

UNIVERSITY OF OSLO
Department of Informatics

**Learning to Use
Spreadsheets**

**An Empirical Study of two User
Training Courses**

Cand. Scient. Thesis

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Abstract

The research in this thesis focuses on the users of spreadsheet (Excel) and those who teach it. Several investigations have shown that *user teaching* and *follow-up* of users are important factors to achieve reasonable and effective use of the technology. Other research also show that extensive use of a program such as Excel is necessary if one is to be an expert-user.

How can training strategies facilitate end-users to become effective users of computer programs? This thesis presents how computer training is conducted at Rikshospitalet and Oslo Katedralskole.

Observation of two spreadsheet courses at Rikshospitalet was conducted and a questionnaire was administered to the participants after the course.

Results in this thesis indicate that the participants had difficulties understanding that a cell is dynamic and that it can retrieve information from the other cells.

A factor that may play an important role in the use of spreadsheets is lack of basic background knowledge of mathematics and/or statistics.

After returning to their work, a large quantity of the participants encountered problems in Excel that they would like to have explained by an instructor, and therefore would like to have a *follow up* session after the course.

My observations and findings therefore show that a follow up session after the course would substantially increase the quality of the spreadsheet training.

1 Introduction

During my studies at the University in Oslo, I attended a course in statistics. In this course we used Excel to do some of our assignments. I experienced that even though almost everybody had used Excel before, and several of the students had studied Informatics for some time, everybody encountered difficulties when doing these assignments and needed help with Excel. I felt that, for us students, there was a need for an introduction to Excel.

At first glance Excel looks and seems easy enough to use. Even though I have never attended an Excel course, it was easy to use for simple actions. But after a while I understood that this program has many possibilities as an aid in what ever work one does, (with numbers). We just have to learn how to use Excel in the best way.

Today spreadsheet programs are widely used all over the world. It is not used only by people in the financial world. Even schools teach use of spreadsheets to their pupils. The pupils use spreadsheet in mathematical classes and in economy classes.

Even though so many people learn to use spreadsheets, they do not know the full potential of the program and/or they find it too complicated to use.

Nilsen et. al. (1993) followed a group of students over a 16 month period as they progressed from novice to expert users of Lotus 1-2-3. They examined the learning of Lotus 1-2-3 in a course over 16 months. The students were taught Lotus 1-2-3 using a paper based tutorial. The duration of the tutorial was about an hour, where the instructor gave a five-minute introduction on how to access Lotus 1-2-3, and then ask the students to work through the tutorial at their own pace.

In 1989, Carlsson found that only *three* out of fourteen who were given spreadsheet training continued to become spreadsheet users. This raised the question of why people, who have been given spreadsheet training, do not use it in their work. He discovered that the participants had learned to use the spreadsheet program, but was not taught how to use it for their

specific work. For some the problem was that the company management had put restrictions on what information would be available for which employees. PC users were not allowed to download data from the mainframe systems. Other employees needed to modify their job to be able to use the spreadsheet program. The making of a spreadsheet model takes time, and they did not think they could free necessary time. Some felt that the critically support needed from management, superiors, colleagues and computer support personnel was inadequate.

Herskin states in several of his books that a problem with training is that it has not enough focus on the participants work. The spreadsheet is supposed to aid them in their work, and therefore Herskin points out the necessity to make it clearer for the participants how to use the program to be an aid in their specific work.

1.1 Focus area

Several articles point out the importance of having employees who know how to use the company's computer system, and know how to do it effectively, (Carlsson, 1989, Nilsen, 1993, Sein, 1998).

Despite high dollar investments in end-user training there is little evidence of effective results, (Nelson, 1995). To try and find a reason for this I conducted an investigation of people learning a spreadsheet program (Excel).

I will base my thesis on the following problem:

- 1. What aspects of Excel are difficult to learn?**
- 2. Why is it difficult to learn spreadsheets?**
- 3. How is Excel teaching done practically?**
- 4. What do the trainers think is the problem?**
- 5. What could be done to make it easier to learn a spreadsheet-program?**
- 6. How do the educators evaluate spreadsheet training?**

I solve the questions by observations, questionnaires and interviews with instructor and the responsible person for courses at RH. The participants at the courses express themselves through the questionnaire.

Questionnaires, interviews and observations were conducted in Norwegian and, when referred to in the thesis, translated to English.

1.2 Target group

I wish this thesis will shed light on issues that can be addressed to make computer training courses more effective when it comes to the learning outcome for the participants. The thesis is written for institutions, which instruct computer program courses, those who buy these services and persons who find themselves in a teaching situation.

1.3 The structure of the thesis

The rest of the thesis is presented as follows;

Chapter 2: Theory and Spreadsheets; describes some of the main literature on the subject of learning and teaching computer programs.

Chapter 3: About the actual courses; gives some background on Rikshospitalet and Oslo Katedralskole where I did my research.

Chapter 4: Research in Information Systems; describes methods used when conducting research in Information Systems.

In Chapter 5: Choice of methods; explains my choice of methods when conducting the research.

In Chapter 6: Findings; presents the results from my investigation.

In Chapter 7: Conclusion; sums up the thesis and my results, and suggest further research.

2 Theory and Spreadsheets

"The first spreadsheet program which was made, VisiCalc, was designed by D. Brinklin. The main reasons for why the spreadsheet became so successful are because Brinklin understood what kind of tool would be useful for people in the financial world and he knew how to design it in a way that these people would find useful. That is; he knew the kind of activities involved in the financial world and the kind of problems people experienced with existing tools when trying to achieve these activities"

(Preece, *et al.* 2002).

A teaching situation will always be restricted by external factors. Resources in form of time, money or personnel will often be limited. To make the total quality of the tutoring as good as possible, it is important that these restrictions are not too strict. Resources to do preparations, carry through and follow up of the students must be set a side. (Larmerud, 1999).

Nelson and colleagues (Nelson, 1995) have studied the Assessment of End-User Training. They found that studies estimated that of the \$50 billion that U. S. organizations spend on training annually, well over \$5 billion is directed toward the users of information technology. Despite the high dollar investment in End-User training, there was little evidence of verifiable returns or effective results.

The American Society for Training and Development found that organizations conducted training-needs-assessment less than 50% of the time. "When taken in aggregate, these studies present a rather discouraging scenario; the inputs into the training process are often not systematically evaluated. Therefore, a great deal of money and effort may

be going into programs that refer a precarious and ineffective “Random-in, Random-out” approach to training” (Nelson, 1995).

2.1 Spreadsheet

A spreadsheet is the computer equivalent of a paper ledger sheet. It consists of a grid made from columns and rows. It is an environment that can make number manipulation easy and somewhat painless. Spreadsheets are designed to work well with numbers, but often include text. (User guide, University of South Dakota). Spreadsheets can help organize information, like alphabetising a list of names or other text or reordering records according to a numeric field. However, spreadsheets are more often used for calculations, such as totalling a column of numbers or generating a more sophisticated formula to calculate some statistical measure on a list of numbers. *“Without the formula, the spreadsheet is merely a static representation, lacking the recalculation function used in “what if” analyses, the hallmark of spreadsheet software.”* (Nilsen et al. 1993).

Excel

The capacities of Excel are as follows. It can have 256 columns of information, and it can have up to 16,384 rows. That comes out to over 4,194,000 cells of information and that's only on the first sheet! You can have 16 sheets of information in one workbook, and the number of sheets can be increased, if needed. Excel refers to each file as a workbook, because there can be multiple sheets (pages) in one file.

Spreadsheets are made up of columns and rows and their intersections are called cells. A *cell* can contain the following types of data; *text* (labels), *numbers* (constants) and *formulas* (mathematical equations).

Formulas are entries that have an equation that calculates the displayed value. The equation will be updated upon the change or entry of any data that is referenced in the equation. One usually enters the cell location where the data is stored and not the data (numbers) itself. For example, one would enter B45 and not the constant 367 which the cell B45 contains. Formulas are mathematical equations, which are available within Excel under the **menu** *insert* down to *function*. For each function there is a short explanation. You have a choice of viewing “most recently used”, “all” and many more. For example, if you choose “*logical*”, only the

functions that are in fact logical are shown; AND, IF, OR, FALSE, NOT and TRUE.

Referencing cells

Each cell has a unique name. A lot of the training I witnessed tried to teach the trainees to use the unique cell-name (*cell location*) instead of the variable *in* the cell. In some situations it could also be effective to give the cell a more informative name like “hours” and “salary”. This will make it easier to quickly understand a formula in a spreadsheet. Example: “*B1*” times “*E6*” equals “*G8*”, compared to “hours” times “salary” equals “Anne’s salary for May”.

Dependencies between cells

If you use cell-location it is easier to see dependencies and easier to change variables. If you make the spreadsheet correct you need only to change the variable at one place and through the rest of the spreadsheet the cells which is dependent on this first cell will be updated accordingly. Excel is equipped with functions to easier get an overview of the dependencies. This is found under *tools* and *customise* in the menu at the top or *tools* and *formula auditing*. Following the blue lines one can find which cells are connected with each other.

2.2 Practice makes perfect

Research has shown that even people who are so called “good” spreadsheets users, need to spend much time with the software before they can be considered experts. (Nilsen, 1993).

The study was conducted at the University of Michigan, over a 16 month period. They followed the development of beginners to “experts” in using spreadsheet (Lotus 1-2-3).

In the first session, thirty six students were taught Lotus 1-2-3 using a paper based tutorial. Within a week, these students came individually to the laboratory to be tested in standard spreadsheet tasks on one of four (counterbalanced) sample spreadsheets. Twenty six students returned to all four sessions at the end of their first, second and third semesters, to perform the same standard spreadsheet tasks on three other but equivalent spreadsheets. For each session they assessed the number of

assignments they performed correctly, the total time per assignment and the pattern of key strokes.

The patterns of key strokes were used to find time patterns and method of choice. The measures were compared within subjects as they proceed, as well as to that of the Experts. They chose seven Experts from the same general Business School population, in response to a survey. Respondents who had both used Lotus 1-2-3 for three years or more and knew multiple methods were chosen to participate in the study. These Experts were then compared to the Stars in the investigation.

Of the total twenty six Novice subjects who completed the course they divided into 3 groups based on their performance in session four.

Table: *The Novice Group*

Sub-Task	Stars	Intermediates	Duffers
Enter formulas	100%	100%	0%
	79%	57%	0%
Set Col Width	<i>100%</i>	<i>100%</i>	<i>80%</i>
	86%	71%	60%
Justify Text	<i>100%</i>	<i>71%</i>	<i>20%</i>
	36%	0%	0%
Format Numbers	<i>100%</i>	<i>71%</i>	<i>20%</i>
	36%	0%	0%
Delete Cells	<i>100%</i>	<i>100%</i>	<i>60%</i>
	79%	71%	0%
Insert Cells	<i>100%</i>	<i>86%</i>	<i>60%</i>
	79%	29%	60%

Comparison of the three Novice groups' success in completing the various subtasks and (*in italics*) the percentage of them that did each with the most efficient method.

Stars; fourteen subjects completed all of the assignments. **Intermediates**; seven subjects performed correctly but with some minor errors. The remaining five subjects committed multiple errors which displayed a basic lack of knowledge about Lotus. These were labelled **Duffers**. “Wherever a formula was required, they simply entered the value which was the product of the formula.”(Nilsen et. Al. 1993).

The table shows the differences in completion rates and efficiency among the various groups of novices. Even the **stars**, who completed the assignments successfully, have difficulty performing some of them with most efficient method offered.

The **stars** were compared to the Experts. The testing was done by measuring numbers of mistakes the “novice experts” did with the numbers of mistakes the experts did, and time spent doing the assignments they were presented with. The Experts performed all of the subtasks in less time than the **stars** in session four. This suggest that even after sixteen months of using Lotus 1-2-3, the Novices have room for improvement in performing many basic spreadsheet commands.

2.3 The non-use of spreadsheets

There might be different reasons for why people who are given training in spreadsheet do not use it later in work related tasks. In a study done by S. A. Carlsson in 1989 they discovered that the expectations the participants at the course had of spreadsheet-use in work related tasks, were not met in the course. They state that the participants:

- Expressed a willingness to start using the SP (spreadsheet program)
- Had management support, implied because SP knowledge was regarded as relevant job knowledge to the participants and they were admitted to the two-day SP course
- Had attended a two-day course

In this particular case, the course was held at a general level: The general use of spreadsheets. At no point in the course were there made any concrete examples of how the spreadsheets could be used in relations to the participants’ work.

Carlsson (1989) studied the non-use of the spreadsheets as a possible reason for not learning spreadsheets well. The purpose of the project was to study spreadsheet program use longitudinally in a natural setting. Fourteen volunteer participants began the study by taking a two-day course on the spreadsheet program in question.

Only three out of the fourteen who participated in the course became users of spreadsheet. The courses were held in March and April, and the fourteen participants were divided into both courses. Only three persons from the two courses actually became spreadsheet users.

The reasons for not using spreadsheets were divided into two categories: “*won’t use*” and “*can’t use*”. “*Won’t use*” terms a decision not to use the spreadsheet program. Some of the information the employees needed was in the mainframe system and they were not allowed to download data from it. They therefore used pocket calculators. Some managers made the decision on a “cost/benefit” analysis. The “*can’t use*” terms that the employees needed to modify their job to be able to use the spreadsheet program. To build a spreadsheet model requires free time and testing activities. The employees doubted they could free up necessary time to do just that. And several of the desk-top bureaucrats believed that critically needed support from management, superiors, colleagues and computer support personnel was inadequate.

Of a group of fourteen persons, only three became users of the spreadsheet-program. All fourteen were motivated to use the spreadsheet-program. They had management support and were given a two-day course on use of spreadsheet-programs. Even though spreadsheet-programs and other end-user tools are considered easy-to learn tools, have direct manipulation attributes and are relevant for business-tasks, a person may not use them in an organisational context.

Carlsson concludes that it is important that end-user computing and computer-based tools fulfil and satisfy both user and organisational needs. Even though this should be obvious, this study suggests that persons may lack a “language” to express their needs.

2.4 The influence of others

Investigations in this field have shown a variety of reasons why some people find it difficult to learn spreadsheets thoroughly. Some researchers

have viewed the learning environment – whether the influence of other people has some effect (positive or negative).

Galletta et al. (1995) suggest that negative expectations reduce the learning outcome compared to non negative expectations. They report little difference between the positive group and the neutral group. The experiment they did was to identify the impact of peer influence on new users who learned to perform a task.

It is recommended that researchers examine how methods of training can enhance motivation to learn and use software. Because there was little literature on the subject of social influence in end-user training, the authors conducted a study which provides manipulation of “soft” variables. Mainly what they wanted to know more about is the extent to which training outcome such as attitude, behaviour and performance are influenced by peers through informal, verbal, word of mouth (WOM) communication, rather than derived solely through direct experience or formal channels. (Galletta et al. 1995).

The hypotheses they wanted to test are;

H1: Post-training attitudes will be more favourable in the positive word-of-mouth conditioning than in the negative.

H2: Post-training intentions to purchase the software will be greater in the positive word-of-mouth conditioning than in the negative conditioning.

They have four hypotheses but number three and four is divided because they are closely related but investigates two somewhat different behaviours.

H3a: Post-training intentions to use the software again will be greater in the positive word-of-mouth conditioning than in the negative conditioning.

H3b: The amount of optional use by subjects will be greater in the positive word-of-mouth conditioning than in the negative condition.

H4a: Post-training performance on a comprehension task will be higher in the positive word-of-mouth conditioning than in the negative conditioning.

H4b: Post-training performance on the experimental task will be higher in the positive word-of-mouth conditioning than in the negative conditioning.

To test these hypotheses they designed three types of experimental treatments, positive, negative and control.

One group would receive positive word-of-mouth treatment, one would receive the negative word-of-mouth treatment and one would not get any treatment - the control group.

The control group received no stimuli, and no hypotheses address the control group. It was included to provide additional data that might be useful in explaining the possible rejections of further hypotheses.

The outbursts (WOM) in the positive and negative group were administered when the experimenter was just out of the room or busy with something. He gave the impression that he did not know what had happened.

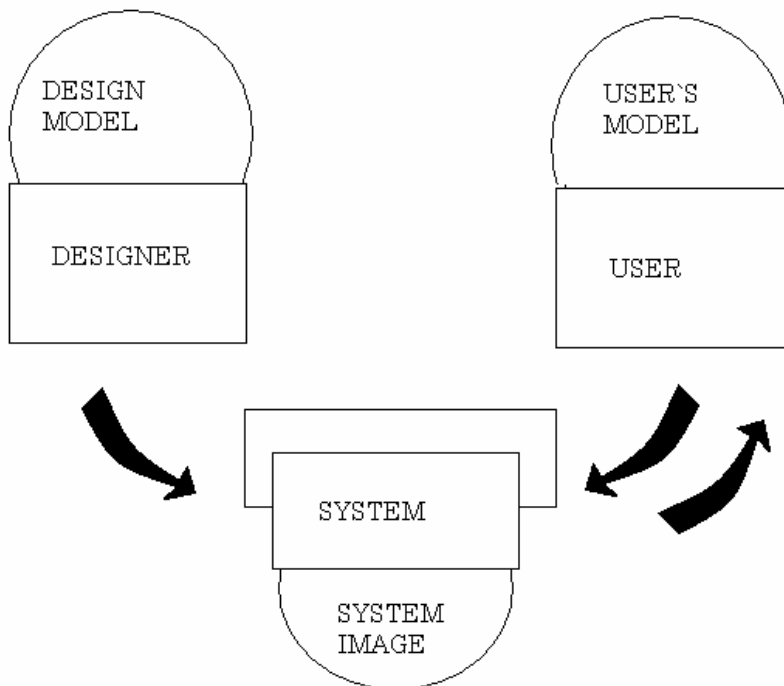
Their findings show that the group who were subjected to unfavourable WOM – statements appeared to adopt unfavourable attitudes toward the software in comparison to the subjects who were exposed to the positive outbursts.

Galletta (Et al. 1995) points out several practitioners who have demonstrated that social factors could be instrumental in the target system's success or failure. Their results (Galletta et al. 1995) suggest that negative WOM have effect on the other participants, but positive WOM did not have an effect. They present two possible explanations for this. One is that the positive treatment might not be as convincing as the negative treatment. The other explanation is that the use of WOM even if positive, might be experienced as disturbing for the other participants and therefore is not considered as positive.

2.5 Mental models and Conceptual models

There are three aspects of *mental models*; the *design model*, the *user's model* and the *system image*.

Model:



Design Model

First, the designer's *mental model* is the designer's understanding of the nature and operational structure of the problem. It is the designer's mental image of the "problem space".

A program designer or any other designer works with a *design model* in mind when designing and developing new products. The *design model* is a conceptualisation of what the designer has in mind.

