other projects in this study there is are clearly identifiable overhead costs that request and allow for another approach than for the other case studies.

Therefore, we will present at least a short figure on the overhead costs of the centre. This is an important feature with respect to comparatively low costs for the project itself. To a certain extent it is very difficult for staff to differentiate the time input spent for the programme or project under investigation. This can be a crucial issue in specifying the costs of certain activities.

1. Costs for development of online courses/materials

Most of the tasks to be undertaken to develop the study programme were carried out when the traditional programme was established. With respect to a comprehensive costing approach this input would have to be taken into account on the basis of its depreciated value. However, it is not possible to specify the costs of the original development so that we are not in position to calculate these costs. We can, therefore, only specify the marginal costs for the development and implementation of the online elements.

Furthermore, the development of the virtual seminar relies on the experience that was gained while developing and running other courses and programmes and has to be considered as continuous process where it is not possible to specify the time input. This is also valid for the **didactical and pedagogical preparation** which was necessary to transfer the already existing traditional distance education programme into a virtual seminar. However, it was not possible to specify the time requirements for this task.

Unfortunately, this means that we cannot specify any time input for the preparation and planning or the development of the virtual seminar. The time input that is necessary for the **development of the eBooks/eMaterials** is probably comparatively low as there is no need for content development.

Another task to be conducted is the **preparation or development of the virtual seminar** by the moderator, which comprises particularly the development of exercises and working

out the solutions and establishing a strategy on how this solution can be reached by the students. The particular time input for the moderators is estimated to be two to four hours. With respect to the costs of the centre for providing this seminar it should be pointed out that this time requirement for the moderators is reimbursed with the lump-sum fee payment which is based on an fixed basis of 4 hours instruction per week. That means, there are no additional costs for the centre!

Staff training is obligatory for every new lecturer and moderator and comprises one or two sessions of two hours each to provide basic information of the centre's general understanding on online seminars and on the particular seminar. The (total) costs are up to € 115 for half a day of the (external) moderator and the project manager. However, the opportunity costs for the centre are only € 115 for the time input of the project manager. The time input of the moderator is settled with the (lump sum) contract.

To sum up, the costs for developing the virtual seminar are fairly low due to the fact that it builds up on an already existing content.

2. Costs for piloting and implementation

The time requirement for **student advice and support** is depending on the number of students, their requests, i.e. the number and quality of messages and contributions posted and the commitment of the (external) moderator. Our interview partners estimated that the time requirement is on average 2 hours per day over 7 days per week during the 5-6 weeks of the term. This adds up to 14 hours per week or 70-84 hours per term. Based on a fee rate of € 25 per hour the costs per term for student advice and support would be about € 1,750-2,100 per group of up to 25 students. As two virtual seminars of 5 to 6 weeks can be run during a normal semester, the total costs would add up to € 3,500 to € 4,200 per semester.

However, as already mentioned above the moderators are only paid for about four hours per week with costs of about € 500 to 600 per term or € 1,000 to € 1,200 per semester. Therefore, there is a huge difference between the costs and expenditure of the centre and the private costs of the moderator. If the estimation of a daily input of about two hours is approximately correct, the difference is € 2,500 to € 3,200 per moderator and semester.[50]

50 This can be an important issue if the moderators are no longer to moderate the seminar for such low fee rates in relation to the time spent. From the viewpoint of the centre this is a very cost saving approach to running the seminar if the moderators are committed to their duties.

Another issue is the organisational and technical support and advice of students and moderators as responsibility of the project manager which requires a quick response and reaction to keep the seminar going. However, for two reasons it is difficult to estimate the time involvement of the project manager. One reason is that there is no clear time slot for these tasks. They can be approached every now and then, or even get no requests over days and weeks, but are 'required' to be online all the time. Thus, it would be necessary to specify the time involvement over a semester or so. And the second reason is that the project manger refrained from a specification of his time input for that task for reasons of principle. From the project manager's understanding, he has to be online all day and night and he highlighted several times that 24/7 would be his approach which does not require a specification of his time input for certain activities.

Evaluation of the courses is generally done in the last week of the course. The review is undertaken by an online questionnaire which is obligatory for all courses and not a special requirement for online courses. It should therefore not be considered as (special) costs of eLearning.

Adding up, the total costs of implementing the virtual seminar is the fee for the moderators of about € 500 to € 600 per term of 5 to 6 weeks or twice that amount per normal semester. The time input of the project manager for supervision cannot be specified, particularly for reasons of principle.

5.5.1.2.4 The seminar's total cost

If we add up, the **total marginal costs of the virtual seminar** which are related to the "distance program" are relatively low. The only computable marginal cost is the fee rate for the moderators which is about € 500 to € 600 per term of 5-6 weeks and moderator and virtual seminar. However, if we would like to specify also the moderator's (opportunity) costs, which are not reimbursed, another up to € 2,500-3,200 would have to be added. This amount is the difference between the (estimated) real time input and the (lump sum) payment the moderator is entitled to.

Another cost related to the online programme is the (opportunity) cost of the project manager in relation to staff training, advice and support to students and supervision of the moderator. However, it should be noted that the time input of the project manager was not specified for certain activities for reasons of principle. Some minor fixed costs will have to be added for the preparation (transfer) of the study materials for web-based usage.

All other costs are not related to the virtual seminar(s) but to the programme as a whole, which is a traditional distance education programme.

This virtual seminar, so far, is the eLearning approach with the lowest marginal costs. This is due to the particular environment that the course is 'just' an amenDM ent of the normal programme. However, these relatively low costs are also due to the organisation of the centre which is to be considered as an overhead cost.

5.5.1.2.5 Overhead costs

If we would try to identify the full costs, we would have to include the **overhead costs** which are, for example, the depreciation of 25 computers of about € 2,500 each (incl. monitor and printer) and the server of about € 15,000. Assuming a depreciation period of about five years, the depreciation would be € 15,500 annually, which would have to be accounted for all the programmes of the centre.

Another topic would be the travel expenditure of about € 7,500, the costs for marketing and public relations of about € 125,000 per annum and the library (€ 1,000). Another € 500 is spent each month on stationery and € 40 for communication. Thus, the annual overhead costs of the centre are, without costs for personnel and (office) equipment, approximately € 155,500.