The Users Model

The users develop the *user's model* through interaction with the system. It is what the users develop in order to explain the operation of the system. The designers expect the *user's model* to be identical to the *design model*. People form *mental models* through experience, training and instruction.

The System Image

The *system image* is what the users interact with, and through this action develops their *user's model*. The *system image* is critical because the designer must ensure that everything with the product is consistent with and exemplifies the operation of the proper *conceptual model*.

If the *system image* fails to help the users to develop a correct *user's model* this in turn will make it difficult for users to learn the system/product properly.

The designers have to make sure that the system reveals the appropriate *system image*. Because it is through the *system image* the user can acquire the proper *user's model* and find support for the translation of intentions into actions and system state into interpretations.

(Norman, 1988).

2.6 Motivation and learning

In 1991 Olfman and Bostrom executed an experiment to find out if one of two training methods were better than the other. The experiment examines understanding, motivation and use as outcomes of software training.

In the study a conventional training method (construct-based training) is compared to a more personally relevant training design (referred to as application-based training). The experiment focuses on measuring users' knowledge and motivation to use software after training and on their subsequent use of software. Conventional training methods seem to avoid the issue of motivating trainees to use software on the job. The training methods were tested on subjects taking a spreadsheet course using Lotus 1-2-3.

A simple way of enhancing motivation in software training is to address the issue of how to use the software in specific job situations. Linking learning to solving job-related problems should make training more relevant for the trainee.

Olfman and Bostrom have identified four components of a software training session delivered in a seminar/classroom setting. These include overview, presentation material, exercises and documentation/handouts.

The **overview** consists of introductory information, presentation of basic concepts of the software to be learned, and a brief demonstration of the software capabilities.

Presentation material is about specific procedural and usage information about the software, and is delivered by the trainer during the seminar. **Exercises** follow the presentation and help the trainee to practice the material to be learned. These exercises could be performed with or without the aid of the computer.

Documentation and handouts are provided to assist the trainee during the seminar and for later reference.

In their article Olfman and Bostrom indicate that hands-on use of computers should be employed in software training because it reduces computer anxiety.

The field experiment was conducted to compare two training methods in terms of personal relevance. The program to be taught was Lotus 1-2-3. The subjects in the experiment were employed in managerial or staff positions with two organisations in Indiana in the US. It was a university and a manufacturing firm.

A total of 70 subjects participated voluntarily. There were 58 from the university and 12 from the manufacturing firm. The 58 from the university were divided into 10 training sessions, and the 12 were divided into two.

Prior to the training session, subjects were sent a pre-training package that consisted of instructions and questionnaires. The questionnaires included an instrument to measure perceived usefulness and previous experience with computers and to capture the demographic data mentioned above.

Each training session was conducted over an 8-hour period during 1 work day. The session began with a 30 min *overview* that included a brief introduction, presentation of a conceptual model and a software demonstration. The *overview* in *applications-based training* included a demonstration of how to set up a problem using Lotus 1-2-3. The *overview* in *construct-based training* demonstrated various features and commands of the software. In both cases the overview included a presentation of a conceptual model of Lotus 1-2-3 as an accounting spreadsheet.

At the end of the overview, trainees were given about 15 minutes to explore Lotus 1-2-3 on their own. The session continued with presentations of other aspects of Lotus 1-2-3 and exercises were alternated up to lunch break and continued for 2 ½ hours after lunch break. At the end of the day the subjects were asked to complete the perceived usefulness measure and a training evaluation. Then the instructor gives each trainee a blank diskette and a problem to solve. After 30 minutes subjects are asked to save their work, and to quite Lotus 1-2-3. After this they were given a language quiz. When they had done their quiz they were free to go.

After eight weeks subjects were interviewed by the instructor over the telephone about their use of Lotus 1-2-3, and about their perceptions of how training had influenced usage.

Olfman and Bostrom found that previous experience was important. The trainees with previous Lotus 1-2-3 experience performed better on understanding assignments. Regarding differences in training methods outcomes, no significant statistical results were found.

But applications-based trainees used software more after training than did construct-based trainees.

In their article Bostrom and Olfman conclude with one reason for a lack of main effect significance for the training methods. It may be the result of the two training methods being too similar. The main effect they talk of in this article is the understanding the trainees have of the program after the course. The trainee's comprehension of the program is not very different, but they see that the ones who received *application-based training* had more motivation to use the program and did use the program more after training was over. The *application-based training* gave the trainees more motivation to use the program than the construct-based did. In some situations motivation would have been a contributor to the main effects. Both methods included hands-on use, one-on-one tutorial assistance and problem solving exercises.

2.7 Group dynamics

Group dynamicists define social influence as “interpersonal processes that change the thoughts, feelings or behaviours of another person”. (Forsyth, 1999). Asch did an experiment on the subject of social influence in 1957. The test was to identify which of three lines was the same length as the

standard line. In the trials there was only one subject. The others were confederates. They sat in half circles and answer some questions. All answers were given out loud. During the first few trials the confederates answered the correct answer. Later the first confederate gave an obviously wrong answer, and the rest of the confederates followed his example and gave a wrong answer. When it was the subject turn to answer, he usually conformed and answered wrong as well. Of the 123 tested subjects 76,4% made at least one conforming response. Asch further explored conformity by letting one confederate agree with the subject. The conformity rates were cut to one-fourth of their previous levels.

It is clear that the behaviour of others have a great influence on us. The fact that motivation is an important factor in making the learning-process easier, makes others behaviour an important issue.

2.8 Teaching computer programs

Bjarne Herskin has looked into the way spreadsheets are taught to people – whether it is best to sit by the computer at all times during the lessons or if it would be better to learn some parts “on paper” first (Herskin,.1991).

Herskin founded “Teach to Teach” in January of 1981. He has a Cand. Psych. degree. For 12 years he worked as a researcher at the Institute of Organisation and Work Sociology (Institutt for Organisation og Arbeidssociologi) at Handelshøyskolen. He still works as a consultant for “Learning Lab” at Handelshøyskolen, where he is part of a team developing e-learning programs.

The way Herskin teaches computer program is intended to give the user a “conceptual knowledge” in comparison to ordinary training which can seem to focus on giving an “instrumental knowledge”. A conceptual understanding of the program focuses on giving the users insight into how they can in a best possible way use this in their working situation.

Herskin calls computer programs sequential; that you have to do operations in a certain order. This can make it difficult for users to keep an overview of what and how to do different actions. The pedagogic of computer needs to make sure that it compensates for these problems in a way that does not obstruct the mediation of the essence of subject.

Even though the computer has not been part of our everyday life for very many years, thousands of people are educated in various areas and the traditions are many and very much worked into the tradition.

He has written a number of books on the subject of teaching computer programs. In his book *Pædagogisk EDB* he claims that the quality level on most computer-courses is too low. He is aware that this is a gross generalisation. But his point is not to criticise the ones who teach the courses but with his book set focus on the problem and help develop a computer-pedagogical way which in turn will make far more effective courses and making the teaching-role a far more appealing to be an instructor.

Herskin, (1990), criticises a systems-oriented way to work through a product. For example; a systems-oriented way (fashion) is not about the solving of a problem, (showing what a product is good for), but about the product, just because of the product. Herskin points out that one of the consequences with system-oriented approach is that it would be more difficult to understand the essence, because it is detached from the problem.

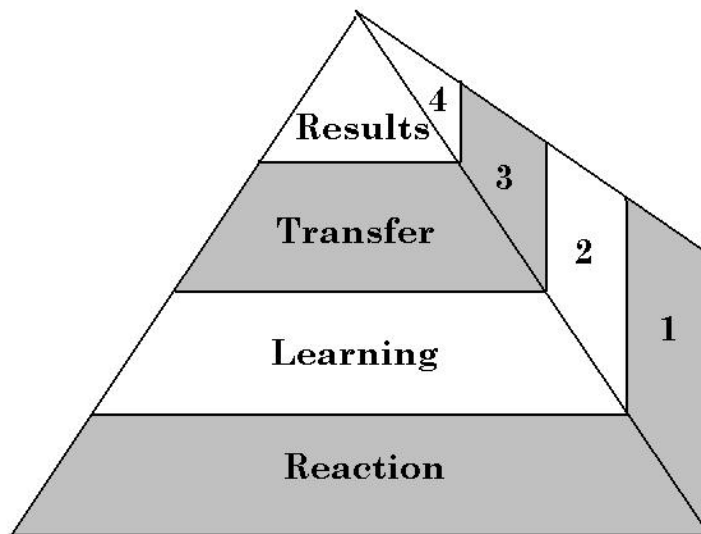
Tutorials

Hsu and Turoff's investigation from 2002 show that what novice trainees think is the best way to learn computer programs is not necessarily the actual best way to learn. *"The result indicate that the kinds of training most resisted by novice users are exactly those which would bring about the best learning, while those which were perceived to be extremely useful turned out not to be that useful after all."*

2.9 Kirkpatrick's four levels of evaluating training programs

From November through February 1959 Donald Kirkpatrick published four articles about evaluation. The articles were designed to stimulate training directors to increase their efforts in evaluating training programs.

Kirkpatrick's 4 - level model:



- **Step 1: Reaction**

How do the trainees react to the training? Evaluating in terms of reaction is the same as measuring trainees' subjective feelings. Because a trainee's reaction is easy to measure, many training directors do it. But in Kirkpatrick's opinion many of the training directors' attempts do not meet the following standards;

- Determine what you want to find out
- Use a written comment sheet with the items determined in the assignment above
- Make the sheet in a way that makes it easy to quantify the reactions
- To obtain honest reactions, make the sheets anonymous
- Allow the trainees to write additional comments not covered by the questions designed to be tabulated and quantified.

The measuring of trainees' reaction is only the first step of the evaluation. Even though the reaction is positive that is no assurance that any learning has taken place.

- **Step 2: Learning**

The favourable reactions to a program the more likely trainees are to pay attention and learn the principles, facts and techniques discussed. Unfortunately, favourable reactions do not assure learning. Kirkpatrick gives some guidelines for measuring learning;

- Measure the learning of each trainee so that quantitative results can be determined.
- Use a before-and-after approach so that learning can be related to a program.
- As much as possible, the learning should be measured on an objective basis.
- Where possible. Use a control group (not receiving the training) to compare with the experimental group that receives the training.
- Where possible, analyze the evaluation results statistically so that learning can be proven in terms of correlation or level of confidence.

As the guidepost indicate, evaluation of learning is more difficult than evaluation of reaction. Knowledge of statistics is necessary. It might even be necessary for training department to call on a statistician to plan the evaluation procedures, analyze the data and interpret the results. To measure the learning in on skills such as job instruction one can use before-and-after situations in which trainees demonstrate whether they know the principles or techniques being taught. This can be done in a classroom and scores of before-and-after shows the learning that has taken place.

- **Step 3: Transfer**

In his early days at the University of Wisconsin, Kirkpatrick was part of human relations for foremen and supervisors. There Kirkpatrick met a foreman who knew all the principles of human relations. As it turned out, he *knew* the principles *but did not use them in his own work*.

Evaluation of training in terms of on-the-job behaviour is more difficult than reaction and learning evaluations.

Kirkpatrick's guideposts for behavioural changes;

- Conduct a systematic appraisal of on-the-job performance on a before-and-after basis.
- The appraisal of performance should be made by one or more of the following groups: trainees, trainees' supervisors, subordinates and peers and other familiar with trainees' on the-job-performance.
- Conduct a statistical analysis to compare before-and-after performance and to relate changes to the training.
- Conduct a post-training appraisal three months or more to after training so that trainees have an opportunity to put into practice what they have learned. Subsequent appraisals may add to the validity of the study.
- Use a control group.

- **Step 4: Results**

The objective of most training programs is the desired results, such as reduced costs, higher quality, increased production, and lower rates of employee turnover.

Some courses are easier to evaluate, such as a typing course. In such a course one can easily measure number of words per minute on a before-and-after basis. Evaluation in terms of results is proceeding at a slow pace. In a few attempts, researchers have tried to segregate factors other than training that might have had an effect. In most cases, before-and-after measures have been attributed directly to training even though other factors have been influential.

2.10 Securing quality in teaching computer programs

Kari-Anne Larmerud wrote a Masters thesis on how to ensure quality when teaching computer programs. Her research shows that the quality assurance in many firms which offers courses in computer programs is not good enough. The lack of quality assurance of end-user teaching is an

important cause to why IT-changes in organisations do not get as good results as expected (Larmerud, 1999).

What are quality factors?

Larmerud points out different factors of quality which contributes to the total quality of computer-teaching, especially where computer training is different from other forms of training.

These are:

Pre-knowledge of participants

In computer teaching it is especially important that the skill level among the participants is as even as possible. If the instructor is repeatedly has to help a participant, the rest is often left idle.

Goals

To get the best out of the training, it is important to have goals for what one wishes to achieve. What kind of knowledge should the participants be left with after the training? Without such goals it is difficult to make a teaching-plan.

Evaluation

Evaluation is important to make the quality of the training better. Instructors should take the evaluation seriously, and adapt their training in response to evaluation-feedback.

Contents

The contents of the training must be adapted to the participants. It is important that the content corresponds with the pre-knowledge, goals and “frames” that are given. This will help the total quality of the training be the best possible.

2.11 Adapting the teaching to best suit the trainees

To ensure a teaching program in a given environment, one has to know the target group and their tasks; that is, what they need the computer program to aid/help them with in their work. The training should be a step further to aid employees; to help them do their job more effectively.

Unfortunately, the user training is not always focused on the background of the users (Aarvik, 2000). The training does not focus enough on the users' understanding of how this (or any) program can be of aid in their work-situation.

Hsu and Turoff (2002) point out that users want to be active, rather than passive when learning a computer program/system. They tested three different types of training on 268 undergraduate students in the study; *offline minimal manuals, standard online training and visual online training*. The students were volunteers from computer science, engineering architecture and accounting. They were categorized as "novice" or "experienced" according to their previous background. The results indicate that the kinds of training most resisted by novice users are exactly those which would bring about the best learning, while those which were perceived to be extremely useful turned out not to be that useful after all. They found that novices learned best with an offline manual, and worst with a visual online. Experienced users learned best with the online training and worst with the visual online. So; experts have reasonably good perceptions of what kinds of training best contribute to their own learning, but novices are largely erroneous in their perceptions (Hsu & Turoff, 2002).

In this chapter a collection of research in the area of my thesis is presented. I have given a short introduction to Excel, and when doing so, concentrated on some of the areas touched in the spreadsheet courses at RH.

In connection to my research questions, Carlsson (1989) and Nilsen (1993) have looked at the *use* of spreadsheet. Carlsson found that participants had difficult learning to use the spreadsheet program if training was not linked to their work and Nielsen discusses time need for become an Expert in using spreadsheet program.

Herskin (1991) have addressed the issue of what might be a reason for why computer programs are complicated to learn. He points out the importance of linking the training of computer programs to the participants' work. This would facilitate the transfer of what the participants have learned during a course to their work.

Nelson et al (1995) also conclude in their article that if the training is adapted to the users' needs the outcome it can improve training effectiveness. If a company improves the needs-assessment process it will make the training more effective and the learning outcome greater.

Evaluation of a training course is important and Kirkpatrick (1996) suggest with his four level model, how to best conduct a thorough evaluation of a training course and the effect it has on the participants.

3 About the actual courses

Throughout the thesis I have differentiated between *participants* and *students*. When I refer to the course at Rikshospitalet (RH) I use *participants*, and when I refer to Oslo Katedralskole I use *students*.

3.1 Background on Rikshospitalet

Rikshospitalet is the main hospital for patients in Helse Sør, and the Medical Faculty at the University of Oslo is part of it (www.rikshospitalet.no).

About 60 percent of the patients at RH are directed from other hospitals to get a more specialised examination and treatment. In a national context RH has an important role as a highly specialised hospital with knowledge about treatment of rare and complicated diseases. Several important tasks across Norway are collected at Rikshospitalet. For example, transplantation of organs and bone marrow, advanced neuron surgery and treatment of children borne with deformity (www.rikshospitalet.no).

Geir Arveng, who is responsible for the training of the employees at Rikshospitalet, gave me a course catalogue for RH (Rikshospitalet, Kurskatalog høst '03).

The catalogue describes the different courses available for the employees. They have all kinds of courses, from teaching employees more about hospital hygiene to courses on presentation techniques, and how to make the transition to being a senior citizen a better one.

The description of the Basic Excel course is as follows, “In this course you will be taught to use a spreadsheet. You will build the models from scratch and learn to present them graphically”.

The target group is “Employees who on a daily basis work with numbers and who wish to learn how to use Excel to solve practical assignments in an easy way”.

The catalogue is printed in 1000 copies. Since I received my copy of the catalogue it has been designed to be almost half its original size. Each course is described in the catalogue, but the description is a bit shorter than before. The complete description for each course can be found on the web. The catalogue is distributed to everybody who has personnel- or educational responsibility. Some departments are divided and are therefore located at different places at Rikshospitalet and therefore some people want to have a catalogue at both places.

Some knowledge of computer use is required to be able to attend the basic course. The participants have to have some knowledge of the use of Windows NT as well as thorough knowledge of Word.

Employees can register for courses in several different ways. Through the “*Riksnett*” (a net solely for Rikshospitalet) they can find a link to the department *Kompetanseutvikling* (the department of competence development) where they can register electronically. On the Internet they can use the link to *Kompetanseutvikling* and find a form they can print, fill in and send in with ordinary mail or fax. They also have the opportunity to get a registration form from an area at “*Riksnett*” that all the employees have access to. This form is in a Word format and is easy to print. This too has to be e-mailed or faxed. The last option is to make a copy from one of the forms in the back of the course catalogue. All the various ways to register is described in the course catalogue.

The registration is received at the department of *Kompetanseutvikling* where it is placed on hold. An e-mail is sent to the head of the ward where the person who sent the registration works. This person has to verify if the employee is to attend the course she/he registered for. The head of the ward has to decide if they have the funds and that these are taken from the right place. The head of the ward then sends a message back to verify the registration. The registration is then placed in the list of employees who has successfully registered to the course in question.

It is the head of each ward who decides if the employee should attend a *basic course* or a *higher level course*.

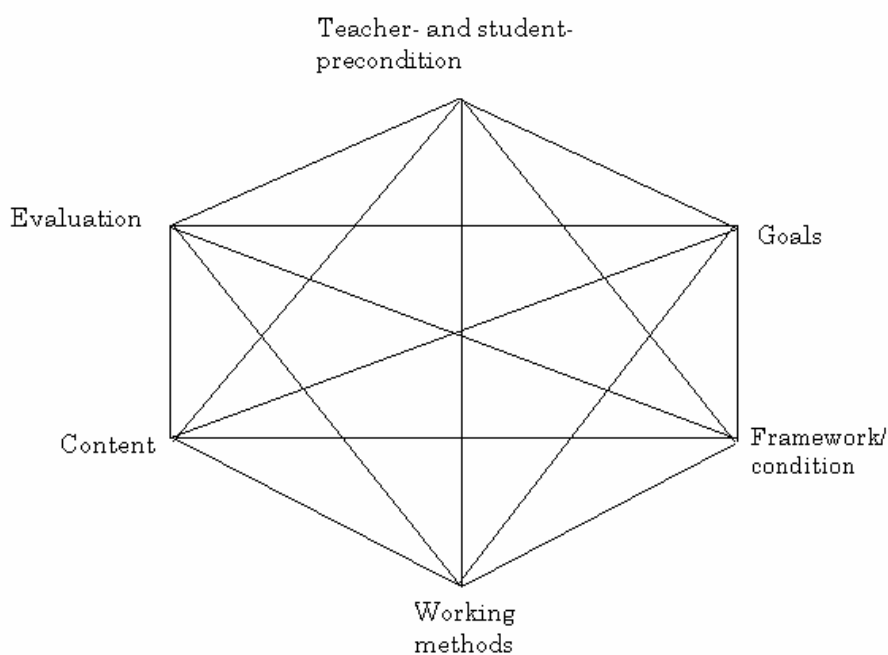
RH has sections in other parts of Norway as well. The employees are taken out of their ordinary work but get paid for a days work. The fee for each participant is 2000 NOK for RH employee and 3000 NOK for external participants. On the three courses I attended there were only participants from RH.

3.2 Background on Oslo Katedralskole

A high schools' teaching plan can be viewed as one of society's most important instrument for guiding how to plan a curriculum for the schools and the teachers. The teaching plan is a binding a work document the schools and teachers are obligated to follow (Hiim&Hippe, 1996).

In our society there are differences and contrasts between different social layers and groups' view of value. Differences in views of value and political conviction is closely related to social and economic background, where in the country one lives, religious conviction etc. (Hiim&Hippe, 1996).

A model to illustrate the connection between the different categories in the planning of the curriculum, (RVO 1989).



The teaching plan for the course “Economy and Information (Økonomi og informasjons-behandling)” in Norway is made by the Department of Church, -Education and Research (Kirke, -utdannings og

forskningsdepartementet). It is a course that all first year students attending an *Almennfaglig linje* must attend.

The teaching plan starts to talk about the origin of the word *economy*. It is from Greek and can be translated to “resources of the house”, in other words, economy is learning to manage resources.

The core of economic thinking is that resources are limited and that priorities will have consequences for people and environment in the present and in the future. Knowledge about accounting and economy will make it easier to gain overview over the connections between alternative uses of resources and about the consequences of choices.

Society, through the authorities, has a substantial job to put the conditions to ground so that economy is effective and sound. When the government puts environmental conditions on consumers and companies, it is important to consider negative sides of economic work – first of all environmental damages. This demands more knowledge about the connections between economy, ecology and technology. In the “teaching plan” it is formulated like this:

“The symbiosis between economics, ecology and technology gives people of our time particular knowledgeable and moral challenges to secure a sustainable development. This development needs to acknowledge the limits nature, resources, technological levels and social relations give, and to acknowledge the conflicts that emerge when environmental issues are prioritised.”

Quotation from the curriculum plan for the course; Economics and Information. Department of Church, - Education and Research, Oslo, December 1993.

(Translated from Norwegian).

For Norwegian version se Appendix, 1.1.1.

The object of the course is to give the students knowledge, attitudes and skills that will help them to deal with these challenges.

The course has a total of 187 hours in one year. (This is on average five hours a week.) The course is divided on two modules: 112 hours of economy (3 hours a week) and 75 hours of informatics (2 hours a week) in a year.

The “economy part’s” main focus is on the individual and the company as administer of resources. As a consumer it is important to be aware of duties and rights in a changeable society. The economy of the consumer, the firm and the society are in many cases dependent on international economy. These may vary and give society a period of financial prosperity and depression. To lessen the effect of depression as much as possible it is important to be a conscious consumer.

The information part of the course shall give the students a common frame of reference, so they can use spreadsheets and text processing tools, and understand the basic principles of use of databases. The pupils shall also show that they know that there are both possibilities and limitations in the use of information technology as well as have knowledge of legal, ethical and environmental aspects of use of information technology.

One of the goals with the course is to give the student a basic insight in economic thinking so that interest and curiosity for further studies of the area economy is awoken. But the teaching plan is somewhat indistinct in describing exactly what the goals are for spreadsheet use in the subject. The teaching plan states: (1a) the pupil should master a keyboard in an effective way like “Touch” and (1d) the pupil should master simple use of a spreadsheet program to make and use simple models (Læreplan for videregående opplæring, Appendix, 1.1.1).

The books used in class

The text book in Economy and Information processing (*Økonomi og Informasjonsbehandling*) starts with a motivation- and “how to use the book”- chapter made for the pupil. The chapter tries to explain *why* one should learn about economy (one uses it in almost every situation in life – it is practical knowledge) and *what* economy is (how to use ones resources in a sensible way), (Ottesen, 1994).

The second chapter is called *Personal economy* and contains:

Chapter 2: Personal economy (page 13 - 176)

- 2 Consumer society
- 3 Income and taxes

CHAPTER 3: ABOUT THE ACTUAL COURSES

- 4 Planning and budgeting
- 5 We do accounting
- 6 Ways of paying
- 7 Saving and loans, car and housing
- 8 Consumer laws
- 9 When the family economy fails

Chapter 3: *Union/clubs and teams (page 177 - 202)*

- 10 Union/club and teams.

Chapter 4: *The Company (page 203 - 262)*

- 11 How to start your own company?
- 12 Company economy
- 13 The company and the foreign countries

Chapter 5: *The society (page 263 - 302)*

- 14 Resources and production
- 15 Economic agreement with foreign countries
- 16 Environmental problems and environmental actions

Chapter 6: *IT-theory (page 303 - 320)*

- 17 Information technology

Every chapter starts with a few sentences that state the goal with this chapter. For the *first chapter* the goals are; (1) that the students can state their own needs, their attitudes and values and their way of living, (2) that they understand the importance of considering ethical and environmental issues in economical choices.

Chapter two, Tax and Income, has as goal that the pupils will know how to estimate their own salary, their taxes and a little about what the

employer can and can not demand of you – they learn a few of the paragraphs in *Arbeidsmiljøloven*.

Chapter three, Clubs and teams. The goal for this chapter is to make the students aware of the financial responsibility that is connected to an honorary post in a club or a team. And be able to keep simple accounting for a club or a team.

Chapter four, The Company, explains the basics for starting your own company. (1) Knowledge of how to establish a company based on a business idea (2) To do simple calculations of price and (3) be able to use simple spreadsheet models to estimate alternatives and analyse the consequences of change in conditions.

Chapter five, Society, describes how the availability of resources and use of resources is linked together and what controls the use of resources in a country as Norway.

The goal for the *last chapter*, Computer theory, is to (1) teach the students how a computer works and some safety routines, (2) the possibility of getting information from external databases, (3) get an overview of the possibilities and limitations information technology presents for the company and society and (4) knowledge of laws and frameworks (privacy, work environment, copyright) connected with information technology.

At the end of each chapter there are control questions and assignment for the students.

In addition to the text book and the workbook they have a small book called *IT-guiden*. This is an introduction to computers, spreadsheet, text editing and presentation tools. When I observed the class at Oslo Katedralskole this was not in use. The teacher told me that he did not put emphasis on this book. *IT-guiden* is certified for *Datakortet*.

IT-guiden starts with a chapter called Introductory Lessons. Lesson A describes, in detail, what a keyboard is and how to write letters, and how to use special symbols on the keyboard. The very first page has a list of practical information the students should remember, like user name, how to log on to the school network, how to save files, rules for using floppy disks, if the computer room is open after class and rules for its use. Lesson B explains features in Windows: About the desk, the pointer, how the menus work and how to make your own file structure. Lesson D is Easy Touch 2000. It is a program to teach you touch on your own. The last lesson of the Introduction is Ergonomics and Health problems.

The next lesson is spreadsheet. It starts with a picture of a spreadsheet with explanatory pointers: title-, menu-, tool-, and formula line, columns and rows, a cell and sheets. After the picture, there are descriptions of the different items. This is followed by a description of how to write text, numbers and formulas in a cell and what symbols/signs to use for addition (+), subtraction (-), multiplication (*) and division (/).

Of the three books, the textbook and the matching workbook was what they used during the observation.

In this chapter the background and different aspects of the course at RH and the class at Oslo Katedralskole have been explained.

The courses at RH are open for all employees, but the head of the employee's department has the final word whether the employee should attend a course or not. The company responsible for the Excel courses is AjourIt.

The teaching plan for the class "Økonomi og Informasjonsbehandling" states that use of spreadsheet program is not the main issue of the subject. The students learn how to use Excel through the assignments in the class "Økonomi og Informasjonsbehandling".

4 Research in Information Systems

Informatics is a complex area. It can contain areas which reaches from the more sociologic and humanistic areas to the more mathematical and technical areas. The methodological approach one chooses, or the methods which are best suited, depends on the different problem areas.

4.1 Quantitative research methods

The different research methods, quantitative and qualitative, are said to have very different features, almost contradictory. (Silverman, D. Pp. 26. 2001). Quantitative methods are labelled “hard” and qualitative methods are labelled “soft”.

There are two main ways of doing quantitative research: surveys and experiments. In an experiment the researcher tries to generalize from a sample to a population. But the basic intent of an experiment is to test the impact of a treatment (or an intervention), controlling for all other factors that might influence that outcome (Creswell, 2003). This is often done in psychological and medical testing with the use of placebos if one wants to test a new treatment. This can be conducted with two groups. These groups are made as similar as possible, so that there is as little difference between the two sample populations as possible. To reduce the effect of placebo, they usually give both group pills but they do not know which group receives the real treatment. That is, if the treatment is a drug in the shape of pills. It may also be in any other form. Often the researcher does not know which group receives the real treatment, to reduce any form of different treatment of the two groups.

4.2 Qualitative research methods

Qualitative research takes place in the natural setting (Creswell, J, W. 2003). This means that when conducting qualitative research, the subject must be investigated in its natural setting. One does not wish to influence

the surroundings of the participants, but to let them interact in their natural setting. In addition, interviews of human subjects will help to give a fuller picture of the situation. This enables the observer to get a better picture of the setting, and to see that what they say they do is really how they do it.

Qualitative research uses multiple methods that are interactive and humanistic. It is fundamentally interpretative (Creswell, J, W. 2003). All data gathered by the researcher is interpreted and analysed. The researcher views all data gathered through his or her personal lens. In this sense all interpretation is subjective (Creswell, J, W. 2003).

Within qualitative research there are different strategies. I will give a short description of a few of them which will be of interest for this thesis.

4.3 Mixed Methods

Mixed methods research is relatively new in the social and human sciences as a distinct research approach. It is a strategy that involves collecting and analyzing both qualitative and quantitative data in a single study. The concept of mixing different methods probably originated in 1959, when Campbell and Fiske used multiple methods to study validity of psychological traits. Recognizing that all methods have limitations, researchers felt that biases inherent in any single method could neutralize or cancel the biases of other methods (Creswell, J, W. 2003).

4.4 Surveys

Questionnaires are a well-established technique for collecting demographic data and users' opinions. They are similar to interviews and have closed or open questions, (Preece et al, 2002). The making of a good questionnaire is demanding and requires certain knowledge of how to make them understandable and unbiased. Surveys are the classic questionnaire one often gets in the grocery shop and various places on the internet. Surveys give a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population. From sample results, the researcher generalizes or makes claims about the population (Creswell, 2003). But to do this you need a

group that can be seen as representative of the population you wish to say something about. You can not for example, use men in jobs if you want to know about housewives. They include cross-sectional (at one point in time) and longitudinal (over time) studies or structured interviews, with the intent of generalizing from a sample to a population (Creswell, 2003).

Many questionnaires start by asking for basic demographic information and details of user experience.

There are different types of rating scales that can be used. Two examples are the Likert scale and semantic differential scale. Likert scales are often used for measuring opinions and attitudes and are therefore widely used for evaluating user satisfaction.

Example of Likert scale:

- How strongly do you agree to the statement “...”? (Where 1 represents strongly disagree, and 5 represents strongly agree).

1	2	3	4	5

Semantic differential scales are used less frequently. They explore a range of bipolar attitudes about a particular item.

Example of semantic differential scale:

- How would you describe “...”? Place only one cross.

Attractive						Ugly
------------	--	--	--	--	--	------

4.5 Observation

The technique *observation* will be very important in my investigations.

Observation is one of the most basic forms of research and it is often combined with other forms of research.

Observation has a tradition of being non-interventional (Fontana and Frey, 1994). When observing subjects one should try to not influence the

subjects too much. This, of course, depends on where on a scale of observation one finds oneself. Fontana and Frey's outline four modes through which one may gather data: the complete participant, the participant-as-observer, the observer-as-participant and the complete observer (Fontana and Frey, 1994). The terms are almost self explanatory, but the complete observer means that the participants do not even see the researcher. In such a case they use see-through mirrors or cameras. If observing something in the wild, they would be careful not to be discovered.

Creswell suggest keeping an observational protocol for the collected data. Possibly a single page divided vertically where one side is for *descriptive notes* (notes about participants, dialogues, physical setting, and so forth) and the other for *reflective notes* (researchers personal thought), (Creswell, J, W. 2003).

4.6 Interview

Interviews can be thought of as “a conversation with a purpose” (Preece, *et al.* 2002). The interview method used decides how much like an ordinary conversation the interview is. The names of the types of interviews describe how much control the interviewer imposes on the conversation by following a predefined set of questions. Open-ended interview (unstructured) is the type of interview which is the least controlled. On the other side of the scale you have structured interviews, which resemble questionnaires. In between these two we have the semi-structured interview. A group interview involves a small group of people guided by an interviewer who facilitates discussion of a specified set of topics (Preece, *et al.* 2002).

Interviews, as most methods, take a lot of practice before getting “the hang of it”. It is difficult and the questions one asks does not always give the answers we are looking (or hoping) for.

Structured interviewing

Structured interviewing refers to a situation in which an interviewer asks the respondent a series of pre-established questions with a limited set of response categories, (Fontana and Frey. 1994). There are generally little

room for variation in response except where an infrequent open-ended question may be used. The interviewer controls the pace of the interview by treating the questionnaire as if it were a theatrical script to be followed in a standardized and straightforward manner, (Fontana and Frey, 1994).

Unstructured interviewing

Unstructured interviews are also referred to as open-ended interviews. These interviews are more like conversations that focus on a particular topic and may often go into considerable depth. The structure is open; the interviewees are free to answer as fully or as briefly as they wish (Preece, *et al.* 2002).

A benefit of this type of interviews is that they generate rich sets of data. The down side with all the collected data, is that it is very time consuming and difficult to analyze (Fontana and Frey, 1994.)

Semi structured interviewing

This is a combination of structured and unstructured interviewing. In this type of interview one can use both structured questions and unstructured questions. The interviewer has a basic script for guidance to assure that the same topics are covered with all the interviewees (Preece, *et al.* 2002).

Group interviews

One form of group interviews is the focus group. Normally there are three to ten people involved. Participants are selected to provide a representative sample of a population. The method assumes that individuals develop opinions within a social context by talking with others (Preece, *et al.* 2002). Group interviews can be used in addition to structured interviews, unstructured interviews and semi-structured interviews. It is not meant to replace individual interviewing, but it is an option that deserves consideration because it can provide another level of data gathering or a perspective on the research problem not available through individual interviews (Fontana and Frey, 1994).

For the investigation in this thesis the methods: observation, interview and survey are used.

5 Choice of methods

5.1 Methods for my research topic

My use of *population* in this thesis refers to people who at one time or another uses spreadsheet. This is the group of people I wish to draw a conclusion from, but my base is only sufficient to make assumptions and see tendencies, not to draw conclusions. My sample group consists of participants at two Excel-courses at Rikshospitalet (RH) and students from a class at Oslo Katedralskole.

For my investigations I plan to look at how teaching and learning of Excel is conducted, and I hope this will give me an idea of why parts of Excel and other spreadsheets are perceived as somewhat difficult to learn.

I wanted to do a qualitative investigation of the use of spreadsheets. But because I want to know what the participants at the course at RH think of the course and how often they use Excel in their work, I decided that as a part of my qualitative research, quantitative methods such as a questionnaire would be a useful addition.

5.2 Literature Study

Relevant literature forms the basis of the research conducted. In my thesis I have focused on literature in the following areas; Spreadsheets, End-User Training and Quality assurance in computer teaching. The source I used to find these articles were the ACM, the library at the Institute of Informatics, BibSys and the Internet.

5.3 Observation

What to look for

When observing I tried to focus on issues that the participants thought was difficult. Was the interaction with such devices (computer, keyboard and mouse) new to the participants? Or do they have problems with the program itself (what functions to use for which assignment)? Is there something that repeats itself as being difficult? Do all the participants think it is difficult or just a few? What parts of the program does the teacher see as a difficulty for the participants and then put more time in explaining this thoroughly to them?

I had made appointments for each of the times I observed a course / class. Once the message had not reached the instructor, but he agreed to have me there anyway. I used a notepad and pencil to write my observation and had the same textbook as the participants and students to keep track of what they were doing.

Observation of Excel-course at Rikshospitalet in Oslo

My first research at RH was in week 6 of 2004. I observed an Excel course they provide for their employees. At present AjoutIt has the contract for holding the courses for RH. AjoutIt also offers course in the other MS Office tools. It was a two-day course, from 9.00 to 15.00.

I tried to stay unnoticed by both the teacher and the students. I sat in the back of the room so everybody but the teacher had their backs to me. The participants sat by a terminal where the instructor had placed a workbook.

At the start of the class I introduced my self and explained why I was there. I put emphasis on the fact that I would not write down any names. At the end of the second day I again asked if someone would be kind enough to answer a questionnaire some time after the course had been completed, and that it would be administered some time after the course.

Observation of an Economy and Information Technology class

When I went to observe the economy class, I thought that they would be learning some Excel in the same way as they did at RH. But in fact, they were not taught Excel, they *used* it. This is a course over a whole year, and I observed a class early in the last semester. The last time I observed the class they were preparing for the big test at the end of the year. They

had far better *time* to learn how to use Excel than the participants at RH's course.

The teacher introduced me to the students and I told them a bit of what I was doing and why I was there. I was free to wonder around in the classroom. During a week they divide the class between lectures and time spent on assignments. The class is five hours a week: two hours where they do assignments and three hours where they work on subjects in the textbook. I observed the class while they spent time on assignments, and took notes during the whole course. To collect observations I used pen and paper.

5.4 Questionnaires

The demographic information that surveys often ask for is useful for finding out the range within the sample group. My sample group will solely consist of employees at RH. I will assume that all participants (my sample group) are employed by RH, but RH is large and have many different types of employments that the participants could occupy.