The personnel comprises 10 academic staff (category BAT IIa) costing some € 510,000 per annum, 10 office and administration staff (category BAT VII) with costs of € 320,000 and 10 student staff of about € 21,500. Thus, the personnel costs of the centre add up to some € 850,000 per year.

Computing the total overheads costs of the centre we arrive at roughly € 1 Mio.

In contrast to the virtual seminar in this section which is an add-on to an already existing programme, the programme that is presented in the next section is a newly developed study programme. It can therefore be expected to be much more expensive.

5.5.2 "Hypermedia Programme"

5.5.2.1 Project description

The "hypermedia programme" is a post-graduate course of study for 2 semesters that is (nearly) completely web-based even though it contains three presence sessions. The study programme is divided into an introductory phase of about four weeks and three to four main modules: one on techniques, two on economics and management, one hands-

on module and one on politics, law and security. The hypermedia programme will be a web-based programme with a main focus on communication and interaction. Teaching and learning materials will be prepared for the computer but not as course materials, i.e. traditionally written. Content will be provided by external authors on a traditional text basis which is then transferred into web-based materials and some might also be prepared hypermedial though there will be no real eBook. As this is a mixture of web-based materials and eBooks we will use the term 'eBooks and eMaterials' in the remaining section

The study programme is still in development and it is expected that up to 50 people will participate when it starts during in the winter term 2002/03.

5.5.2.2 The costs of the "hypermedia programme"

In this section we will present the costing of the project which is mainly to prepare e-Books and eMaterials for web-based usage of the students and the cost of the virtual seminar. The costs will be presented separately for investment and recurrent costs. The recurrent costs are subdivided into the costs for the three phases: preparation and planning, development and implementation. At the beginning we will give an overview of the budget expenditure and the financing of the programmes shall be provided.

5.5.2.2.1 Financing and budget expenditures

The programme is financed from the normal budget allocation of the centre (and the university) and reimbursed by the students' tuition fees of about € 1,350 per student. The programme will start for the first time in the winter term 2002/03 with an expected number of 50 students so that the (expected) revenue will be € 67,500 for the first semester. If the number of students is in that range for the later sessions and the tuition fee left unchanged the maximum income per year would be € 270,000 per annum.

If the number of participants per virtual seminar exceeds 25, most of the courses will be divided into two sub-groups.

5.5.2.2.2 Investments

The only investment is a template of about € 3,000, that in the medium term shall be applied for other online programmes as well. If the first 'edition' can be used, for example, for two years without further development or other costs, the annual costs are € 1,500.

5.5.2.2.3 Budgetary and non-budgetary costs of the project

For the following calculation of the costs of the project it is divided into three phases and a number of activities.

Project phases

The preparation of the study programme lasted for about a year and started in autumn 2001. The implementation phase will start in October 2002 with the first group of students.

1. Costs for preparation and planning

The total period of preparation and planning lasted roughly one year and comprised curriculum development and the identification of the authors etc. However, at the moment the status of the programme is still unclear so that drafting and/or an adjustment of study and examination regulations is not yet incorporated. One centre staff member is responsible for the preparation and planning as well as management and administration of the programme. Thus, the immediate costs of the centre for this phase are € 50,880 for the one year. Yet, if we assume that establishing the programme is not the only task but that at least some time of the project manager is directed towards other projects and issues, particularly overhead costs, the programme's costs are less. Assuming that at least 10 to 20 % of his work load are to be accounted for other purposes, the costs would decrease to € 40,000 to € 45,000.

Project planning: is the only task to be considered under the first phase of the project. However, it was not specified during the interview and will have required only a few days as the programme is not that big and the centre and its staff are experienced with these kinds of projects. Thus, an approximation of the time input for project planning would be in the range of 2 to 3 days, costing some € 550 to 700.

Neither the **preparation of an application** nor the **selection of investment goods** has to be undertaken as this is part of the normal programme of the centre and hard- and software is available, except for the template which surely does not require much time for selection.

Preparatory talks cannot be estimated separately. There is an ongoing discussion process within the centre which results in such new study programme offers. However, this steady discussion makes it impossible to specify the time that is spent on the study pro-

gramme under investigation. These talks have to be considered as overhead costs and are covered by the presentation of the previous chapter.

Staff recruitment: most of the project staff are external staff (authors and moderators) whose recruitment is considered as part of the administration and management duties of the project manager. However, some of the authors and moderators are already known in advance so that the time input is not that much.

Adding up, the costs for preparation and planning are close to zero as most of the task considered under this headline are to be regarded as overhead costs.

2. Costs for development of online courses/materials

Preparation of concept and design: From the viewpoint of each course the costs for preparing concept and design is an overhead cost because this is not developed specifically for a certain programme or course but once developed and then uniquely applied to all programmes. Furthermore, it is said that the general approach is further developed on a continuous basis.

Media-related didactical preparation: comprises development and realisation and takes 2 to 3 weeks per module and covers approximately 100 pages (DIN A4). The didactical preparation is done partially internally and partially externally. The costs are estimated to be on average € 3,000 per module, although it depends on the size of each module. If this was done totally externally, the costs would be estimated to be approximately € 12,800 per module. Thus, the total costs of the media-related didactical preparation are approximately € 45,000 instead of € 192,000.

System development: is part of the overhead costs due to the fact that the centre offers a number of online courses and courses with online elements, respectively.

Content development: As this is a completely new programme it was necessary to develop the content newly for all 15 modules. This was undertaken by external staff. As each author received a fee of € 5,000, the cost for the development of all modules was € 75,000.

Development of eMaterials and eBooks: The content which is delivered by the authors has to be prepared for use on the Internet and hyperlinks are to be integrated etc. The time input could not be specified during the interview as it was not written down by those involved and depends on the particular module to be prepared. A rough approximation would be to assume that the average time requirement for each module might be in the

range of five days. As the number of modules is 15 the total time input would be 75 days. The total costs would add up to € 17,300 for all modules and approximately € 1,550 per module.