Because these courses are so small, about 12 – 15 persons at each course (and sometimes only 6-7), I tried very hard to get a high return rate. When sending out the questionnaires, I gave them extra postage stamps so that they could return them easily, and explained in the letter I sent to them that it was important for the outcome of my thesis that I got a high return rate, and I thanked them for helping me. I also planed to give a present to one of those who returned the questionnaire.

Even tough I explained to the participants that it was crucial for me that they answered and returned the questionnaires, (because they were so few), only seven out of ten at the ground level course and three out of six at the higher level course returned the questionnaire. I sent the questionnaire by e-mail to the participants I got an e-mail address from. To the others I sent the questionnaire by ordinary mail to their workplace. The e-mail / mail contained the questionnaire and a letter explaining again who I was, what I was doing and that it was anonymous.

I put a few assignments in the questionnaire to get an impression on what they had learned. To find out what they remembered and what they might discover to be difficult, I sent the questionnaire out to the participants approximately three months after the course. I got their

email address from the department that is in charge of the courses at RH. I made the questionnaire in Word because this is the most common text processing tool to use.

When getting the first questionnaires back I chose to change it a bit before I sent it out to the participants at the higher level course. I added a question to see what position they had within RH. I chose to add a question so they could write how often they used Excel if the alternatives in the multiple choice question did not cover their amount of time spent on Excel.

In the questionnaire I made short assignments in a type “multiple choices”. They had to read through the question and put an “x” for the right answer. For example, I asked which of two models displayed the best way of adding some numbers. The assignment was based on what I had witnessed that they were taught in the course. Of this type I had two variations.

5.5 Interviews

Brigitte Heitmann works as an instructor/senior consultant in the department User teaching at AjourIt. She has previously worked at Siemens in Germany and as a high school teacher.

I met Brigitte Heitmann the first time I observed an Excel course at RH. We talked informally for a little while during the breaks in the course. She was interested in what I was writing about, and a few days after the course I sent her an e-mail. She had no objections to letting me interview her and we arranged a telephone-interview because that would be more convenient for her.

When interviewing B. H. I started with a set of questions about things I wanted to know more about. I started with a semi-structured interview approach. Some questions were concrete and some were more open-ended. These questions were to give me an overview of how the instructors work and what and how they feel about the types of course they do for RH.

I used pen and paper when I interviewed her because recording the phone interview would be difficult.

She also brought up issues that she had thoughts on.

For full interview, see Appendix, 1.3.1, for summary of interview see chapter 6.

Geir Arveng works as a course consultant at Rikshospitalet in the personnel department.

I interviewed Geir Arveng at his work. It was a bit difficult to get an appointment because he was very busy. His phone rang twice and we got interrupted once by a co-worker during the interview.

I had a set of questions on my notepad and started with those. I chose to let him guide the interview in such a way that he could tell me about how their department worked to plan and administer the different courses available at RH.

For full interview, see Appendix, section 1.3.2, summary of interview see chapter 6.

When interviewing Brigitte Heitmann I had no opportunity to tape the interview. And when I interviewed Geir Arveng I wanted to make the interview more like a conversation and less like an interview. I wanted to make him at ease, because I wanted to ask him about the questionnaires that RH distribute to the participants at the courses. I hoped that it would be possible to see a statistic of the answers of the questionnaires but unfortunately they did not make statistics of them, only went through them to see if the participants were satisfied with the instructor and course.

5.6 Possible limits

The group I observed was not big. This means that the group of participants is too small to be viewed as a representative of the population. A solution to this is to observe several groups. But this again is depended on the time restraints of a thesis.

Another issue of such an observation is the setting in which the participants are learning spreadsheets. They are in a new setting with people they do not know. When they sign up for the course they choose a date and do not know with whom they will be taking the course with. Everything is new to them, and they are not in their natural work setting. The participants have different reasons for taking a course in spreadsheet and different types of jobs at RH. Therefore it is difficult to plan assignments for the participants that relates to their jobs. Some of the participants also come from different parts of the country. RH has

divisions in other regions of Norway besides Østlandet and Oslo. These participants fly in (or come by train) for the duration of the course.

To make a questionnaire and administering a survey is a challenge. It is not an easy task to make a questionnaire that is easy to do for the participants and gives informative feedback. All textbooks that have something to say about questionnaires state that one should always do a pilot session. This is very important but it also takes time and resources to do it thoroughly. I tested my questionnaires on a few representatives who had some experience with spreadsheet program. A critique of the surveys is that it can not capture the feelings of the participants and the gestures that might lead the interviewer to explore some issues further.

The ethical sides to this study are not prominent. There was no personal information about the participants that I need to use. At each course I asked if there were anyone there who did not like it if I was present. This was not so much a study of the participants' abilities but more of what they think of the program at hand. When I conducted the interviews I certainly asked for their consent.

6 Findings

In this chapter the findings are presented in conjunction with Kirpatrick's first two levels of his 4-level model. His model begins with evaluating the trainee's *reaction* after the course. Observation of a course is not part of his model and the observations in this thesis are therefore presented at the beginning of this chapter together with the interview of B. Heitmann. The observation of the class at Oslo Katedralskole is placed under *learning*, because it describes more of how and what they learn compared to the observation at RH. Observation at RH and Oslo Katedralskole was conducted twice, but presented once because of the few participants at the higher level course at RH and because during the second observation at Oslo Katedralskole, the students were preparing for the final exam.

The questionnaires were only distributed to the participants at the course at RH, because the class at Oslo Katedralskole was not a class in which to learn how to use Excel. Of the ten participants who attended the ground level course, seven returned the questionnaire, and of the six participants at the higher level course, three returned the questionnaire. The findings from the ground level- and higher level course are presented together, except where there are reasons not to.

6.1 Observation of an Excel course at RH

The instructor begins by introducing himself and the schedule for the two days: Besides the teaching there would be a 10 minute break every hour and a 45 minute lunch.

The room is under ground level and there are no windows, but because of the air conditioner the air is fresh and the room cool. The instructor has placed a work-book/tutorial at each terminal. It has some explanatory assignments with pictures which show how different tasks are done and other assignments which the participants can practice their new-learned skills on. The instructor suggests that everybody makes personal notes in

it. The instructor's computer screen is displayed at a canvas in front of the class.

Before he starts he would like to know why the participants have signed up for this course and what they expect or want to learn.

This was a ground level course and some of the participants pre-knowledge was not high. As the instructor starts explaining important features of Excel that they need to know before starting on the assignments, (how to move between cells, how to put numbers/text in the cells, the different "looks" of the marker), some participants do as he shows on the canvas while others reads the news on the Internet.

The instructor suggests that everybody memorises navigation with keyboard keys in Excel and writes a few on the blackboard. One participant starts writing every thing down. Suddenly a woman stands up from her desk and says that she just wants to get some coffee. The instructor asks if she could wait a little bit since it is just 10 minutes before the break. She says no, and leaves the room.

The instructor continues with showing how to do a few computations, and the participants repeat the actions. Then the instructor gives them some assignments to do on their own. When they are busy doing the assignments, the instructor walks around to see how they are doing and answer questions. When most of the participants have finished the assignment he begins explaining the next subject. While the instructor explains, the participants do what he does, and by doing so, some participants had trouble following what the instructor did and remember how to do the assignment. Because some have not finished the assignment when the instructor moves on, they do not get the foundation they need to proceed. One woman states in the questionnaire that she would have liked to learn more about cells, which was one of the first things the instructor explained and was used throughout the course. Some of the numbers they use in their assignments are in already existing files.

The rest of the course go by with the instructor explaining a subject, showing how to do it on the screen and the participants repeating the action on some assignments in the workbook.

For full observation see Appendix, section 1.2.3, and 1.2.4.

6.2 Summary of interview with Brigitte Heitmann

Brigitte Heitmann started working for Siemens in Germany and later at AjourIt in Norway. AjourIt is now fully owned by Visma, which is the holding company of the two divisions, Visma Software and Visma Services.

The way spreadsheets are generally taught in Norway and Germany is quite similar. The main difference lies in the *time* spent on the subject. She gives an example: When she was to attend a course in printer programming, the date and start time was given on the course paper, but no end time. She therefore called the course holder to get the time for when the course was over. But there were none! The answer she got was: *How could they set an end-time? They did not know how much time she would use on the assignments (!)*.

The course is, for example, planned like this: Before lunch the participants are explained the general build up of the program they are there to learn. After lunch they use this knowledge on several assignments. They continue as long as they want to. Those who were done early could leave, while those who wanted to stay longer and work on the assignments had the teacher there to assist them if they needed it.

When I asked what she felt was missing or lacking in the computer program training here in Norway, she said: “The thing that is very important in training, but often lacking, is follow up. It is when the participant is in his/her natural environment at work that the problems might occur. One problem is how to use what they have learned in the course in their everyday work”. When she worked in Germany she was responsible for the internal education of the employees. She therefore had the opportunity to visit and help people in their natural environment. This was greatly appreciated by the employees.

In the Excel course in Norway she experienced that some participants had too little knowledge of mathematics than what would have been preferable when working with spreadsheets. She bases this observation on both the work done at AjourIt and as a teacher in mathematics at a high school.

When asked the question if she could see that the teaching of a computer program could be performed partially without a computer and partially with a computer, she said: “Absolutely! Sometimes the computer can be a distraction for the participants”.

For full interview, see Appendix 1.2.1.

6.3 Kirkpatrick's level 1: Reaction

Kirkpatrick suggest starting an evaluation of a course by measuring the participants' feelings (reactions) to different aspects of a course. He points out that this is fairly easy to do and that many training directors follow this procedure, (Kirkpatrick, 1996). But they do not always do it as thoroughly as they should.

6.3.1 Rikshospitalet and quality assurance

RH also measures the participants' reaction of a course. It is a short and simple questionnaire which the instructor gives out at the end of the last day of the course. It contains 10 questions. The last question is a place where the participants can give their own comment on the course. The other questions try to establish if the *expectations* they had were met, what they thought of the professional *level* of the subjects in the course, the *subjects* it contained, if the instructor was good at *communicating* the subjects, their *own effort* during the course and the *duration* of the course. The questionnaire was anonymous. To answer the questions they chose a number between 1 and 5, where 1 is bad and 5 is good. For every question there is a space for additional comments. The faster they complete the questionnaire, the sooner they could leave. They did not spend more than 5-7 minutes.

At first, I thought the questionnaire was administered by AjourIt. But when talking to one of the instructors he told me that it was RH who had made them. When I interviewed Geir Arveng, course consultant at RH, he told me that they go through each response to see what the participants thought of the course and the instructor. If an instructor got a below average score compared to other instructors, RH would request a different instructor for the next course.

I was not permitted to look at RH's filled out questionnaires.

For Rikshospitalet's questionnaire, see Appendix; section 1.4.4.

For full interview with Geir Arveng see Appendix, section 1.3.2.

6.3.2 Functions in Excel

In the questionnaire the participants were asked to write down what they wanted to learn more about when using Excel after the course. This was done to better understand what the participants felt were difficult and therefore wanted to learn more about. It was an open-ended question. They had the opportunity to answer what they wanted. Five out of the ten who returned the questionnaire wished there had been spent more time *functions*. There are many different possibilities the *function* can display; from simple AVERAGE-function to more complex LOGICAL-functions. In the basic level course only a few of the simple ones were addressed. For each function there is a short description of how and what this function is used for. This indicates that the participants had problems knowing how to use the different functions. If they had known how to use for example COS in a mathematical computation on paper and with a calculator as an aid, they would understand how to do it using Excel.

6.3.3 Follow up

In my questionnaires I asked whether they would like to have a “follow up” day. Six out of ten of the participants at the course at RH answered “yes”. B. Heitmann also suggests that the participants would benefit from support after the course was over. This could either be a follow up session (in a classroom) or a person who could come to their work place and help the participants directly in their work.

Ground Level Course									Higher L. Course			
Follow up?	Y	Y	Y	N	Y	---	Y	5	N	N	Y	1

The table indicates if the participants would like a day of follow up after the course. The number indicates how many participants who are positive to a day of follow up.

This show that a larger quantity of the participants at the ground level course feel the need for a follow up session. One participant did not answer.

6.3.4 The teaching situation

It is a noticeable difference in the way the participants in the Excel course at RH behaved, compared to how the students at Oslo Katedralskole behaved in the learning situation. The students were more comfortable in the situation of having a teacher and listening to him when he explained the assignment at hand and thus more relaxed. The atmosphere was different from the one at the course at RH. It was noisier in the classroom, (25 in a class, 10 and 6 at the RH course), but at the same time it was a more relaxed atmosphere. The students were in an economic and informatics class, not a “pure” Excel class. Their object was to do what the class required (learning the subject) and Excel was just an aid in doing so. The course at RH was a two-day course. At the school the class stretches over a whole year. The students all know each other since they had been part of this class for nearly a year. At the course at RH there were only two women who had met briefly once prior to the course. Some people might feel more comfortable in asking questions aloud in a class if they know the people who surround them. And of course, there is an age difference between the students at Oslo Katedralskole and the participants at the course at RH.

6.3.5 Exercises / homework

At school the students get homework. This gives them the opportunity to practice their skills and to find out what they know and do not know. When they go to the next class they have an opportunity to ask the teacher to explain what they did not understand. A participant at the RH course requested more homework. Actually, at the end of the first day the instructor suggested what to read for the next day. The suggested pages also contained assignments they could do. But since the instructor did not emphasize that it was homework, few actually did these assignments.

When interviewing Brigitte Heitmann she pointed out that it is easier to realise difficult areas of a subject when working alone. In a classroom setting, the participants can be shown how to solve an assignment. If the participants at the course at RH had tried to do some assignments on their own, they might have discovered that they did not know areas they thought they knew and have the opportunity to get this explained on the second day of the course.

6.4 Kirkpatrick's level 2: Learning

In step 2, Kirkpatrick suggest to measure the learning outcome of each trainee, so that quantitative results can be obtained. To best do this, one should have a before-and-after approach. Because I did not have the time or the knowledge of who would attend a course at RH, it was not possible to administer a questionnaire prior to the observation. And because it is such a small sample group it is difficult to get any statistical numbers out of these findings.

I have therefore tried to get an impression of what both the participants at RH and the students at Oslo Katedralskole have learned, by observation and questionnaires. The actual learning is quite difficult to capture.

6.4.1 Do the participants have a good enough foundation to attend the course?

To partake at a basic Excel course at RH one needs only knowledge of basic use of computers. Even so, the instructor starts the course with a thorough introduction of computers. The course catalogue states that it is useful to be familiar with the use of Word and simple file organisation, but it is not necessary since the participant will be taught this in the course.

Do the participants have the mathematical and/or statistical foundation to learn the program? The spreadsheet is an aid to do calculations, but to do this, it is important to know how to proceed to get the correct answer. To put it simple: A calculator is no help in a mathematical exam if you do not know how to do the calculations. If you do not know which variables to use and *how* to use them, it is difficult to get the correct answer. The calculator will not give any hints on *how* to do the calculations.

Brigitte Heitmann, when asked what she thought was a problem for the participants, answered that they did not have the necessary knowledge of mathematics and statistics needed to make Excel an aid. One participant states in the questionnaire that he feels a need to read up on statistics.

Another participant answered that she would like to have learned more about cells in the course. This was the first thing the instructor explained and cells were used throughout the course. It might be that she did not

have the basic computer knowledge needed even though she states that she felt that she had sufficient knowledge about Windows and Word before attending the course.

When observing the students at Oslo Katedralskole, I experienced that the most frequent question was where to place the variables in the table they were working on. For example; they were working on an assignment where two boys had bought a stereo. After a while these two boys wanted to sell the stereo. The assignment was to figure out what they lost financially when they sold the stereo. The students had all the information they needed, but their problem was what to do with it. Not only had they problems with where filling out the correct variable in the spreadsheet, but also how to do the computations. But they did not seem to have problems using Excel. They seemed confident when using the spreadsheet program and were not afraid of trying out new buttons or scroll-down menus.

The students used two books, one textbook and one exercise book. Often the textbook had explanation on how to solve the problem in the exercise book. The examples were of course a bit different from the exercises, but similar enough to give hints as how to solve the exercises.

This suggests that the students needed to learn more of the mathematical foundation to be able to do the exercises on their own. But the teacher explained that the class' sole object was to teach them just that. It was about personal economics, economy for small communities like a band and a little bit about the Norwegian economy, and not a class for learning Excel.

6.4.2 From my questionnaires

The questionnaire contained four questions to evaluate the learning outcome for the participants. It was administered approximately three months after the course. The questions were the same for both the ground level course and the higher level course.

The first two questions were related to, *function* and *references* (cell location), and directly connected to what the participants had learned during the course. With the two questions I wanted to find out if the

participants knew how to add numbers with Excel, and also if they remembered to use the cell location when doing so. The first question was directed towards the use of the function SUM. Several assignments during the course had been about the use of this function.

The sentence in parenthesis is a hint to make them think through the question before answering, and for the second question on addition, just to clarify that the answer could be in both the cell location and the function line. The observation showed that some participants preferred to write directly in the cell while others wrote in the function line. The two examples in the first question are quite similar, the function in model “A” uses the *function SUM* while the function in model “B” pictures the way the computation would, for example, be written on a calculator or on paper. Because there were only two alternatives and I wanted to avoid any guessing, I asked them to state a reason for their choice.

1. Which model is the best? A or B. Please state a reason for your choice. (Which model is easiest to reuse?)

	A	B	C
1	Eksempel A		
2	Enkel lønns beregning		
3	Timelønn	125.5	
4			
5	Antall vanlige arbeidstimer	60	
6	Ant overtid hverdag	8	
7	Ant overtid lø (14-16)	5	
8	Ant overtid lø (16-18)	1	
9	Overtid sats:		
10	Overtid hverdager	24	
11	Overtid lørdager (14-16)	42	
12	Overtid lørdager (16-18)	84	
13	Utdata:		
14	Vanlig lønn	7530	
15	Overtid hverdager	192	
16	Overtid lørdager (14-16)	210	
17	Overtid lørdager (16-18)	84	
18	Brutto lønn	8016	

	A	B	C
1	Eksempel B		
2	Enkel lønns beregning		
3	Timelønn	125.5	
4			
5	Antall vanlige arbeidstimer	16	
6	Ant overtid hverdag	7	
7	Ant overtid lø (14-16)	2	
8	Ant overtid lø (16-18)	1	
9	Overtid sats:		
10	Overtid hverdager	24	
11	Overtid lørdager (14-16)	42	
12	Overtid lørdager (16-18)	84	
13	Utdata:		
14	Vanlig lønn	2008	
15	Overtid hverdager	168	
16	Overtid lørdager (14-16)	84	
17	Overtid lørdager (16-18)	84	
18	Brutto lønn	2344	

Eight of the ten participants at the course at RH answered correct on this question. One at the ground level course and one at the higher level course answered incorrect. The participant at the ground level course had answered the questions concerning demographics, but none of the other questions, and no answer, is interpreted as incorrect.