Staff training: is obligatory for every new lecturer and moderator and comprises one or two sessions of two hours each to provide basic information on the centre's general understanding about online seminars and on the particular seminar. The (total) costs are up to € 215 for half a day of the (external) moderator(s) and the project manager. However, the opportunity costs for the centre are only € 115 for the time input of the project manager. The time input of the moderator is settled with the (lump sum) contract. The total time spent for training all new moderators might be half a day for all of them or half a day for each of them depending on the particular needs of the moderators. Anyhow, the costs are very low and, thus, negligible.

The **preparation of manuals and tutorials** has to be considered as part of the overhead costs because it is undertaken for all online-based instruction and not separately for the several study programmes.

The time requirements for **project management and administration** were not specified directly during the interview. The tasks of the project manager were considered to be (more or less) one overall responsibility where a specification would only be possible if the time had been written down.

However, an approximation of the time input would be possible on the basis of the experiences of the other case studies. For large-scale projects the administration and management effort covered at least half of the workload of the project manager, which is below 10 % for small projects. This study programme can be regarded as a medium-sized project. To get a rough estimate for this project is difficult, as there are two contradictory impressions. The first is that the programme is not that big, whereas the second refers to the impression that a number of external staff are involved, which requires more administration effort than other projects. Based on these figures it seems appropriate to suggest a share of 20 to 30 % of the manager's workload for administration and management. As the two phases of preparation and planning and development have to be considered together and lasting one year, the costs are between € 10,400 and 15,000.

Adding up, the costs for the development of the whole study programme are approximately € 150,000 or on average € 10,000 per module.

3. Costs for piloting and implementation

The costs for implementing the virtual seminar the time and costs input for **student advice and support** cannot be specified clearly at the moment as the course is about to start in winter term 2002/03. However, it is expected that the costs will be in the range of the other virtual seminar. This means that the costs per semester and seminar will be at around € 1,600. If the students are required to take 3 to 4 major modules a group of 50 students will require roughly 5 seminars each semester with total costs of about € 8,000. Thus, the annual costs can be expected to reach € 16,000.

Evaluation of the platform: As the platform is used for all programmes this will be an overhead cost for the programme under consideration here.

Evaluation of the courses is done generally in the last week of the course. The review is undertaken by an online questionnaire which is obligatory for all courses and not a special requirement for online courses. The costs of the external moderators are fixed and do not differ for this course. It should therefore not be considered as (special) costs of eLearning.

In contrast to the virtual seminar presented in the previous section the expenditure for **public relations and marketing** can be specified here. For developing a brochure, placement of an advertisement and an e-mailing campaign roughly € 3,000 were spent.

Project controlling is part of the project manager's duty but the time requirements cannot be specified.

Maintenance of the system is part of the overhead costs, specified above.

System administration is part of the overhead costs because of the fact that it cannot be specified for this particular programme but is undertaken for all programmes.

Content updating: As the programme is about to start in winter term 2002/03 there is no experience on the expenditure for content updating up to now.

Project management and administration is the major duty of the project manager, whose only responsibility (more or less) is to care for this study programme. However, all academic staff and project managers are also part of the overall centre and have to cater for it as well. Thus, the time the project manager spends on the management and administration of the course is below 100 % without the possibility of specifying whether it is 80 or 90 %. Therefore, the annual costs can be assumed to be in the range of € 40,000 to 45,000. Furthermore, there will be also some other tasks to be carried out further reducing the time spent for management and administration.

Looking at the other programmes presented as case studies in the investigation at hand, the 'real' time input for administration and management of 'middle size' programmes is somewhere between 20 and 30 %, so that the time requirement for this task would be between 45 and 65 days annually, adding up to costs between € 10,400 and € 15,000.

Adding up the costs for the implementation and provision of the course the costs are between € 25,000 and 30,000, based on the previous specifications. Another € 3,000 has to be added for marketing purposes.

5.5.2.2.4 The total cost of the 'Hypermedia programme'

The costs for preparation/planning and development are roughly € 150,000. Another € 3,000 each were spent on marketing and for the template. Thus, if we add up these costs we arrive at € 156,000 which are the investment and fixed costs. These costs have to depreciated over the live time of the study programme. For example, assuming a period of five years the annual costs would be some € 31,200 per annum.

The recurrent costs are calculated to be up to € 30,000, so that the average annual costs are some € 61,200.

5.6 Technical University of Darmstadt: Mathematic Didactics

5.6.1 Project description

The newly-developed online seminar was offered as a traditional classroom-based seminar for about 10 years. The platform Visum which is used for the project was developed as part of a project funded by the federal programme "New media in education" and conducted by the Universities of Münster, Würzburg and Hannover. The course mathematic didactics itself is not part of this programme but is considered as a co-operation partner.

The course is a practical tutorial for students studying in the first and second stages in order to become teachers. The aim of this special course is that the students start very early with media-based instruction. Practically-oriented content is repeated and mathematical tasks are learnt in several forms.

With this course students can get a certificate (credit points) for successfully finalising it, either as a so-called Mittelseminar, a fachdidaktisches Seminar or as a Zusatzqualifikation für die Förderung mathematischer Schüler (additional qualification for the development of mathematically-gifted pupils). The latter is considered as a special incentive for students to participate. At the moment, the course is a regular offer of the university without tuition fees. However, it is expected that the course will be offered as further education course for teachers. In this case the licence fee would be € 100 for schools p.a. while the fee for the teachers has not been specified yet.

The course consists of 6 modules of 6 hrs. each. In addition, at the end of each module, the students can participate voluntarily in a face-to-face seminar. Furthermore, an eBook is to be prepared which is partially the outcome of the former traditional course. In addition to the online tutorial, students can participate in online discussions. It is expected that up to 30 students will participate in the course and that one third of them are students in their stage I studies and two third in their stage II studies.

Integration into the study and examination regulations was not necessary as the course fits in the existing regulations. The tutorials consist of tasks containing animation and interactivity and internet-based research. Up to 3 students can co-operate in a group.

5.6.2 Financing

The project is mainly conducted as part of the normal duties of Professor Bruder and her Department at the university. Thus the preparation and provision is done mainly by

normal staff for which additional funding is not required. However, some additional funding is provided by the Technical University of Darmstadt for 200 hours of student support staff (SHK) for developing the online seminar. This adds up to approximately € 5,100,[51] provided out of a funding scheme for "New Forms of Instruction" (Neue Lernformen). The remaining input of student support staff is done by normal staff that is also funded by the TU Darmstadt, though through normal allocation.

Furthermore, an assistant researcher is funded by Deutsche Forschungsgemeinschaft (DFG). 30 % of his time is spent for project involvement, this is worth approximately € 10,000.

Another six students supported the project by providing content through their final theses. Each of these studies comprised a time input of at least three months with 30 days a month.[52] Therefore, the total time input of these "thesis students" is estimated to be 540 days (estimated fee € 90 per day) in total, and thus worth € 48,600. Anyhow, this is not money to be spent, i.e. this is a cost not an expenditure.

Finally, an administration officer is involved with 5 % of their working time. This adds up to cost of € 1,700. Thus, the additionally allocated funds are about € 15,000. The major share is funded by normal budget allocations.

5.6.3 The costs of providing Mathematic Didactics

In this section we will present the costing of the project which is mainly to prepare an eBook and to be run as an online tutorial for the students. The costs will be presented separately for investment and recurrent costs. The recurrent costs are divided into the costs for the three phases preparation and planning, development and implementation.

5.6.3.1 Investments

The required investments are very low compared to other projects. One workstation was purchased costing € 1,600. If the course runs for a number of years as it is planned the annual costs will depend on the depreciation period. We assume that the depreciation period is four years, so that the annual costs are € 400.

[51] Relying on our unified salary scheme this would amount to € 5,300, while € 15,000 were provided by the TU Darmstadt.

[52] It seems to be realistic to suggest that students writing their final thesis will spent at least three months without a break on their thesis. Alternatively, one might expect that the 'real' time for the preparation of the thesis requires more than three months.

Furthermore, there are some minor software investments. Euklid was bought for € 500 and the Blackboard license costs US$260 per year. Though these costs are very small and are generally to be considered as a recurrent expenditure, we present them here to provide a full picture.

5.6.3.2 Budgetary (recurrent) expenditure

Personnel expenditure

As already discussed there are a number of staff involved in developing and running the online course 'mathematics didactics' but most of them are not funded separately, i.e. no additional expenditure arises. The only budgetary expenses are for one student support staff (approx. € 5,100) and an assistant researcher spending 30 % of his work time on the project.

Thus, the budgetary expenses add up to some € 15,000. Yet, the costs of the project are much higher.

5.6.3.3 Budgetary and non-budgetary costs of the project

For the following calculation of the costs of the project this is divided into three phases several and a number of activities, as for the other case studies.

Project phases

The course will be run in the winter semester 2002/03 for the first time, so that the implementation phase is supposed to start on October 21, 2002 and will last until February 14, 2003. For the other two phases there is no clear demarcation line to separate them. As it is a smaller project the preparation and planning phase does not comprise much time to that there is no need to clear by divide them. The project started in early 2002.

1. Costs for preparation and planning

Project planning: Took place for about two days due to the fact that this is a small-scale project. This was done by the supervising professor and (time) costs are, thus, € 844 in total.

Application preparation: For the financing the project only one smaller application for internal support of the TU Darmstadt was prepared. It is estimated that the time input was 2 days, costing (time) of another € 844.

Selection of investment goods: For this task the professor spent five days, costing € 2,110 which € 500 were spent on travel. Furthermore, there are five days input of Tele-TUD, a university organisation (Liebe Frau Bruder, können Sie kurz ausführen, was TELE-TUD macht bzw. was deren Aufgaben sind.). Assuming that the respective staff is more or less equal to academic staff of category BAT IIa, these costs are about € 1,250. The total costs, therefore, add up to € 3,850 in total.

Preparatory talks: Professor Bruder estimated a time input for preparatory talks to be 10 days for herself and 3 days for academic staff, adding up to roughly € 4,900.

Development of a business model: At the moment the course is embedded in the normal course supply of the TU Darmstadt so that there was no need to develop a business model. However, there is the intention to offer this course as further education course for teachers in future. To develop and specify this idea one day was spent and considered as time for developing a business model. Opportunity costs are just € 422.

Organisational and structural adjustments: Only minor adjustments were necessary, requiring one day with time costs of € 422.

Staff recruitment: Another day was spent for the recruitment of new staff. The costs are € 422.

Project administration and management: The requirements for project administration and management were very small. Prof. Bruder herself spent 3 days and the corresponding costs are € 1,266. She was assisted for about 1.5 days by an administration officer for unspecified duties. This adds € 220, adding up to less than € 1,500.

Conference and fair visits: Ms. Bruder spent 6 days at several conferences and fairs. The time costs were approx. € 2,530 supplemented by € 500 for travel and € 100 participation fees. In total, this amounts to € 3,130.

The total costs for preparation and planning the online course "Mathematic didactics" add up to nearly € 16,650, although this is a comparatively small project. The budgetary expenditure was only € 1,100 for travel and conference fees. This highlights that even smaller projects are linked to serious (opportunity) costs which might often be underestimated.

2. Costs for the development of online courses/materials

Preparation of concept and design: Ms. Bruder spent 20 days for the preparation of the concept and the design of the online course. The respective (time) costs are € 8,440. This includes the time for didactical preparation:

System development did not take place as part of the project under consideration here. However, some system development was done by the VISUM-project. This was estimated to be worth € 5,100 for the project.

Content development: Most of the time input during the second phase is spent on content development, although most of the content was already available due to the traditional classroom-based course. One student support staff spent 30 to 65 days. The costs are therefore € 5,850, but this is not all.

A major input came from six theses of three months duration each. Assuming that the students spent three months without weekends (or – perhaps more realistically – extended the time for preparation over the three months 'in fact') their input is estimated to be 90 days each or 540 days in total. Although they are not reimbursed for there input in monetary terms, this assistance has an enormous value for the project. On the basis of the daily fee rate for student support staff, this adds up to € 48,800.

Furthermore, input was also provided by an assistant researcher during the development phase. Although the tasks to be undertaken are unspecified we assume that this was mainly for content development. This would add another € 8,900 to the costs of content development.

Thus, the total costs of content development are about € 63,550 which is nearly half of the total costs of the project.

Development of the media: One eBook was prepared, requiring five days of academic staff and another 12 days of student support staff. The corresponding costs of preparing an eBook is € 2,235, which is not more than 2 % of the overall project costs.