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All answers were as expected, except for one. The choice of model was correct, but his reason is not what was expected. (See number two, higher level course). And adding a row automatically moves the formulae down without ruining it.

The replies to why they chose as they did to the first question on addition:

Answers, ground level course.	
1	A is the best because of the auto sum function.
2	A because of auto sum, it is easiest to copy to avoid writing a wrong number.
3	A: auto sum is used.
4	A is easiest to reuse.
5	A is faster to use, instead of a writing a long row of numbers.
6	--- (Did not answer any question related to knowledge of Excel).
7	Ex. A
Answers, higher level course.	
1	Because of auto sum.
2	A, if one has to add a row which moves the cell containing the formulae.
3	B – The model to the right.

The numbers to the left indicate which questionnaire the replies are from.

The second question was directed towards the use of cell location. It is an assignment where two and two numbers should be multiplied and then added. The alternatives show two computations that would produce a wrong answer and two computations that would both give a correct answer. I deliberately made two computations with a correct outcome to

make sure that, if they chose the computation with the cell location rather than the one with the numbers, they did so with intent.

2. What would be best answer to put in “Sum lønn”? (Or to put in the function line: fx ?)

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D
1	Timelønn	126		
2	Antall time	43		
3	Overtidsats	48		
4	Ant. Overti	4		
5	Sum lønn			

The formula bar shows the active cell B5 with the function line fx .

Answer:

- A. $(126*43)+(48*4)$
 B. $=B2+B3+B4+B5$
 C. $=B1*B2+B3*B4$
 D. $=SUM (B2:B6)$

Of the participants' answers, six out of ten were incorrect. Three answered “A”, one answered “B” and two did not answer. The answers indicate a wish to use *numbers*, instead of the *cell location*, to do the computation. None of the participants of the higher level course gave a correct answer. It might be an idea for the instructor to go through some basic characteristics of a cell before starting on the higher level curriculum. The participants at a higher level course should have attended a ground level course and learned the basic use of excel, before attending the higher level course.

The subject of logic sentences was addressed in both courses, but they did not spend much time on it. I wanted to know if they remembered this even though there was spent little time on it and because I thought this was a difficult subject which could give indications of the level of the learning after the course.

3. What is the best way to write the logical sentence for: “If A is bigger than B then “overtid” is to be paid, if not then no “overtid” payment”?

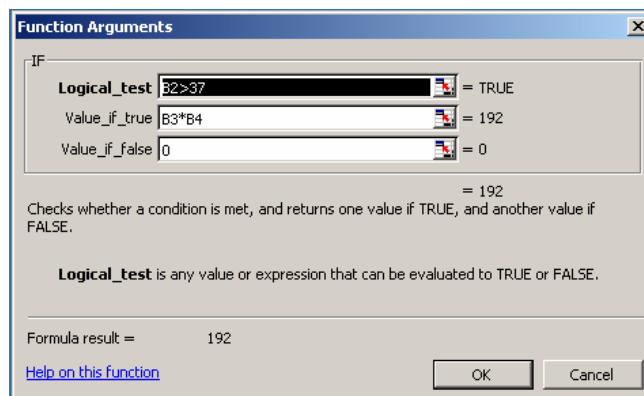
- A. $\text{HVIS } A > B \text{ SÅ } \text{'overtidtimer * overtidsats' ELLER '0'}$
- B. $\text{HVIS } (A > B, \text{'overtidtimer * overtidsats'}, \text{'0'})$
- C. $\text{HVIS } (A > B) \text{ SANN}(\text{'overtidtimer * overtidsats'}) \text{ USANN } (0)$

Answer:

A	B	C



This question had two correct answers: B and C. When the logic function is shown in the formula line the function looks like B. When made with the *Function Argument*-window it looks like C.

Only two participants answered incorrect to this question. It was a surprise that this question had fewer incorrect answers compared to the two addition questions.



The participants at the ground level course who answered correct answered C, while the participants at the higher level course answered B. It might be because the participants at the higher level course are more familiar with the use of Excel and consequently used the logic function more often and therefore used to seeing it in the form displayed in the function line.

Both courses addressed the subject of format. An example: How do you use “time” as a format when working with employees’ monthly time sheets? If you write a date in a cell, this cell is automatically formatted to “date”. And stays formatted as “date” until changed. Therefore it is useful to know how to copy the format of a cell which has the desired format.

4. Which of A, B and C is a fast way to copy the format from a chosen cell to other cells in the same worksheet?
- A. Uses the CTRL-button to chose the desired cells, and then click the **Paste**  button on the tool line.
 - B. Copy the chosen cell, and then choose the other cells. Click **Style** on the **Format** menu, and click **Modify**.
 - C. Click the **Format Painter**  on **Format** in the tool line twice, and then click in the cells you want to copy the format to.

Answ.:

Six out of ten participants answered incorrect. To copy the contents of a cell is different from copying the format. Three participants who answered incorrect did not distinguish between the two. Three participants did not give an answer, and one of them wrote that he was not familiar with this.

The second question of addition and the question of format had the most incorrect answers. Those who had chosen wrong on the addition question had chosen to use the content (numbers) in a cell rather than the cell location (for example B4) for making the computation.

This indicates that the participant had not fully grasped the idea of a cell as dynamic and that use of cell location can make it easier to make large spreadsheet models.

This was a surprise since the questions were made with their specific course in mind. It was no surprise that those who answered everything correctly were those who used Excel the most.

Answers collected in a table:

Ground Level Course									Higher L. Course			
Qest.	1	2	3	4	5	6	7	Incorr.	1	2	3	Incorr.
Add 1	R	R	R	R	R	V	R	1	R	R	V b	1
Add 2	R	R	V a	R	R	V	V a	3	V a	V b	V	3
Log	R	R	R	R	R	V	V	2	R	R	R	0
Format	R	R	V	R	V	V	V	4	R	V	V	2

			a		a						a	
--	--	--	---	--	---	--	--	--	--	--	---	--

The column to the left indicates which of the questions. The upper row shows the number of the questionnaires. R is correct and V is incorrect. The letter next to the V shows which answer the participant chose. No letter next to the V indicates that the participant did not answer the question.

6.4.3 A cell; what is it really?

A cell in Excel is dynamical. You can make intricate mathematical calculation or you can make simple logical statements. What seemed to be tricky to understand is that all the cells can be linked together. The observations I did, showed that some of the participants at the basic level course had trouble using variables from one cell in a calculation in another. They tend to write the value of the cell instead of using the cell-location. In the questionnaire I asked the participants to give a short description of a cell.

Here are the replies:

From the ground level course:

- A cell can understand dates, months, numbers calculations, etc, etc.
 - Male, 4/4 correct, uses Excel 1-2 hours a day.

- It (the cell) can easily be copied, it has to be formatted for numbers, text, etc.
 - Male, 4/4 correct, uses Excel more than indicated in the questionnaire.

- The contents (of the cell) can be adjusted/copied, formatted, make formulas, number formatted.
 - Female, 2/4 correct, uses Excel 1-2 hours a week.

- Formatting, sum (cells), copy.

-Female, 4/4 correct, 1-2 hours a day.

- Move to the left, move up, delete.

-Female, 3/4 correct, uses Excel less than once a month.

- This female did not attempt to answer any questions that were related to knowledge of Excel. On the question if there was something she would have liked to learn more about she answered; cells. When I observed the course she did not pay attention to the instructor and had problems doing the assignments. She was constantly in need of assistance from the instructor.

- Female, 0/4 correct, 5-7 hours a month.

- Active cell – the one that one works in. A cell has an address = line number + column: example C12.

- Female, 1/4 correct, 1 hour per day.

A cell can use values placed in other cells to compute with. This is (in my opinion) one of the greatest features of Excel. In large spreadsheet models one can easily change a value, and only have to do it once.

Replies from the higher level course:

- Do not understand the question.

- Male, 3/4 correct, uses Excel 1-2 hours a week.

- ? (A question mark was the only reply).

- Male, 2/4 correct, uses Excel 3-5 hours a week or more.

- Coding of data, yes/no answers that can be used to sum. Large storage possibility for text.

- Female, 1/4 correct, uses Excel 1-2 hours a week.

One can argue that some of the replies meant to say that a cell is dynamic. But I deliberately did not make this a multiple choice question just to see if there were someone who would point out that a cell is dynamic or that they can be linked together.

6.4.4 Observation of students using Excel in their class

I had arranged to observe the students while they were working with assignments. The students have five hours of this course every week. Three hours on economy and two on information technology. In this class they used three school-hours on subjects covered in the book and two school-hours on doing assignments in Excel.

Before my observation they had gone through the chapter on Investment Estimates. They start immediately with an assignment where two persons wonder if they would benefit from buying a stereo for NOK 30.000 and selling it for NOK 6000.

The students help each other and share books. If they get stuck on something they ask the teacher. Today there are two teachers present and 23 of 25 students present.

Some of the problems the students ask about are how to do the computations: What variables to do what with. They are not afraid to try out new functions in Excel, but some have problems deciding what functions would be useful in a particular situation. I asked the teacher if it might be that the students do not have the mathematical knowledge of how to do the assignments? But he explains that part of the idea with these assignments is to teach the students how to do the computation and how a cell works; that they are linked together, and that the variables in a cell can be a value or a formula.

At the end of the class, the teacher goes through the assignment together with the class. His screen is displayed on the canvas in the front of the class. He continually asks the students what to be put in the spreadsheet model; the different variables they need, what to call them and what kind of formula they need to make. In the end he has a correct spreadsheet model on the canvas made by the students with the teachers help.

For full observation see Appendix, section 1.2.1, and 1.2.2.

6.4.5 Summary of interview with Geir Arveng

Geir Arveng, course consultant, is responsible for the IT-training at RH. Standard courses are done by an outside firm. Right now it is AjourIt, but choice of partner is done by tender/estimate and the contract lasted out 2004. They (the training department) are also responsible for more specialized courses such as hospital hygiene, and further education for employees at RH. For doctors they have an *Øre-Nese-Hals* specialization education on the Internet.

If they announce a course that they feel is of interest for a department or group of people, and few sign up for it they send out an e-mail 3 weeks before the course to remind those who have not signed up.

The instructor distributes a questionnaire at the end of the last day of the course. These evaluation sheets are kept in a ring leaf book. After each course the sheets are gone through. If the participants express less satisfaction with this course than with other courses they tell AjourIt. If there is less satisfaction with an instructor than with others, they ask if AjourIt can send another instructor the next time.

For full interview see Appendix, section 1.3.2.

7 Conclusion

The research questions are presented in this chapter together with a description of how the questions are answered.

7.1 Question 1: What aspects of Excel are difficult to learn?

Little investigation has been conducted to discover what participants at a spreadsheet course might find difficult. Investigations have mainly been on the area of how the training has been conducted (Carlsson, 1989. Sein, 1998. Galletta, 1995. Hsu&Turoff, 2002).

To better understand the participants' use of Excel, I tried to find out some of their habits. How often did they use Excel? What did they use it for (in their work)? Did they use Excel outside work? What they would have liked to learn more about in the course? And if they personally thought they had gained something by attending the course.

The average time the seven participants at the ground level course spent on Excel in a week is approximately 5 hours. Some used Excel only once a month, while others used it for about 2 hours a day. The participants at the higher level course each used Excel for about 13-14 hours a week.

To get an indication of what they had learned during the course, I put four questions that were related to knowledge of Excel in the questionnaire.

The questions in the questionnaire were related to: function, references, logic statements, and formatting cells.

To the first question there were just two incorrect answers. One from a participant at the ground level course, who did not answer any of the question related to knowledge, and one from a participant at the higher level course. For the second question, six participants answered incorrect. None of the participants at the higher level course answered correct to the

second question. Nilsen (1993) encountered that his subjects entered the numbers instead of cell location and formula. “Wherever a formula was required, they simply entered the value which was the product of the formula. Without the formulas, the spreadsheet is merely a static representation, lacking the recalculation function used in “what if” analyses, the hallmark of spreadsheet software”.

The two questions are quite similar, so the difference was surprising. When they had the two pictures side by side it might have been easier to recognise the correct answer. And the fact that this question had only two possible answers could also explain why there were fewer incorrect replies. The second question had four possible answers, and they were not visualised with pictures. Those who answered correct on the second question had also answered correct on the first. Why some chose the correct answer on the first question and not the second is not easy to tell. The first question would help them chose correct for the second question too.

One reason for this inconsistency might be not enough time spent on reading and filling out the questionnaire, but because of the “state reason for your choice” they might have thought through this specific question.

Another question in the questionnaire was: What are some of the abilities of a cell in Excel. No one pointed out that a cell is linked together with the other cells. The instructors thoroughly pointed this fact out when they started explaining about Excel. One participant stated that she would like to have learned more about cells.

The teacher at Oslo Katedralskole told me that these assignments were partly made to teach the students about the cells and that they are linked together.

Five out of ten respondents said in the questionnaire that they wished that there was more focus on *functions*, which possibly indicate lack of mathematical knowledge of how to use the different functions.

This was found to be difficult:

- The observations and the questionnaires show that some found it difficult to make spreadsheet models, use Excel to manipulate data as they need to do in their work.

- Doing the computations, using the material and put it into a spreadsheet model which gives the answer to their problem.
- The fact that a cell is dynamic and that using the cells to their full potential can ease the use if one builds a large spreadsheet model.

7.2 Question 2: Why is it difficult to learn spreadsheets?

It is not easy to find out why some people find it difficult to learn a spreadsheet program. People are different and have different background and what one person find difficult another might find easy.

The observation of the courses at RH and the class *Economy and Information* at Oslo Kateralskole indicate that some of the problems the participants and students encountered were related to mathematics and statistical knowledge. The students had all the information they needed to get the right answer, but did not know how to use the information. The students worked on assignments when I observed them, and I had done the assignments they were to do during this class to be able to keep track of how they worked. The participants at RH's course also had all the information needed. The numbers for many of the assignments they worked on were located in already existing files.

It seems that a cell's characteristics are not easy to understand. When comparing Excel to a paper ledger, people might think that the way one writes on paper is the same as in spreadsheets. But a cell can also be connected to all the other cells and can retrieve information from them if one uses the cell location in for example a computation. It might be difficult do grasp that a computer program actually is multi dimensional if one does not have any knowledge of programming and the build up of computer programs. With multi dimensional I mean that there is more to what one sees in the actual cell. That there is something in the background of Excel that is not visible for the user.

7.3 Question 3: How is Excel taught?

How is Excel taught at the two institutions considered in this thesis?

At the course at RH the instructor stands in front of the class and explains important features of Excel that they (participants) need to know

before starting with the assignments. He shows them on his computer which is displayed at a canvas in the front of the classroom. He continues with showing how to do a few computations, and the participants repeat the actions. Then the instructor gives them some assignments to do on their own. When they are busy doing the assignments the instructor walks around to see how they are doing and answering questions. When most participants have finished the assignment he begins explaining the next subject. While the instructor explains, the participants do what he does. That way some have problems following both what the instructor does and doing so themselves, and therefore have problems remembering how to do the assignment.

At Oslo Katedralskole the teacher and the students had gone through the material together in an earlier class. This was done in another class room without computers. All the students knew what they were going to do and the teacher had only to get them started. When they worked with the assignments, the teacher walked around helping those who had questions.

There are similarities to how RH and Oslo Katedralskole teach spreadsheets. The greatest difference lies in that at the school the students have more time to spend on the subjects. Its duration is a whole year compared to the course at RH, which lasts only two days.

The participants' work in focus

Herskin focus on motivating the participants to use the program when they are back at work. And he also points out that the course should be made to focus directly on the participants' work. In the article "Why Jonny can't or won't spreadsheet", Carlsson (1989) concludes that the participants expectations of the spreadsheet training was not met, and that this affected the participants' use of spreadsheets. The training had not showed them how to use the spreadsheet program in their work. In Carlsson's study the course was a two-day keystroke- and function-oriented course. Carlsson states in his article that "no attempt was made to link use of the SP to the participants' jobs". He further suggests that linking training to the participants' jobs will make the expectations to the system more realistic. And more realistic expectations make it easier to have better attitude towards the system.

This is an important factor which B. Heitmann also pointed out. At the course at RH the instructor begins the course by asking why the

participants have signed up for the class and what they expect or want to learn during the course. He asked them to tell him what they worked with and give examples of what they used Excel for in their work. But because the participants all came from different departments at RH, the training could not be linked to each of their work.

The background level of the participants

Larmerud (1999) sees the precondition of the participants as an important factor in quality assuring a computer program course. The different levels the participants have before attending a computer program course may cause some participants being bored while others struggle to keep up with the instructor. This means that it is probable that the participant do not understand the content of the computer program course. She also points out that some might feel embarrassed to admit that they do not master computers as much as they feel society demands of them.

The participants at the course at RH showed that they were unsure of how to use the variables given in an assignment to come up with the correct answer. Brigitte Heitmann pointed this out as a problem for some of the participants. They did not have the background knowledge of mathematics and statistics needed to learn Excel fully. One participant wrote that he had to read up on the statistics, because he found that it was the statistic that was the problem, and not Excel.

When observing the courses at RH I observed that some of the participants seemed bored. The course was put on a level which was too basic for some of them – too easy. Several spent time reading news on the Internet or checking e-mail. One participant told me that he actually wanted to go to the higher level course, but because he had not attended a ground level course, the head of his department wanted him to attend this before attending a higher level course. He was bored through the course. He did not do anything to disturb the others, but finished the assignments and reading news on the Internet while waiting for the instructor to move on in the course.

Did this have an impact on the other participants? Did they too detect that the others gave the impression that the course was too easy? And if so: How did that make them feel? If they felt that the course was a little

difficult and the others thought it was easy- did that make them feel inadequate?

Galletta et al. (1995) investigated if peer influence had an impact on users who learned to perform a new task. Their investigation shows that positive and neutral *word of mouth* (WOM) (see section 2.4) has little impact, but negative WOM had impact on the learning outcome. Their proposed explanation of this outcome is that (1) the positive WOM might not be as convincing as the negative, or (2) that positive WOM is considered as a disturbance and can be comprehended as negative for the other participants. Are some participants disturbed by others who are surfing the internet instead of paying attention to the instructor? Or someone who leaves the class after announcing that she “just wants to get some coffee”? According to Galletta’s investigation this could influence the other participants.

7.4 Question 4: What do the trainers think is the problem?

When interviewing Brigitte Heitmann, she told me that some (participants at her courses) had trouble with learning how to use Excel because they had too little knowledge of mathematics and statistics. As long as they knew, or had an idea, of how to solve the assignment on paper, they seem to be able to find out how to use Excel to do it. She also told me that the course was short compared to the amount of things the participants were supposed to learn. A follow up, either a new course or coming directly to the participants’ work would be valuable for the participants.