Another five days were spent by student support staff to develop the environment for the tutoring approach. Due to this relatively small time input the costs were only € 540.

Preparation of (additional) materials: Student support staff spent 10 days for the preparation of additional materials, costing € 900.

Staff training: Staff training took place in the form of three meetings of two days each. Prof. Bruder and one academic staff member were involved, as well as four student support staff. This adds up to costs of € 6,080.

Preparation of manuals and tutorials: Five days were spent by student support staff to prepare a tutorial for the students. Costs: € 450.

Project management and administration: Prof. Bruder estimated that she spent 45 days during the development phase for management, administration and particularly supervision. The corresponding costs are nearly € 19,000.

Adding up all costs for the development of the online course "Mathematics Didactic" this amounts to approximately € 105,300 which is roughly 70 % of the overall project costs.

3. Costs for piloting and implementation

Before going into the details it should be highlighted that the figures to be presented in this section are just rough and preliminary estimates, because the online course is due to start on October 21. The findings may thus be open to change.

Student advice and support: Due to the fact that the course will be run as an online tutorial, most time during the implementation phase will be spent on student advice and support. This is estimated to require 16 days during the winter term or one day per week of Prof. Bruder. Another half a day is expected to be spent by an academic staff member, which adds up to 8 days during winter term. Thus, the costs for student advise and support are in total € 8,600.

Evaluation: Evaluation of the seminar will take place in three steps to measure the effect of the course. Student performance will be measured at the beginning of the course, during the seminar and at the end. For the preparation of the test and its analysis Prof. Bruder expects a timely input of one day for herself and three days of student staff. The costs for evaluation are therefore € 1,123.

Staff training for implementation does not take place as there is no other staff involved that need to be trained:

Public relations/marketing: An administration officer is involved in PR and marketing activities which at the moment is not an important issue. This may change when the course is to serve for teachers' further education which shall take place in the future to gain income. However time costs at the moment are € 290.

Content updating:: It is expected that five days will be required to update the content regularly when the course is to be run another time. Thus, the cost are approx. € 2,100 every six months. (Frau Bruder ist dies richtig, oder bezieht sich das auf eine jährliche Betrachtung?)

Project management and administration: During the implementation phase project administration is not an important issue and expected to require only one day in the winter term. Thus, the costs are just € 422.

Nearly all of the **total costs** presented here for the implementation phase can be considered as running costs that would arise every semester the course is running. The costs add up to nearly € 12,500 and are less than 10 % of the total costs. Furthermore, this amount is a cost but not an additional expenditure

5.6.3.4 Summary of costing

The total cost of developing the online course "Mathematic didactics" add up to approx. € 139,600, which seems to be a lot when taking into consideration that only one course is the outcome of it. In contrast to this figure the additional budget allocation is just € 15,000, merely 11 % of the costs. Out of this only € 7,750 (5.5 %) are non-personnel costs, while around € 131,850 (92.8 %) are personnel costs. The remaining € 2,350 or 1.7 % are investments in hard and software.

The costs are distributed over the three project phases:

	preparation and planning		**development**		**implementation**		**total**	
	in €	in %	in €	in %	in €	in %	in €	in %
Investments	2.350	1,7 %		0,0 %		0,0 %	2.350	1,7 %
personnel costs	13.993	10,0 %	102.968	73,8 %	12.545	9,0 %	129.506	92,8 %
non-personnel costs	2.650	1,9 %	5.100	3,7 %		0,0 %	7.750	5,6 %
Total	18.993	13,6 %	108.068	77,4 %	12.545	9,0 %	139.606	100,0 %

Table 8: The costs of "Mathematic Didactics" at the TU Darmstadt

The major share of the costs is spent on the development of the online course (75 %) and particularly for content development (45,5 %). This is somewhat surprising insofar as it was said that most of the content was already available at the beginning of the project.

If all the costs arising during the first two phases were considered as investment costs, this is a little bit more than € 127,000 or 91 % of the total project costs. Only a mere 9 % of the total costs arise as recurrent costs. However, the additional recurrent budget allocation might be close to zero, as no additional staff has to be deployed.

5.7 Co-operation project: Technical Informatics

5.7.1 Project description

This project is funded by the federal programme "New Media in Higher Education" and is a co-operation project of 11 universities, 1 university of applied science, and 2 occupational associations: (Gesellschaft für Informatik, Gesellschaft für technische Informatik) and Siemens as an adjunct partner (Verbundpartner). Finally, the aim of the project is to provide the whole content for technical informatics as content for eLearning solutions.

This content shall be available as a building block system (Baukastensystem) of modules where each module is scalable in three dimensions according to level of difficulty:

– Intensity: content can be used for introductory purposes as a lecture of 2 hours; for advanced courses (4 hours lecture and 2 hours tutorial) and a version for consolidation (Vertiefungsversion) with 8 hours of lectures and 4 hours of tutorials;
– Target group orientation: depending on who is the target group, such as questions for examinations (e.g. for students) or answers (e.g. for lecturers or instructors), the content based from the viewpoint of those looking at it;
– Media of instruction: the modules can be used in a number of medial approaches: as PowerPoint-slides for face-to-face learning, as xml or as fully functional multimedia version in html (containing hyperlinks to other sources) as well as simulations. Finally, it can be used as a printed version for self-study.

As these three dimensions can be combined with each other the project, arrives at 18 different approaches. Furthermore, the project programme applies all medial approaches, i.e. on the first level computer-based and web-based approaches and on the second level eMaterials and eBooks, teleteaching and tele tutoring as well as audio-video. As the decision on which medium will be applied is handed over to the responsible project partners, it is difficult to state what the share of the overall project programme will refer to which medial approach.

The project aim is to develop a total number of 150 modules which cover the full spectrum of information on technical informatics. Even if there might be some overlapping between these 150 modules, the particular approach might be different. This is due to the particular purpose of the module, for example, lecture or tutorial or degree of interaction etc.

Due to this approach it is impossible to fix the expected learning time because this depends on the requests of the person relying on the materials.

The major benefit of the project is the re-usability of the materials and the general availability of such material. One preliminary success of this approach is that in recent times, some other (external) professors and lecturers already asked whether they could use the materials for their own purposes.

The target groups are students and lecturers/instructors in higher education institutions and for in-company-training. The occupational associations involved (Gesellschaft für Informatik, Gesellschaft für Technische Informatik) have agreed to rely on the material that is provided by the project. Furthermore, the content and media developed can be used for stage I and stage II studies.

Based on the number of students at the participating universities, the expected number of participants is up to 15,000 to 18,000 annually in the final stage of the project. However, based on the experiences of other universities, it is obvious that the number of students requesting these modules will finally be smaller than expected.

The motivation for starting and developing the project was, firstly, that the programme "New media for higher education" envisaged funds; secondly, a needs analysis of existing materials revealed that the available material had to be re-written for the project aim (the preferred flexibility with respect to the three dimensions of flexibility could not be realised), and, finally, the already existing vision of a notebook-university.

5.7.2 The costs of the project

In this section we will present the costing of the project, which is mainly to prepare e-Books and eMaterials for web-based usage of the students. The costs will be presented separately investment and recurrent costs. The recurrent costs are divided into the costs for the three phases preparation and planning, development and implementation.

5.7.2.1 Financing and budgetary expenditures

The project is funded by the programme "New media in higher education" of the Federal Ministry of Education and Research and was awarded with an amount of € 3.17 mill. (DM 6,2 mill). The funding is mainly for financing the costs of personnel while, in fact, overheads and most of the recurrent costs of this project are funded by the participating universities. However, as for most of the other case studies, it is impossible to specify these overheads and recurrent costs due to an insufficient accounting system.

In the long run the costs for further development and for the provision of the course programmes shall be financed by income generation, for example revenue from licensing or for further education measures etc. In fact, this might be restricted to a certain extent that other German higher education institutions cannot be charged due to corresponding regulations of the funding programme. An exemption in this respect might the so-called Mediennutzungsgebühr, a fee for the use of (new) media which is additional to the fees that are charged for study letters at the Fernuniversität Hagen. However, it has not yet been fully discussed and clarified how the programme shall be financed in future.

Out of the budget allocation 16.5 academic staff (category BAT IIa) are funded and 1.5 staff of category BAT III. Based on our unified salary scheme this would sum up to € 2.7 mill. Another roughly € 800,000 is spent on student support staff. As this would be more than the budget allocation it is obvious that some staff are not employed over the full project period.

5.7.2.2 Investments

As with most of the other case studies, investments are of minor importance for the project presented here. Total hardware investment is about € 12,270. This covers one server and 2 workstations for approximately € 6,135. About the same amount was spent on several goods that cannot be specified.

€ 6,350 was spent on software investments, i.e. € 715 for an authoring tool and € 5,625 for 23 XML-spies. The remaining software was already available.

It was highlighted that a major difficulty of the project was the inability to identify a platform that was good enough to satisfy the needs of the project. More than one year was spent and proved to be without success. At the moment, it is unclear how this development, that cannot be funded from project resources, shall be financed. Some opportunities that were envisaged might be sponsoring or public private partnership or through the programme "Notebook university" that is also funded by the Federal Ministry of Education and Research.

5.7.2.3 Budgetary and non-budgetary costs of the project

For the following calculation of the costs of the project this is divided into three phases and a number of activities.

Project phases

The project started officially in April 2001 and will last until March 2004. However, if we are to include also the time that has been spent on the preparation of the application, the overall project period considered in this study is longer. It is foreseen that the pilot phase will start in the summer semester 2003 while implementation will take place even later. Thus, more or less, the major issue that is covered in this case study is content development.

1. Costs for preparation and planning

The first three steps, **project planning**, **preparation of application and the selection of co-operation partners**: was undertaken as a joint effort so that the time input cannot be specified for each of these tasks. In total, 70 days were spent, 10 days of a professor and 60 days of academic staff, adding up to nearly € 13,900. The travel expenses which were around € 1,840 in relation to these three tasks can only be specified for staff of the University of Rostock. However, as the project comprises 11 partners, travel expenses for these preparatory meetings will be much higher. Even if they are not that high for the other partners it appears to be realistic to expect them to be in a range of € 8,000 to 10,000.[53]

Selection of investment goods: The real investment should not have taken much time due to the small number of goods purchased. However, as already mentioned, an important issue was the approach to select a learning platform what proved to be not possible due to an inappropriate performance for the project purposes. However, it is not possible to specify the time input that was necessary for this task.

Development of a business model: a business model has not yet been specified apart from what is mentioned in the previous chapter.

Staff recruitment: In contrast to most of the other case studies where this was not a big issue it is said to have been a relatively time-consuming topic. In total, the departments at the 11 universities spent 20 days on staff recruitment, which adds up to € 4,600.

Project administration and management: The fact that this is a project with a very high number of co-operation partners, expenditure for administration and management and particularly coordination, is very high. On the one hand, a project workshop takes place every six months and, on the other hand, every two months the coordinators meet for a smaller working meeting.

53 We have assumed that the average costs per meeting are € 250-300 per university. The number of meetings was three.

The project workshop is a meeting with about 35 people involved, i.e. 12 professors and 23 academic staff. This adds up to opportunity costs of approximately € 10,500 per day that this groups meets. Assuming that the meeting lasts for about 2 days (incl. travel) the opportunity costs per meeting are approximately € 21,500. If we include the travel expenses the total costs will be at least € 30,000 per meeting. As the group meets twice a year the annual costs are € 60,000 and over the whole project period (3 years) € 180,000.

For the second meeting, the smaller working meeting, 5 to 10 people meet every two months. Based on the information we got, it is assumed that the average number is 8 with 2 being professors. Thus, the (opportunity) costs per day are about € 2,230 while travel costs are estimated to be approximately € 2000. Again, it is assumed that each meeting lasts for about 2 days and takes place six times a year. Based on these figures the costs arrive at approximately € 25,400 annually or € 76,200 over the three years of the project.

Summing up the total costs of these coordination meetings we arrive at travel costs of € 78,500 and opportunity costs of about € 204,800. Thus, the total costs of the meetings are € 282,300 which is 9 % of the overall budget allocation.

However, even if this seems to be a lot in relation to the other projects we have not yet included the time required for day-to-day administration and management which cannot be neglected in a project of that size.