When I asked the teacher at Oslo Katedralskole (Knut Skrindo) the same question, he did not agree. His class was learning about economy and information technology. They did not have all the knowledge needed, and the assignments were there to help them learn the subject. The assignments were made to help the students use what they had read in the textbook to learn it better; learn it through practice. Excel was just an aid in doing the assignments.

User training

Today most people get to know how to handle a computer during early school years. Computer anxiety still exist, but it has been reduced a great deal. Herskin (1991) has worked as a computer program instructor for

many years in Denmark and written several books on the subject. Herskin and Olfman and Bostrom are of the opposite opinion on the use of computers during a training session. Olfman and Bostrom (1991) suggest hands-on use of computer to reduce computer anxiety. But computers are rather commonplace today. Soon after children start school, they are taught use of computers. Most people have been in contact with a computer before signing up for a computer program course. Herskin explains that trainees in a course are more distracted by the computer than gaining knowledge from it. Herskin is not against the use of computers in a training setting entirely. He feels that some parts of the training should be done on paper to help the trainees get a better conceptual model of the program to be learned before actually trying out the program itself.

Herskin also argues that the training should be designed so that it corresponds to the work the participants do. This way the training would clearly show them what and how Excel (or any other computer program) can aid them in their work.

His view on the subject of computer program training corresponds with what Brigitte Heitmann expressed. They both work with computer program training and see the need of making the training focus on the trainees' work.

7.5 Question 5: What could be done to make it easier to learn a spreadsheet-program?

I observed that especially at the course at RH, it would benefit the participants if they were to learn about Excel on paper before sitting down by a computer. As it is now, the instructor shows something on the screen and the participants repeat it on their computer. This "breaks up" the rhythm of how to work. They have to hurry to finish of what they are doing because the instructor moves on. If they used paper, they would be able to fully concentrate on what the instructor said and did, and would have to wait a bit before trying out what they had learned on a computer. This way they would have time to digest the information and when sitting down by a computer new information would not interfere with their work. After the instructor had explained how to proceed to solve the assignments, they could do assignments on their own. This way they could find out if there were things they found difficult and if so, get help from the instructor.

Learning spreadsheets

The research in this thesis has focused on the users of Excel (spreadsheets) and those who teach it. Several investigations show that user teaching and follow-up of users are important factors to achieve reasonable and effective use of the technology (Herskin, 1991, Sein et. al, 1998). The research Nielsen did in 1993 also show that extensive use of a spreadsheet program such as Excel is necessary if one is to be an expert-user. A two-day course is not sufficient to make an expert user of Excel. To learn Excel thoroughly one needs to use it regularly. If one uses Excel a few times a month it would be possible to forget things one learned in the course. It is important to maintain the knowledge. The questionnaires indicate that those who used Excel seldom, made more mistakes. Brigitte Heitmann said that if there had been “follow up” sessions in the area of computer teaching, this would greatly benefit the trainees.

Hsu & Turoff (2002) recommend use of paper tutorials for novice trainees. Their investigation show that paper based tutorial is best for novices and that electronic tutorials and visual online training are best for more experienced trainees. The more complex online form of training, seem better suited to learners with previous computing experience.

Based on the above mentioned, I suggest the following to improve computer training:

- Link the teaching to the participants' jobs
- Use Herskin's idea of some of the teaching with out a computer
- Use paper based tutorials
- Spend more time on a course, a two day course is VERY intensive
- Evaluate the training more thoroughly using Kirkpatrick's model. Preferably all the four levels, but at least to level 2 Learning.
- Divide the courses in more than ground level- and higher level course. Some people need a more basic training than others and this can easily result in someone being bored.

7.6 Question 6: How do the educators evaluate spreadsheet training?

Rikshospitalet

In 1959 Donald Kirkpatrick proposed that training programs should be evaluated at four levels: *reaction*, *learning*, *behaviour* and *result*. Even though the first issue of the article, *Kirkpatrick's 4-level Model*, was written many years ago, we can still learn from it today. It shows a proposition of how to proceed to get the best out of a training situation. If you do not do the training thoroughly, the participants will be left with a lesser learning outcome. The first level measures the satisfaction of the trainee with the training material, instructor, instruction and environment. The second measures the skill and/or knowledge learned.

My investigation of the course at RH shows that the training is evaluated as in Kirkpatrick's step 1, *Reaction*, where it is suggested to investigate what the participants thought of the course – their subjective feelings of the course. This questionnaire was handed out at the end of the last day of the course. The participants had no time to let the material sink in or to try out their skills on their work. In my survey, several of the participants state that there were issues that they had encountered after the course, when returning to their own work and their own setting that they would have liked to know more about. This is something that RH would greatly benefit from knowing and communicate to the party responsible for the course.

I got no indication from RH that there was any effort to take the evaluation further, as Kirkpatrick suggests.

My investigation takes it a step further to step 2, *Learning*, what is the learning result? Is the learning outcome significantly better than before they attended the course? Unfortunately, I did not have the means to conduct a survey of the participants before they attended the course. I therefore can not give a statement of what they knew prior to the course and what they may or may not have learned during the course. I could only try to test if they had learned the subjects presented in the course.

7.7 Further work

Suggestions for future work regarding the issues considered in this thesis:

- Use Kirkpatrick's 4-level model and conduct a study where one has two groups to base the findings on: a research group and control group, and go through all the 4 levels (reaction, learning, transfer and results). The organisation would benefit from doing this even if there is some cost involved. The control group would benefit from the training itself. Be sure to measure the participants' learning both before and after a course. In the *transfer* level one is to do an assessment of on-the-job performance. This requires close cooperation with the company in question. The companies who agree to be part of such a research project must agree to let the researchers in on its financial situation (level four: *transfer*) to assess if the training has been beneficial to the company. This last of Kirkpatrick's four levels, should be conducted some time after the training.
- Get a closer cooperation with RH and possibly the company that conducts the courses at RH.
- Spend more time on the observation- observe more courses to get a better basis to draw a conclusion from.
- Preferably depth interviews with all the participants at the courses, instructors and people at the different departments where the course-participants work.
- Create follow-up sessions for one of the two groups some time after the course and perhaps give aid with using Excel in their work in their own office.
- Investigate further on how the teachers plan a semester of teaching this subject.

Even though user training is agreed to be important, it also is subject for cuts in funding. I understand that it is easier to justify cuts in the funding of user training as apposed to cut in medical staff or teachers.

In the information society there are forces that argue that "soft" informatics should be removed from informatics and be placed in social studies instead. I am afraid that the outcome of this is that there would be even less focus on making user-friendly programs. Today there are few who do not know anything about computers, but still one can see evidence that some people find some computer programs difficult. If one removes

the soft part of IT from IT, how will the link between “ordinary” people and “IT” educated people be? It usually is the “ordinary” people who in the end are to use these programs.

We need to have subjects in our training to help us understand issues when considering human computer interactions.

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Appendix

A.1 Læreplan for videregående opplæring

Læreplan for videregående opplæring

Økonomi og informasjonsbehandling

Felles allment fag for grunnskurs allmenne og økonomiske/administrative fag

Oslo, desember 1993
Kirke-, utdannings- og forskningsdepartementet

Forord

Læreplanverket for videregående opplæring omfatter all opplæring under

- lov om videregående opplæring
- lov om fagopplæring i arbeidslivet

Læreplanverket består av to deler:

1. Læreplan, generell del, for grunnskole, videregående opplæring og voksenopplæring.
Generell del angir overordnede mål og retningslinjer for den samlede virksomheten i grunnskolen og videregående opplæring.
2. Læreplaner for videregående opplæring.

Denne læreplan gjelder for grunnkurs allmenne og økonomiske/administrative fag.

Denne læreplanen skal inngå som en del av læreplanene for de ulike opplæringsløp. Når læreplanene for alle løp foreligger, vil de enkelte læreplaner bli satt sammen til én læreplan for hvert opplæringsløp. Det innebærer at det må foretas enkelte justeringer i kapittel 1 og i vedlegg. I denne forbindelse vil det også bli vurdert om det er elementer i læreplanene som overlapper hverandre. Språklig gjennomgang vil bli foretatt når den

endelige plan foreligger. Veiledende utstyrlister, metodiske veiledninger, oversikt over opplæringstilbud og annen informasjon om videregående opplæring vil bli utgitt separat.

Departementet forventer at skolene i løpet av en overgangsperiode på 5 år fra 01.08.94 har skaffet nødvendig utstyr til å kunne bruke informasjonsteknologi i opplæringen.

Denne læreplanen er midlertidig fastsatt fram til de endelige læreplaner for de ulike opplæringsløp foreligger.

Kirke-, utdannings- og forskningsdepartementet, 06.12.93

Innhold

Kapittel 1: _____ Generell informasjon

1

1.1 Innledning

1

1.2 Faget økonomi og informasjonsbehandling

2

Kapittel 2: _____ Mål og hovedmomenter

3

2.1 Felles mål for modul 1 og 2

3

2.2 Informasjonsbehandling

4

2.3 Økonomi

5

Kapittel 3: _____ Vurdering

8

3.1 Hvorfor vurdering?

8

3.2 Hva skal vurderes?

8

3.3 Hvordan skal vurdering skje?

8

3.4 Spesielle forhold som gjelder faget

9

Vedlegg 1 _____

Moduler
10**Vedlegg 2** _____**Vurderingsordninger**
11***Kapittel 1: Generell informasjon******1.1 Innledning***

Økonomiske oppstillinger - i første rekke oversikter over leveranser til templene i det gamle Babylon - er over 4000 år gamle og nedfelt i kileskrift på steintavler. Oversikt over hva en har og hva en skylder er en av de viktigste beregningene vi foretar, både for å holde våre forpliktelser overfor andre og for å kunne prioritere innenfor gitte og realistiske rammer.

Ordet *økonomi* er gresk og er en sammensetning av substantivet oikos (hus, i betydningen: husets ressurser) og verbet nemein (forvalte). Økonomi er læren om forvaltning av ressurser. All vår økonomi, vår forvaltning av ressurser, må måles opp mot en bærekraftig utvikling lokalt, nasjonalt og globalt.

Kjernen i økonomisk tenking er at ressurser er begrenset og at prioriteringer vil få konsekvenser for mennesker og miljø i nåtid og fremtid. Dette perspektivet er viktig både når det gjelder personlig økonomi, bedriftens økonomi og samfunnets økonomi.

Kunnskap om regnskap og økonomi skal gjøre det lettere å skaffe seg oversikt over sammenhengene mellom alternative anvendelser av ressurser og om konsekvensene av valg.

Enkeltindividet eller familien som økonomisk enhet har vanligvis ikke oversikt og muligheter til alltid å handle innenfor et globalt perspektiv. Det gjelder også for bedrifter og enkeltsamfunn. Det er ikke alltid lett å vite hva som er det riktige i globalt perspektiv. Det er innenfor økonomisk tenkning en rekke ideologiske retninger som til dels har helt motsatte syn på hva som er riktig og ikke riktig forvaltning av ressursene.

Samfunnet, gjennom de offentlige myndigheter, har som en vesentlig oppgave å legge forholdene til rette slik at økonomien sett under ett er effektiv og bærekraftig. Når staten legger rammebetingelser for forbrukere og bedrifter, er det viktig å ta hensyn til negative sider av økonomisk virksomhet - fremfor alt til miljøskader. Dette er oppgaver som krever økte kunnskaper om sammenhengene mellom økonomi, økologi og teknologi. I læreplanens generelle del er dette formulert slik:

"Samspillet mellom økonomi, økologi og teknologi stiller vår tid overfor særlig kunnskaps-messige og moralske utfordringer for å sikre en bærekraftig utvikling. Denne må ta utgangspunkt i de begrensninger natur, ressurser, teknologisk nivå og sosiale forhold setter og i de konflikter som utløses når miljøhensyn skal prioriteres"

Dersom elevene tar aktivt del med de kunnskaper, holdninger og ferdigheter dette kurset formidler, vil det være et steg på veien for å møte disse utfordringene. Det er viktig at eleven bevisst retter oppmerksomheten i første rekke mot seg selv som forbruker og ressursforvalter, og deretter ser på bedriften. I tillegg skal elevene ha elementære kunnskaper om det offentliges forvaltning og fordeling av ressurser.

Opplæringen må være slik at den *"gir den enkelte kraft til å ta hånd om eget liv, forpliktelse overfor samfunnslivet og omsorg for livsmiljøet."*

Elevene må også få kjennskap til teknologiens historiske bakgrunn og de muligheter og begrensninger som teknologien har. Læreplanens generelle del sier blant annet følgende om teknologi:

Fremveksten av ny teknologi utvikler redskaper, næringsveier, samfunnsformer og åndsliv. Det er en vesentlig del av allmenndannelsen å kjenne vår teknologiske kulturarv.

1.2 Faget økonomi og informasjonsbehandling

Faget økonomi og informasjonsbehandling er et felles allmennt fag på grunnkurset i studie-retning for allmenne- og økonomiske/administrative fag.

Faget har totalt 187 årstimer (gjennomsnittlig 5 uketimer) fordelt på to moduler.

Modulen *økonomi* er på 112 årstimer (gjennomsnittlig 3 uketimer), og modulen *informasjonsbehandling* er på 75 årstimer (gjennomsnittlig 2 uketimer).

Faget skal gi elevene grunnleggende kunnskaper om økonomisk viten, og gi dem kompetanse til å foreta enkle økonomiske prioriteringer og bevissthet om at prioriteringer har økonomiske, miljømessige og fordelingsmessige konsekvenser.

I økonomidelen blir hovedvekten lagt på på enkeltindividet og bedriften som forvalter av ressurser. Som forbruker er det viktig å være klar over plikter og rettigheter i et omskiftelig samfunn. Økonomien både til enkeltforbruker, til bedrifter og til samfunnet er i mange tilfeller avhengig av internasjonal økonomi, og de svinginger som kan komme vil gi samfunnet preg av økonomisk oppgang- eller nedgangstider. For i størst mulig grad å dempe virkningene av nedgangstider er det viktig å være en bevisst forbruker.

Informasjonsbehandling har i dag en bred plass i yrkeslivet og i samfunnet forøvrig.

Opplæring i informasjonsbehandling skal gi elevene en felles referanseramme, slik at de kan anvende tekstbehandling og regneark, og kunne forstå grunnprinsippene ved bruk av data-baser. Elevene skal vise at de forstår at det er både muligheter og begrensninger i bruk av informasjonsteknologi, og ha kjennskap til de juridiske, etiske og miljømessige aspektene ved bruk av teknologi.

Et av målene med dette kurset er å gi elevene en grunnleggende innsikt i helhetlig økonomisk tenkning slik at interesse og nysgjerrighet for videre studier av fagområdet økonomi blir vekket.

Kapittel 2: Mål og hovedmomenter

2.1 Felles mål for modul 1 og 2

Faget er beskrevet i 5 mål. Målene gjenspeiler de to hoveddelene i faget - økonomi og informasjonsbehandling.

Etter endt grunnkurs skal elevene

- kunne beherske et tastatur og bruke informasjonsteknologi som verktøy i ulike sammenhenger
- ha forståelse for muligheter og samfunnsmessige konsekvenser ved bruk av informasjonsteknologien (IT)
- ha en grunnleggende forståelse for personlig økonomi og forbrukerspørsmål og være i stand til å utnytte sine ressurser på en god og ansvarsfull måte
- ha innsikt i etiske problemstillinger knyttet til personens/husholdningens, foreningens og bedriftens økonomiske aktivitet
- kunne bruke sin innsikt i egen økonomi som grunnlag for forståelse for økonomien i bedriften og samfunnet
- ha en grunnleggende forståelse for de økonomiske sammenhengene i en bedrift og mellom bedriften og samfunnet
- ha kjennskap til etiske problemstillinger knyttet til forholdet mellom økonomi, økologi og en solidarisk ressursfordeling, nasjonalt og internasjonalt
- arbeide selvstendig, men også kommunisere og samarbeide med andre elever og lærere
- kunne vise oppfinnsomhet og evne til nyskaping i arbeidet med faget
- ta ansvar for egen læring

- ha grunnlag for valg av videre økonomisk/administrativ og allemennfaglig utdanning

2.2 Informasjonsbehandling

Mål 1 - IT som verktøy

Elevene skal etter endt grunnkurs kunne bruke IT for behandling av tekst og tall.

De skal kunne gjøre bruk av ulike programvare for å løse oppgaver på egen hånd.

Hovedmomenter

Elevene skal

- 1a kunne beherske et tastatur på en effektiv måte etter Touch-metoden*
- 1b kjenne til en datamaskins virkemåte, enkle funksjoner i et operativsystem og til sikkerhetsrutiner i forbindelse med oppbevaring av data
- 1c kunne bruke et vanlig tekstbehandlingsprogram til å skrive, redigere, lagre og hente fram tekster (brev, rapporter, referater o.l.)
- 1d kunne enkel bruk av regnearkprogram til å lage og bruke enkle modeller
- 1e kunne søke i interne databaser og kjenne til mulighetene for innhenting av informasjon fra eksterne databaser

* Touch-innlæringen skal ikke overskride 20 timer.

Mål 2 - IT i samfunnet

Elevene skal ha forståelse for sammenhengen mellom den teknologiske utviklingen

og de samfunnsmessige konsekvenser ved bruk av IT. Videre skal de kjenne til sikker-hetsrutiner, lover/avtaler m.h.t. IT.

Hovedmomenter

Elevene skal

- 2a ha kjennskap til de muligheter og begrensninger som IT gir for bedriften og samfunnet for øvrig
- 2b ha kjennskap til lover og avtaleverk (personvern, arbeidsmiljø, opphavsrett) i forbindelse med IT
- 2c kjenne til ergonomi og belastningsskader i forhold til bruk av PC

2.3 Økonomi

Mål 3 - Personen/husholdningen

Elevene skal ha grunnleggende kunnskaper om personlig økonomi og forbruker-spørsmål, slik at de kan ta bevisste og økonomisk fornuftige valg. De må vise en etisk og miljømessig bevissthet som viktige korrektiver til det å opptre egennyttig.

Elevene skal gjennom sine handlinger og valg kunne utnytte sine ressurser på en best mulig måte. De skal kunne bruke IT til å løse problemer, der utstyr er tilgjengelig.