2. Costs for development of online courses/materials

The development phase started when the project started in April 2001 and will finally last until the end of the project in March 2004. As the phase for pilot runs will begin in April 2003 there will be some overlap between the project stages. All of the costs presented in following section are costs for personnel and are based on the project application.

Preparation of concept and design and screenplay: Particularly the latter required a time input of 220 days, which is not that much when taking into account that the project consists of about 150 modules. Thus, this translates into 1.5 days per module. The total costs for this task are about € 50,800.

Content development is the major task of the project. If we look at the whole project, a total number of 9,900 days will be spent on content development which adds up to 45 years. Therefore, the total costs for content development are nearly € 2,3 mill. Due to the project approach that hands over the responsibility for the specification of each module to

those who will prepare and develop it, it is impossible to specify the medial approaches that are selected.

Development of the media: cannot be specified but is said to be negligible

Adjustments of the platform: As already mentioned, it was planned to purchase a platform, which proved not to be possible due to insufficient performance of the platforms available on the market. Therefore, it was and is necessary to develop a platform that served the purpose of the project. As this task has not yet been fulfilled, the required time input can only be estimated on a very rough basis. This estimate arrives at 440 days or costs of € 101,640.

Adding up all costs for the development of this project we arrive at more than € 2.71 mill. which corresponds to a large extent to the costs for academic staff. However, a major problem of this case study is that the time requirements for the several tasks can only be specified on a very rough figure.

3. Costs for piloting and implementation

The costs for this phase cannot be specified yet and are obviously not really included in the project budget.

5.7.2.4 Total costs

Based on the figures presented in the previous section we arrive at total costs of approximately € 3,05 mill. which is very close to the budget allocation although we have included some time input for tasks that are not part of the project application. However, the major problem of the case study is the very rough specification of activities to be undertaken in relation to their time requirements.

This is not to say, that the estimated and applied for number of staff is too high (or too low) but the question is how did the project partners arrive at their estimates on the number of staff they needed to fulfil their project aim.

By looking at the list of activities where there is no specification on how much time is (to be) spent there seems to be a misrelation. No time adjustment for project management and administration, no time input for manuals and tutorials etc. is – from the viewpoint of someone who is outside the project – this is confusing and suspicious! However, if we translate the total costs of the project of about € 3.17 mill. into the average costs of each of the 150 module, we come up with approximately € 21,000 per module, which is not that much.

Literature

American Federation of Teachers (2001), A Virtual Revolution: Trends in the Expansion of Distance Education, http://www.aft.org/higher_ed/downloadable/VirtualRevolution.pdf.

Arvan, Lanny (1997), The Economics of ALN: Some Issues, in: Journal of Asynchronous Learning Networks (JALN), Vol. 1, Issue 1, March 1997, pp. 17-27.

Baltes, Beate (2001), Online-Lernen, Schwangau: Huber Verlag.

Bates, Tony (1995), Technology, Open Learning and Distance Education, London-New York: Routledge.

Bates, Tony (2000), Managing Technological Change, San Francisco: Jossey-Bass Publishers

Bates, Tony (2001), The Continuing Evolution of ICT Capacity: The Implications for Education, in: Glen M. Farrell (ed.), The Changing Faces of Virtual Education, The Commonwealth of Learning, Vancouver (http://www.col.org/virtualed/)

Bates, A.W., F. Berrigan, D. Brown, N. Durbridge, M.Gallagher, H. Grundin, V. Lockwood, and S. Rodwell (1981), Radio: the Forgotten Medium?, Milton Keynes: The Open University Institute of Educational Technology.

Bertelsmann-Stiftung und Heinz-Nixdorf-Stiftung (Hrsg.) (2000), Studium online, Gütersloh.

Blumenstyk, G. (2000a), How a Publishing Empire IS Changing Higher Education, The Chronicle of Higher Education, Sept. 8, 2000, p. 43.

Brockhaus, Michael, Martin Emrich, Antonella Mai-Pochtler (2000), Hochschulentwicklung durch neue Medien – internationale Best-Practice-Projekte, in: Bertelsmann-Stiftung und Heinz-Nixdorf-Stiftung (Hrsg.), Studium online, Gütersloh.

Coenen, Olaf (2002), E-Learning-Architektur für universitäre Lernprozesse, 2. Auflage, Reihe: Wirtschaftsinformatik, Band 34, Lohmar-Köln.

DeVeaux, P. (2000), Virtual Survey: An Overview of Some of the Leading Virtual and Online Universities, in: E-Learning Magazine, October, http://www.elearningmag.com/issues/oct00/virtual.asp

DiPaolo, Andy (2001), The Rise of a New Educational Industry: Lessons Learned in the Evolution of Online Learning, presented at the Distance Learning 2001 Conference, 10 August 2001, University of Wisconsin: Madison, (http://scpd.standford.edu/SCPD/js/brandingFrame/external.html)

Dohmen, Dieter (1999), Ausbildungskosten, Ausbildungsförderung und Familienlastenausgleich – Eine ökonomische Analyse unter Berücksichtigung rechtlicher Rahmenbedingungen, Duncker & Homblodt Verlag, Berlin.

Downes, Stephen (n.d.), The Economics of eLearning, (www.atl.ualberta.ca/downes/future/econonmics.htm)

Encarnação, José L., Wolfgang Kraemer, August-Wilhelm Scheer, Dennis Tsichritzis (2000), Technologie und Infrastruktur: Standardisieren schafft Vorteile, in: Bertelsmann-Stiftung und Heinz-Nixdorf-Stiftung (Hrsg.), Studium online, Gütersloh.

Evans, S. (2000), Net-Based Training Goes the Distance: Employers Find E-Learning Saves Costs, Time, The Washington Post, May 15, 2000, p. 20

Farrell, Glen M. (2001), Introduction, in Glen M. Farrell (ed.), The Changing Faces of Virtual Education, The Commonwealth of Learning, Vancouver (http://www.col.org/virtualed/)

Glotz, Peter, Herbert Kubicek (2000), Finanzierung virtueller Studienangebote, in: Bertelsmann-Stiftung und Heinz-Nixdorf-Stiftung (Hrsg.), Studium online, Gütersloh.

Glowalla, Ulrich, Heinz Lothar Grob, Rainer Thome (2000), Qualitätssicherung virtueller Studienangebote, in: Bertelsmann-Stiftung und Heinz-Nixdorf-Stiftung (Hrsg.), Studium online, Gütersloh.

Glowalla, Ulrich, Gudrun Glowalla, Alfred Kohnert (2001a), Evaliis – Evaluation interaktiven Studierens. Studierverhalten im Präsenzveranstaltungen und mit Online-Bildungsangeboten, Bertelsmann-Stiftung und Heinz-Nixdorf-Stiftung (Hrsg.), Gütersloh.

Gottwald, Franz-Theo, K. Peter Sprinkart (2000), Multi-Media Campus: die Zukunft der Bildung, Regensburg, Düsseldorf: Metropolitan-Verlag; Walhalla-Fachverlag.
Hagenhoff, Svenja (2002), Univerrsitäre Bildungskooperation. Gestaltungsvarianten für Geschäftsmodelle, Wiesbaden: Deutscher Universitäts-Verlag.
Hesse, Friedrich W., Heinz Mandl (2000), Neue Technik verlangt neue pädagogische Konzepte, in: Bertelsmann-Stiftung und Heinz-Nixdorf-Stiftung (Hrsg.), Studium online, Gütersloh.
Hülsmann, Thomas (2000), The costs of open learning: a handbook, Oldenburg: Bibliotheks- dn Informationssystem der Universität Oldenburg.
Hülsmann, Thomas (2002), The costs of online teaching. A cost-analysis of two certificate programs by the Center for Distance Education (ZEF) at Carl von Ossietzky University (Germany) within the UMUC Master of Distance Education program. A case study, mimeo, Oldenburg
Inglis, Alistair (1999), Is online delivery less costly than print and is it meaningful to ask?, in: Distance Education, Vol. 20, No. 2, pp. 220-239.
Jamison, Dean T., Steven J. Klees, Stuart J. Wells (1978), The Costs of Educational Media. Guidelines for Planning and Evaluation, Beverly Hills-London: Sage Publications.
Kiedrowski, Joachim von, Andreas Preu (1999), Internetbasierte Lerneinheiten: Produktion und Organisationsmodell, in: Bertelsmann Stiftung, Heinz Nixdorf Stiftung (eds.), VIRTUS – Virtuelle Universitätssysteme. Jahresbericht 1998/1999, Gütersloh.
Lawrence, Shannon (2001), Typology Overview for Organizational and Funding Models in E-Learning, paper prepared for "University Teaching as E-Business? Research and Policy Agendas at the Center for Studies in Higher Education, University of California, Berkeley, (www.ishi.lib.berkeley.edu:80/cshe/projects/university/ ebusness/ typology_map.pdf)
Massy, William F. (2000), The ABCs of Course-Level Costing, paper presented at the Conference "Cost Containment and Continuous Improvement in Higher Education", Columbia, MO, September 27-28, 2000, (www.nwmissouri.edu/sloan/CostBook/CourseLevelCosting.html).
Moe, M. and H. Blodget, 2000, The Knowledge Web, New York: Merrill Lynch.
Morgan, Brian M. (2000), Is Distance Learning Worth It? Helping to Determine the Costs of Online Course, (http://webpages.marshall.edu/~morgan16/onlinecosts/distance _learning.pdf)
Overland, M.A. (2000), Carnegie Mellon U. Will Offer Online Programming Classes in India, The Chronicle of Higher Education, November 17, 2000, p. A47
Phipps, Ronald A., Jane V. Wellman (2001), Funding the "Infostructure". A Guide to Financing Technology Infrastructure in Higher Education, Lumina – Foundation for Education: New Agenda Series™, Vol. 3, No. 2, April 2001.
Rosenberg, Marc J. (2001), e-Learning: Strategies for Delivering Knowledge in the Digital Age, New York u.a.
Rumble, Greville (1989), On-line costs: interactivity at a price, in: R. Mason and A Kaye (ed.), Mindweave: Communication, Computers and Distance Education, Oxford: Pergamon.
Rumble Greville (1997), The Costs and Economics of Open and Distance Learning. London: Kogan Page
Rumble, Greville (2001), The Costs and Costing of Networked Learning, Journal of Asynchronus Learning Networks (JALN), Vol. 5, Issue 2, September 2001, pp. 75-96.
Sacke, Nick, William L. Simon (2000), Improving the Return on Investment for Organizational Training, in: Michael Christ, Gernold P. Frank, Burkhard Herold (ed.), E-Learning mit Business-TV, Braunschweig-Wiesbaden: Vieweg
Schellhase, J. (2001), Entwicklungsmethoden und Architekturkonzepte für Web-Applikationen, Wiesbaden
Schulmeister, Rolf (2001),Virtuelle Universität – Virtuelles Lernen, München-Wien.
Seibt, Dietrich, Olaf Coenen (2001), Costs and Benefits of E-Learning Arrangements, paper presented at the conference "E-Learning and Economics", Trier, September 13-14, PowerPoint-Presentation.
Stahmer, A. and L. Green (1993), Analysing Costs/Benefits of Training Technologiges: Some Guidelines, Toronto: The Training Technology Monitor.
Tiemeyer, Ernst (2001), E-Learning Projekte erfolgreich managen, in: Andreas Hohenstein, Karl Wilbers (Hrsg.), Handbuch E-Learning. Expertenwissen aus Wissenschaft und Praxis, Köln.

Turoff, Murray (1997), Costs for the Development of a Virtual University, in: Journal of Asynchronus Learning Networks (JALN), Vol. 1, Issue 1, March 1997, pp. 28-38.
Wagner, L. (1982), The Economics of Educational Media, London: Macmillan.
Western Cooperative for Educational Telecommunications (WCET 2001a), TCM – Technology Costing Methodology Handbook, Version 1.0, Boulder, Col.
Western Cooperative for Educational Telecommunications (WCET 2001b), TCM – Technology Costing Methodology Casebook 2001, Version 1.0, Boulder, Col.
Western Cooperative for Educational Telecommunications (WCET 2001c), TCM – Tabulator Tool, Version 1, Boulder, Col.