Hovedmomenter

Elevene skal

- 3a kunne vurdere egne behov, holdninger, verdier og livsstil, og forstå nødvendigheten av etiske og miljømessige hensyn i sine økonomiske valg
- 3b kunne beregne inntekt, skattetrekk og feriepenger som grunnlag for egen økonomiplanlegging

- 3c kunne sette opp budsjett og regnskap som ledd i egen planlegging på kort og lang sikt
- 3d kunne foreta renteberegning og sammenligning av de vanligste spareformer
- 3e kunne beregne og forstå de økonomiske konsekvensene av låneopptak, kredittkjøp og bruk av kredittkort
- 3f kjenne betydningen av de vanligste kontrakter ved kjøp av varer og tjenester
- 3g ha kjennskap til de vanligste betalingsformer
- 3i kjenne hovedinnholdet i de viktigste forbrukerlovene og kunne bruke dem i aktuelle situasjoner
- 3j kjenne til ulike årsaker til at inntekter kan falle bort og at disse årsakene kan ligge på personlig plan, bedriftsplan og samfunnsplan. Videre skal elevene kjenne til de muligheter offentlige myndigheter har for å lette den enkeltes håndtering av endret økonomisk situasjon

Mål 4 - Foreningen/laget

Elevene skal ha kunnskaper som setter dem i stand til å delta i en forening eller et lags aktiviteter som for eksempel å ha ansvar for inn- og utbetalinger, føre regnskap og delta i beslutninger som har økonomiske konsekvenser.

Hovedmomenter

Elevene skal

- 4a kunne føre og avslutte et enkelt regnskap for en forening eller et lag
- 4b kunne forstå det økonomiske ansvaret som følger med tillitsverv i en forening eller et lag

Mål 5 - Bedriften

Elevene skal ha grunnleggende forståelse for de muligheter og krav som er knyttet til etablering og økonomisk styring av en bedrift. De skal kjenne til aktuelle prioriteringer og interessekonflikter som bedrifter må håndtere. I tillegg skal elevene kjenne til bedriftens rolle som ressursforvalter i samspillet mellom økonomi, økologi og teknologi. Elevene skal kunne bruke IT til å løse problemer, der utstyr er tilgjengelig.

Hovedmomenter

Elevene skal

5a som bakgrunn for en grunnleggende forståelse for økonomisk styring av en bedrift:

- ha kjennskap til hvordan ny virksomhet etableres med utgangspunkt i en forretningside
- kunne utføre enkle beregninger knyttet til prissetting, kalkulasjon og investering
- kunne sette opp og tolke enkle regnskap og budsjetter med hovedvekt på resultat og balanse

5b kjenne til bedriftenes bidrag og forpliktelser til sysselsetting og verdiskaping

5c kunne bruke enkle regnearkmodeller til å vurdere alternativer og analysere konsekvenser av endrede forutsetninger

5d kjenne til de vanligste etiske og miljømessige problemstillinger som kan oppstå i en bedrift

5e kjenne til formålet med revisjon

Mål 6 - Samfunnet

Elevene skal få en grunnleggende forståelse for at samfunnets ressurser er begrenset og at prioriteringer vil få konsekvenser for mennesker og miljø både i nåtid og framtid.

Hovedmomenter

Elevene skal

- 6a ha kjennskap til hva som styrer ressursbruken i et land som Norge (markedsstyring, offentlig styring og organisasjoners innflytelse på ressursbruken) og sammenhengen mellom ressurstilgang og ressursbruk
- 6b forstå miljøkonsekvenser av beslutninger om produksjon og forbruk (bærekraftig utvikling) og betydningen av kollektive tiltak i miljøpolitikken
- 6c ha kjennskap til norsk økonomis avhengighet av internasjonal økonomi
- 6d ha kjennskap til de globale miljøproblemer og fordelingskonflikter mellom rike og fattige land, og kjenne til hvordan økonomiske virkemidler kan brukes for å løse disse problemene

Kapittel 3: Vurdering

3.1 Hvorfor vurdering?

Formålet med vurdering er å sikre en nasjonal standard i opplæringen, slik at vi får et godt og likeverdig opplæringstilbud for alle. Vurdering innebærer at resultatet av opplæringen vurderes i lys av de mål som er formulert i læreplanen.

Vurdering vil ha ulike hensikter, bl.a.

- å informere eleven, foresatte, lærer og opplæringssted i arbeidet fram mot et læringsmål, om hvor langt eleven er kommet i utvikling fram mot en kompetanse
- å veilede, motivere og utvikle eleven

- å motivere læreren til kontinuerlig å vurdere sin undervisningspraksis
- å informere samfunnet, arbeidslivet og videre utdanning om hvilken kompetanse eleven har oppnådd

3.2 Hva skal vurderes?

- **Målene for opplæringen** slik de er fastsatt i den generelle delen av læreplanen og i kapittel 2 i denne læreplanen, danner utgangspunkt for vurderingen.
- Det er elevens/lærlingens **helhetlige kompetanse** som skal vurderes, slik den er beskrevet i opplæringens mål.
- Vurderingen av eleven/lærlingen skal vise **i hvilken grad** hun/han har nådd målene i læreplanen.

3.3 Hvordan skal vurdering skje?

Det skilles mellom to hovedtyper vurdering:

- Vurdering underveis.
- Avsluttende vurdering.

Vurdering underveis har til hensikt å informere og motivere elever/lærlinger og lærere i arbeidet med å nå opplæringsmålene. Slik vurdering kan være formell eller uformell. Et nyttig hjelpemiddel i vurderingsarbeidet underveis kan være at eleven fører arbeidsbok, loggbok, dagbok e.l. knyttet til gjennomføring av opplæringen. Formell vurdering underveis kommer til uttrykk i terminkarakterer. Lærere vil finne ideer og hjelp til vurderingsarbeidet i en metodisk veiledning.

Avsluttende vurdering kommer til uttrykk i en standpunktkarakter og i et dokumentert resultat av en avsluttende eksamen.

3.4 Spesielle forhold som gjelder faget

Eksamen skal være knyttet til mål og hovedmomenter for faget.

Ved vurdering må det legges vekt på elevenes evne til å anvende teoretiske kunnskaper til løsning av problemorienterte oppgaver.

Elevene skal gjennom skoleåret gjennomføre ett eller flere prosjektarbeid. I minst ett av prosjektarbeidene skal flere fag inngå.

Vi viser ellers til vedlegg 2 - Vurderingsordninger.

Vedlegg 1

Moduler

Det felles allmenne faget Økonomi og informasjonsbehandling på gjennomsnittlig 5 uketimer kan deles i to moduler:

Moduler	Årstimer	(gjennomsnitt uketimer)
Modul 1: Mål 1 og 2	75	2
Modul 2: Mål 3, 4, 5 og 6	112	3

Merknad til vedlegg 1

Utgangspunkt for undervisningstimetallet er samlet timetall på årsbasis (Årstimer). Gjennomsnittlige uketimer er årstimetall dividert på 38. Konf. arbeidstidsavtalen hvor det forutsettes at undervisningen skal legges over 190 dager fordelt på 38 uker*

*Spesielt organiserte tilbud for voksne kan gjennomføres på kortere tid (komprimerte løp). For grupper eller enkeltelever som har behov for det, kan opplæringen strekkes over lengre tid.

Vedlegg 2

Vurderingsordninger

Standpunktkarakter

Det gis én standpunktkarakter i faget.
Resultat av prosjektarbeid skal inngå i standpunktkarakteren.

Eksamen

Elevene kan trekkes ut til skriftlig og/eller muntlig/praktisk eksamen.
Skriftlige eksamensoppgaver utarbeides sentralt med sentral sensur.
Oppgaver til muntlig/praktisk eksamen utarbeides lokalt etter sentrale retningslinjer.
Lokal sensur med ekstern sensor.

Det skal være mulig å avlegge privatisteksamen etter retningslinjer gitt av departementet.

Retningslinjer for den praktiske gjennomføringen av eksamen vil bli gitt i egne skriv.

A.2 Observasjon

A.1.1 Observasjon 1 hos Oslo Katedralskole

12/3 2004

Klasse 1b

Lærer; *Knut Skrindo*.

Timen starter med litt skryt av teateret som akkurat er avsluttet. Deretter rett på oppgaver. Forrige time hadde de gått gjennom kapitelet om Investerings kalkyler. Oppgaven går ut på å sjekke om det vil lønne seg for personene i eksempelet. Eks: to personer har kjøpt seg et stereoanlegg til 30.000,- og selger det for 6000,-. Vil det da lønne seg?

Elevene hjelper hverandre og deler bøker. Når de sitter fast med noe spør de læreren. I dag er de to lærere i klassen. Klassen er på 25 elever. Det var 23 til stede.

Jeg får inntrykk av at noe av problemet kan være at de ikke helt er med på matten bak oppgaven. At det er det matematiske som kan være litt vanskelig. Men så forteller lærer at noe av vitsen med denne typen oppgave er å få elevene til å forstå at cellene i regnearket "henger sammen", at de oppdateres hvis verdien i en annen celle forandres. (Forskjell på å lære seg program og å lære seg matten en trenger for å kunne løse oppgavene.)

- Kunne begge for å kunne bruke et regneark.

(Litt utenom faglig tull; de har en nynorsk oppgave som skal leveres inn samme dag. Ikke alle er ferdige med den.)

Flere stiller spørsmål om hvilke tall som skal fylles inn i hvilke celler. De "flinkeste" elevene skriver ned skjemaet på s 241 og fyller ut med det som er på s 243. Knut (lærer) sier at han regner med at det er noen som ikke kommer til å klare oppgavene. Personlig synes jeg tanken bak oppgavene virker vanskeligere enn programmet. Så er jo også programmet i bruk for å lette utførelsen av oppgavene som gis.

Dynamiske celler, -> 'koble' celler – formler. At innholdet forandrer seg i andre celler når en forandrer verdier i en celle som er ”brukt” for å gi verdi i en annen celle.

Etter en stund så går Knut gjennom oppgaven i plenum. Det går helt greit. Han spør hele tiden elevene hva han skal skrive i regnearket.

A.1.2 Observasjon 2 hos Oslo Katedralskole

Tirsdag 23/3 2004.

I dag skulle klassen forberede seg til heldags-prøve på torsdag. De får utdelt et ark med ufullstendige oppgaver som skal hjelpe dem med hva de trenger å kunne til torsdag. Dette er oppgaver de får på prøven, men da får de også resten av dataene som gjør at de kan regne ut oppgavene. Prøven skal gjøres i Excel. De sperrer en ruter så de ikke får tilgang til Internet under prøven. Ideen er at de kan starte å lage modeller som de kan bruke på prøven. De har jobbet med liknende oppgaver tidligere og ved hjelp av dette oppgave arket skal de kunne lage modeller som de på torsdag bare trenger å sette de riktige verdiene inn i riktige celler.

En del av spørsmålene handler om det faglige. Veldig mange spørsmål handler om hva som kan være ”utvidelsen” av arket de har fått utdelt.

Alle er flinke til å samarbeide og hjelpe hverandre hvis det trengs. Sammen prøver de å komme frem til hvilke verdier de mangler for å få hele modeller. De skriver de opp og regner med at de får på prøven.

En elev har bedt om hjelp av en med-elev, hvor på med-eleven blir irritert og frustrert. Og sier ”jeg sa jeg skulle hjelpe deg, men og at du må lese dette og prøve å lære det selv! Sett deg og LES! Her; ta boken min, og les!”

Ellers er det en del utenom faglig aktivitet; mye surfing på nett.

Elevene klager på at maskinparken er foreldet. Diskettstasjonene fungerer kun på lærerens maskin, som kan gjøre det vanskelig for elever som vil jobbe med modellene hjemme før prøven og ta de med på diskett hjemmefra. Til daglig får de lov å bruke lærers maskin til dette, men hvis hele klassen (25 stk) vil gjøre dette vil det ta for mye tid.

Timen blir avsluttet før tiden fordi det skal komme informasjon til elevene over høyttaler -nett. Høyttaleren gir veldig svak lyd og alle må

stille seg tett inntil for å høre noe. Kort tid etter ringer det ut til friminutt.

A.1.3 Observasjon av Excel Grunnkurs på Rikshospitalet

Dag en av kurset

4 feb. 2004.

Kursholder har ikke fått beskjed om at jeg kommer.

Han heter Hans Peter Grieg. Voksen, ca 50/60 år.

Stedet: Kurset holdes i RH's lokaler i Forskningsveien i Oslo. Det ligger ca 10 min fra RH. Rommet er lyst i en vennlig lys gul farge. Vanlig klasseroms oppstilling av maskiner og lærerens bord. Det er en konstant summing fra maskinene. 10 minutters pause per time og $\frac{3}{4}$ time lunch. God lufting i rommet selv om det ikke er noen vinduer, nesten kaldt.

Han foreslår et lunch tidspunkt for å sjekke om det passer for alle, og for å prøve å vente på at noen flere skal rekke å komme før han starter ordentlig. Ved hver terminal ligger en arbeidsbok. Instruktør forteller at det er en bok de skal bruke under kurset og at de kan ta den med seg etter kursslutt. Han oppfordrer til å notere i den.

Instruktørens skjerm bilde er prosjektert opp på veggen slik at alle kan se hva han gjør på sin terminal. Han kan også låse bildet slik at han kan jobbe med en oppgave uten at deltagerne ser det og deretter vise det.

Det er en mild dag. Veiene er veldig glatte og mange er forsinket.

Han begynner å snakke om tema for kurset. Folk kommer etter hvert.

Han bruker analogi for "bøkene". (Book 1) – papir remser. Excel er en avansert regnemaskin.

Går igjennom kryss og firkant i høyre hjørne.

Deretter gjennomgang av innholdsfortegnelse, hva som er viktig og hva som er litt mindre viktig.

Antar at deltagere er kjent med bruk av mus og tastatur.

Gjennomgang av hva folk forventer av et Excel-kurs. Hva de ønsker å lære og behøver å lære.

- Brukt Excel og Word hjemme og på jobb. (Avdeling: Sikkerhet)
- Brukt Excel (Avdeling: Radiologisk)
- Trenger Excel på jobb, bruker Word. (Avdeling: Medisinsk lab)
- Brukt Excel. Lære mer om modeller i Excel. (Avdeling: Intensiv)
- Excel er nytt. Ganske ny i den stillingen. (Avdeling: Intensiv)
- Bruker Excel. Mye Word og turnus program. (Avdeling: Steril sentralen)
- Bruker Excel, men trenger basis kunnskap. (Avdeling: Transport)
- Skal bruke Excel. (Hovedfag, Farmasi)
- Bruker Excel daglig, men trenger å få bedre utbytte av det. (Avdeling: -)
- Bruker Word, men vil gjerne lære Excel. (Avdeling: -)

Gjennomgang av skjermbilde på første side i boken. Likner mye på Word. Forklarer igjen at musemarkøren forandrer seg avhengig av hvor man peker. F. eks at når man peker på ulike deler av en celle så forandrer markøren seg og kan gjøre ulike ting med cellen.

Folk lytter og ser. De gjør noen av de tingene instruktøren gjør for å teste ut om de får samme resultat. Noen sitter og leser avisen på nett.

Han anbefaler pugging av navigasjon i Excel.

Han forklarer videre om hvordan man setter opp enkle regnestykker. Hvordan formlene begynner med ”=”. At man kan skrive hele regnestykket i cellen og at det som synes i cellen er svaret. Ønsker man å se hvordan man kom frem til det som står i cellen, klikker man på den og i formellinjen står det hvilke tall som er brukt.

APPENDIX

Noen av deltagerne noterer i bøkene sine. Noen logger seg inn på e-post klienter for å sjekke om det er kommet noe nytt. En kvinne reiser seg plutselig opp og forklarer at hun skal bare ha seg litt kaffe. Instruktøren spør om ikke hun kan vente til pausen, det er bare ca ti minutter til pausen? Men hun bare smiler og sier nei og forsvinner ut av værelset for å finne seg kaffe.

Det er ikke alltid lett å se ved første øyekast om det i cellen er en variabel ("150") eller en formel ("D2+C4"). Derfor bør man alltid titte på formellinjen for å være sikker.

Klokken er ca 11.00. De får en oppgave å bryne seg på. Den går ut på å legge sammen to tall, og å dele et tall på et annet. Litt enkel regning med tall i regnearket. En øvelse på å lage formler. I denne oppgaven er det kun å skrive tall og operatør (+, -, /, *) i cellen.

Det forløper ganske greit. Ingen har problemer med dette. Etter en liten stund hvor instruktøren føler at de har klart å komme igjennom oppgavene går han gjennom fremgangsmåten på sin maskin. De følger nøye med. Litt mer oppmerksomme enn tidligere. Virker spent på om de har klart alt slik som han viser.

Σ - Etter oppgaven går han videre og forklarer summeringsfunksjonen. Når han forklarer på sin maskin (vist på veggen) virker det veldig enkelt. Men når de skal forsøke selv er det litt vanskeligere. Først må de skrive inn en rekke med tall. Deretter skal de velge en celle hvor de vil ha summen, og så trykke på Σ - knappen og så sjekke om rekken er riktig og deretter på Σ - knappen for å bekrefte hvis dette er riktig. Sekvensen er litt lang og noen "går seg litt bort" i de ulike aksjonene og forandrer litt på rekkefølgen. Knappen er hos noen "stilt inn på" en annen funksjon enn sum. Dette skaper først forvirring når de ser at resultatet deres er ulikt fra hva instruktøren får.

Knappen kan også gi mange andre funksjoner og det kommer frem av spørreskjemaene at dette er det de fleste gjerne vil ha mer om.

Så fort instruktøren oppdager at ikke alle sum - knappene var innstilt på summering av tallene forklarer han raskt hvordan de skal velge summering og titter raskt på alle de andre funksjonene denne knappen kan tilby. Dette er noe de går nærmere inn på i et videregående kurs.

Instruktøren forklarer at hvis man vet hvor verdiene man ønsker å gjøre noe med er så kan man bruke "Navneboksen" og angi hvilke celler det gjelder. Veldig nytting hvis man har et stort regneark man jobber med. Man kan også angi en del av en rad man ønsker å summere. Man kan legge til at ofte er det best å bruke markøren og klikke på de cellene man vil ha slik at man unngår å ta feil.

Dette testes av deltakerne. Noen bruker tiden på å lese litt avis på nett. Ellers er dette en øvelse som alle synes går greit.

Lunch

Etter lunch begynner instruktøren med en gang med en oppgave. De skal lage en matrise for en avdeling. Måneder langs raden og avdeling langs kolonene.

For å fortsette på denne oppgaven er det nødvendig at folk kan lagre filer. Instruktøren spør derfor om alle kan dette. De fleste svarer ja. Men når de skal lagre det et sted hvor de senere kan finne det igjen blir det litt tull. Alle på RH har et eget område som de kan bruke. De lagrer litt vilkårlig og mange har litt vanskeligheter når de prøver å hente det frem igjen. De som klarer å lagre det på sitt område på RH (disc) gjør det, men de andre lagrer på det temporære området som er satt av til denne undervisningen. Ikke alle som har egen plass klarte å få tilgang til den og de måtte også lagre på det temporære området. Det som er synd med dette er at de har da liten mulighet til å finne frem til de gamle oppgavene etter kursslutt. Instruktøren så at de kunne ta med seg en diskett og lagre på men jeg så ingen som faktisk gjorde det. (*Ville de faktisk bruke det som et supplement til læreboken hvis de hadde hatt oppgavene lett tilgjengelig på sin maskin / sitt område?*) Noen surfer på nett mens instruktøren forklarer. De henter seg lett inn igjen. Det viser seg at de fleste av de som surfer gjør det fordi undervisningen blir for grundig. En person fortalte at han kun tok kurset fordi han måtte ha det grunnleggende før han kunne ta det videregående kurset.

De fortsetter med å lage tabellen. De skal skrive ned det instruktøren viser på sin skjerm. En kommer ved et uhell nær en eller annen tast og har klart å fjerne alt. Men hun hadde ikke kommet så langt på modellen så hun hentet seg for inn igjen.

Med denne modellen vil instruktøren vise hvordan man kan kopiere handlingen "summering" til flere koloner.

Når deltagerne begynner med dette viser flere av dem at de er kjent med Word. Mange av hurtigtastene fra Word er de samme i Excel og det er mange som kan disse.

Deretter skal de plassere gjennomsnittet i en celle. En som ikke fulgte med på forklaringen gikk glipp av hvilken knapp som ble brukt. Hun turte ikke (ville ikke?) si fra. Ingen tegn til at sidemannen vil hjelpe. I pausen sier hun fra til instruktøren som hjelper henne. (Dette er samme dame som om morgenen forsvant ut av klasserommet for å hente seg kaffe. Mulig at sidemannen er litt mindre villig til å hjelpe når hun ganske tydelig gjør ting som å surfe og derfor ikke får med seg alt.)

Undervisningen fortsetter. Personen som hadde problemer tidligere har igjen begynt å gjøre ting som gjør at hun ikke klarer å følge med. (*Kan det være språkproblemer? Men hun snakker greit med de andre i pausen...*) Fremdeles ingen hjelp fra sidemannen.

De går over til et nytt tema; tallformater. Alle blir opp på angitt side. Forsamlingen er veldig stille. Ingen sier noe. Litt forklaring av formater av tekst (**bold**, *kursiv* og farger). Noen følger ikke helt med. Litt i sine egne tanker, noen opptatt av ting på nett. (*Hadde det vært en ide å ikke være koblet til nett under undervisningen? Kunne læreren hatt mulighet til å kutte ut tilkoblingen til nett. Men de er jo voksne mennesker som er der av fri vilje. Man skulle tro at de ville konsentrere seg om kurset.*)

Spørsmål fra deltager om klokkeformat og kolon i celler. Deltagerne følger med på spørsmålet og forklaringen. Når instruktøren fortsetter begynner noen igjen å surfe på nett.

Diagram

Fremdeles noen som ikke følger med. Det er litt av og på om de følger med.

Alle klikker i vei på diagrammene og ser hva som skjer.

Mens alle holder på og klikker spør en av deltagerne om hjelp til praktiske oppgaver hun støter på i hverdagen på jobb.

Manipulere diagrammer. Instruktøren forklarer at man kan klikke på ønsket søyle en gang og på den måten merke alle. Ved å klikke to ganger kan man bevege søylen og diagrammet beveger seg også. Dette blir godt mottatt av deltagerne og de klikker for å se alt de kan gjøre.

Instruktøren gir en lekse til i morgen; lese side 1 til 40. Kl 1450 avslutter han, men blir igjen for de som har spørsmål. Noen spør om hva som er på planen for i morgen. Men de fleste forter seg å pakke sammen tingene sine og gå.

Dag to av kurset

5. februar 2004

Når deltagerne kommer logger de seg på samme terminalen de satt på i går. De surfer og ser litt på de tingene de gjorde i går. Noen står ute i gangen og prater litt over en kaffe kopp. I gangen er det muligheter til å kjøpe seg te eller kaffe for en billig penge.

Instruktøren starter dagen med å ta opp gårsdagen. Var det noen som ønsket noe repetert? Ikke så veldig stor respons, men han tar allikevel en rask repetisjon.

For de som synes progresjonen er litt treg forklarer instruktøren at dette er et grunnleggende kurs hvor forkunnskaper i Excel ikke nødvendig, derfor vil noen synes det går litt tregt.

I dag skal de lære om absolutte referanser.

De får i oppgave å lage en liten tabell med fire navn x tre måneder. Lærer gjør dette veldig fort og mange har litt problemer med å følge med. De har glemt noen av de short cuts de lærte i går.

En person kopierer tallene rett av tavlen uten å skjønne at *sum*, alles lønn pr mnd, er en formel og at 1. kvartal er summen av alle månedene. Hun har heller ikke slått av telefonen sin. (Dette er samme person som i går gikk ut midt i timen for å hente seg kaffe). Hun får heller ikke med seg når instruktøren forklarer hvordan han har gjort det på tavlen.

Det er flere som ikke husker hvordan de lager enkle formler. *Det overrasker meg. Jeg som har sittet stille bakerst og tatt notater husker helt tydelig det han forklarte i går. Hadde de husket det lettere hvis de ikke hadde sittet foran en terminal? Er den litt forstyrrende?*

Instruktøren påpeker at det er bedre hvis de "klikker" når de lager formler enn å skrive inn celle-destinasjon i formler.

Hun som har med problemer snakker under forklaringen til instruktøren. En av de som får med seg det meste, forteller hvordan hun får denne formelen videre.

Klikk og dra og formelen blir kopiert til de andre cellene. Hun som ikke henger med fikk det ikke med seg. Hun får hjelp av sidemannen og er i dag flinkere til å spørre hvis hun lurer på noe.

Oppgave: Legge seg selv inn i oppgaven de har holdt på med. De skal selv bestemme hvor i skjemaet de skal legge dette. Dette går veldig enkelt for de fleste. Deretter skal de lagre. Hun som har litt problemer klarer ikke å lagre. Vet ikke om hun selv oppdager det.

Instruktøren går videre i undervisningen. De skal starte med et nytt ark. Ikke alle hører hva han sier; hun er nok mer opptatt av forrige oppgave. På det nye arket skal de øve seg på muspekeren. Den blir "hvit pil", "hvitt kryss" eller "sort kryss" alt etter hvor på en celle man holder muspekeren.

"Klikk og dra" blir forklart grundig. Veldig grundig. Det er rart å se at hun fremdeles ikke får det til.

Instruktøren gir en oppgave. Den er nesten lik som den forrige, men de skal bruke "klikk og dra" metoden for å fylle ut de verdier som kan fylles ut på den måten.

Alle jobber med å lage det nye skjemaet.

Spørsmål fra salen: Kan man angi både dag og dato i en og samme celle?

Ja, -meny, format, format celler. ddd dd.mmm.åå

Deretter gjør alle dette. De bruker ikke lang tid på dette.

Neste punkt på planen er "Absolutt adressering". For å forklare hva som er flott med absolutt adressering gir instruktøren dem en oppgave hvor de skal kopiere en formel fra en celle til flere celler. Men det som skjer er at innholdet i cellene forskyves. "E3/E8" forskyves og blir til "E4/E9". Altså lurt å kunne låse en verdi.

Dette er en funksjon som er veldig nyttig. Noen kjeder seg under forklaringen og surfer. Hun som har hatt litt problemer har fulgt nøye med, men allikevel skjønner hun ikke hvordan hun skal klare å lage en formel som brukes nedover i tabellen.

Alle lagrer og åpner et nytt ark. Nye oppgaven går ut på å finn utgiftene en røyker har.

Noen tall til skjemaet får de oppgitt. Disse skal de bruke i formler og fylle ut resten av skjemaet.

Hun som vanlig vis har problemer klarte dette veldig greit. Men når dette tas i plenum snakker hun (høyt) hele tiden selv om det er noen andre som blir spurt.

Lunch

Etter lunch fortsetter de litt med tabellen. Forandrer litt på variablene for å se at ting er avhengige av hverandre.

Deretter snakker han litt om frysing av formler. Dette er lurt hvis du skal lage et skjema som andre også skal kunne fylle inn i. Ikke alltid lett og se om et tall i en celle er et enkelt tall eller en formel. –markere de cellene som ikke skal beskyttes og deretter beskytte regnearket. Mange jobber

selvstendig med dette. Prøver nye ting, sjekker at det faktisk er beskyttet. Andre gjør bare det instruktøren viser.

Instruktøren går over til å forklare nytten ved fx -formler. Det er mange ulike typer en kan velge. Han skal forklare HVIS- logisk setning. HVIS er ikke en enkel ting hvis man ikke har erfaring fra liknende måter å tenke på fra før. Selv om han viser akkurat hva de skal gjøre så knoter flere. Jeg tror det som er vanskelig i denne situasjonen er hvordan de skal tenke for å komme frem til hva de skal plassere hvor i HVIS –setningen. Omtrent 5 stykker har fått det til. De surfer litt mens de venter på å gå videre.

Instruktøren går over til å vise noen av de nyttigste funksjonene som Excel tilbyr. Sammenhenger er veldig greit så man ikke går seg bort i mange formler som er avhengige av andre formler igjen. Mange i rommet er overrasket over denne funksjonen og ser nytten av den.

Nå skal de lære hvordan de kobler to ark sammen. De får beskjed om å sette navn på arkene sine. Ikke alle får med seg at de skal sette navn på arkene. *Lurer litt på hvorfor hun ikke får det med seg.* Dette er litt mer komplisert for alle, men de fleste får det til. Mange flere trenger hjelp. Fem som får hjelp av instruktøren, og noen hjelper hverandre i tillegg. Det viser seg at dette var vanskeligst av alt. Noen hadde mistet noen formler og instruktøren måtte hjelpe dem gjennom.

I neste oppgave skal de bruke en fil som allerede er laget. Det er ikke helt lett å finne den for alle. De er ikke helt vandt med filstrukturen. Igen når instruktøren forteller hvordan oppgaven skal løses så prater de masse. I denne oppgaven får de muligheten til å bruke mye av det de har lært i løpet av kurset. Det blir litt som en repetisjon. Da de som prater slutter med det, følger hun, som har litt problemer med å holde følge med undervisningen, fremdeles ikke med. (!)

De går videre og skal lære om lister. De skal åpne et dokument som er lagret på kursets område. En har ikke fått opp dokumentet og en har fått opp et som likner, men ikke er det riktige. *Hvorfor sier de ikke fra om det?*

De fortsetter med filtrering. De tester samme handlingene instruktøren gjør på den samme filen som de brukte for lister.

Pause

Noen går i pausen.

14.22 Siste time av siste dag. Instruktøren deler ut kursbevis til alle. Og en evaluering. En person spør om noe og han hjelper henne med det. Det gjelder en konkret ting hun trenger i jobben sin, men som ikke er del av

kurset. Tilslutt går de igjennom utskrifter av regneark. Angi utskriftsområde og at det er lurt å se på forhåndsvisning før man printer. Det aller siste han forteller om er Hjelp funksjonen. Noen noterer noe av det han forteller. Til sist takker han for seg og ønsker dem lykke til videre.

A.1.4 Observasjon av Excel Videregående kurs på Rikshospitalet

1 Juni 2004.

Kursholder: Petter Sørby (ps@ajourit.no)

Da klokken er 0900, har fem personer møtt opp. En har gitt beskjed om at hun kommer kl 1000.

Fire av de seks:

- Mikrobiologisk 1. sekretær. Fra Excel til database.
- Barnelege. Forskningsprosjekt, Manipulering/bearbeiding av data.
- Innkjøpsseksjonen. Føre regnskap, store tabeller.
- Daglig drift på RH. Pivottabeller.

Kursholder ville gjerne at alle skulle fortelle hva de skulle bruke Excel til i sitt arbeide og hvilke forventninger de hadde til kurset. Få hadde noen spesielle forventninger.

Først skal de finne noen filer og så kopiere dem til fellesområde på maskinen de sitter på. Altså marker og dra. Noen fikk litt problemer. Men dette kom av at de gjorde det riktig, men det er en så rask måte å flytte noe på så de trodde ikke noe hadde skjedd. –Tyder muligens på usikkerhet ved bruk av datamaskin, kanskje ikke helt kjent med den.

Først sier kursholder at han liker hurtigtaster og kommer til å skrive opp disse etter hvert som han bruker dem. (*ctrl+home = raskest vei hjem, ctrl+shift+→ = makerer hele kolonnen som det er skrevet noe i, bortover, ctrl+shift+↓ = samme, nedover, ctrl+* = markere en tabell*).

Mulig at dette bidrar til at deltakerne ”faller ut”, at de ikke følger med hele tiden fordi de er opptatt av å skrive opp alt som kursholder sier. En av deltakerne hadde i løpet av de første 20min skrevet ca to sider med notater (!).

De går merkbart forttere frem enn i grunnkurset. Folk har tydelig bedre grunnlag i Excel og tar ting litt forttere. (*F2 = redigere tast. Markør bakerst.*)

De skal jobbe med noen tall, absolutt referanse, og kursholder spør om alle vet hva det er. Veldig mange som rister på hodet. Men de som tar dette kurset har jo tatt grunnkurset og der har de gått gjennom dette. (?) (*F4 er tast for absolutt tegnene*).

Har til nå ikke åpnet heftet. (Læreboken).

Noe forvirring oppstår når han sier de skal lukke og lagre. Rækkefølgen blir feil for dem og de blir usikre. "Skal vi ikke lagre den?" Vanligvis lagrer de dokumenter ved å gå i menyen og finne "lagre som" eller "lagre". Dette viser at de ikke er helt trygge på bruken av dokumenter og filer og er redde for at noe skal bli borte. Det er kun de kvinnelige deltagerne som er usikre her. Mennene er mer sikre i sin bruk.

Kl 10 kommer den siste personen. Hun får litt hjelp til å komme i gang. Hun innhenter seg fort.

Ctrl+j = viser formler.

Legen har tenkt på noe annet, antagelig skrevet notater og får ikke med seg hva som er gjort og må ha litt hjelp.

Pause. Etter pause → boken.

Det første de begynner med er dokumentmaler. Det kan virke som at legen har glemt vesentlig ting fra grunnkurset. Ting som enkle formler med + og – går tregt, og hun må ha hjelp. Igjen – mye notater!

Tommelfingerregel: Tall (verdier) skal kun skrives en gang. Bruke verdiene i cellen flere steder og da oppdateres de automatisk når "original" cellen forandres.

Filtype mal: Ved å bruke maler kommer beskjeden "lagre som" opp automatisk, slik at man ikke overskriver den malen man har brukt.

Her snakker han mye om beskyttelse av dokumenter og innhold.

Lunch.

Etter lunch skal kursholder illustrere et poeng med beskyttede filer. Problemet er at alle FÅR åpnet filen. Det skulle de egentlig ikke få lov til.

APPENDIX

Ctrl+ tab = bevege seg mellom programmer. Ctrl+shift = bevege seg mellom dokumenter.

Tidsfunksjoner, kap 5 s. 8.

Celleformater og datoer og tall. De lærer datoer som skrives som en formel for at det skal være i datoformat i cellen. Noen synes dette er forvirrende.

Kursholder illustrerer prinsippene med en tallinje. Viktig i denne sammenheng å huske at amerikanerne begynner uken med søndag. Ellers blir mye utregning feil.

Gjør oppmerksom på at dato/time formatet. Når du regner med timer, så regner den til 24 timer og så starter på 0 igjen.

Personlig synes jeg det var vel mye vekt på dato/time formatet.

Ved å ikke bruke boken så mye, vil det være litt vanskeligere for deltagere å jobbe hjemme med hjelp i boken. De er mindre vant til å bruke den.

Med jobbing av pivottabeller er det mange som får problemer fordi Excel krasjer. Hos deltagere hvor Excel krasjer, må de lukke programmet (hos noen brutalt) og deretter åpne kursholders dokument. Det de holdt på med er tapt. Det er litt forvirrende for dem for de tror de må gjøre alt om igjen, men på det dokumentet de åpner er oppgaven ”ferdig”.

Dag 2.

Onsdag 2. Juni

I dag skal de jobbe med å hente inn tekstfiler inn i Excel. Derfor går kursholder igjennom hvordan en viser kun en type filer i ”åpne fil” - vinduet.

For å gjøre dette bruker de tekst-imortør veiviser. Der kan de angi hvor en ønsker å hente teksten fra og hva som er skilletegnet mellom dataene. Deretter forklarer han litt mer om formater. Når en henter inn en .txt -fil så kan ingen formateringer lagres i det formatet. Derfor må det lagres som noe annet. (Excel).

Da de får lastet inn filen i Excel, den ble veldig fin, så gjør de to oppgaver om sortering for å repetere fra i går.

En som kom for sent, trenger litt hjelp for å komme i gang.

Shift = fra og til markering. Høyre klikk.

Mye om lister og pivottabell. Her er det ingen link mor deltageres jobb. Mulig at ikke alle klarer å overføre all info til sitt arbeid.

Spørsmål fra deltager i pausen. Kan man legge til datagrunnlag?

De lager et lite eksempel med to avdelinger (salg, adm) og totalt 5 ansatte. De skal finne gjennomsnitt av lønn i de to avdelingene. Deretter skal jobbe med hvordan en kan legge til mer datagrunnlag nederst i en eksisterende tabell. To nye personer i ny avdelingen.

Pivottabellen de har laget oppdaterer seg ikke av seg selv.

Dette er noe han viser på lerretet og forteller hva de skal gjøre og hvordan. Deretter gjør han det slik at de kan se. Mens de jobber med slike oppgaver går han rundt og titter på hvordan de klarer seg. Dette er lurt i og med at mange som sitter fast på noe, ikke alltid sier fra.

Fryse kolonne og dele vinduet.

For at overskrifter alltid skal vises over cellen og til venstre for cellen.

Det er hele tiden mye informasjon som fortalt. Snakker om hvorfor en skulle kunne ønske å gjøre dette. Men også mye om hvordan komme dit (altså hvilke knapper og lignende). Følger de kun med på *hvordan* eller får de også med seg *hvorfor*? Altså hvorfor dette kan være nyttig for dem?

Går deretter over til kobling av ark.

Noen har problemer med å følge med. Ting de skulle ha kunnet fra Excel Grunnkurs er "borte".

For ting som gjennomgås nevner han tydelig ting som kan gå galt, hva som kan være farlig og hvordan unngå dette. (struktur beskyttelse).

Flere av deltakerne tar opp problemer de har støtt på i bruk av Excel i privat/ jobb sammenheng. Dette indikerer en bruk av Excel som antagelig er mer og grundigere enn de som tok grunnkurset. Jeg merket lite til slike spørsmål fra de kursene.

Deretter jobber de med oppgaver fra heftet. Det virker som det er greit for de fleste. Hvis ikke det er greit, sier de heller ikke fra om det. Muligens sitter de og venter på at kursholder skal gå igjennom det på tavlen.

Lunch.

De jobber med Finn Rad. Flere operasjoner etter hverandre skaper litt forvirring. Funksjonen er ikke enkel, men "kjekk" hvis man skal lete etter f. eks en verdi i et stort ark. Her kommer en person med spørsmålet "Når kan jeg få bruk for denne funksjonen?". Ikke fulgt godt nok med?

APPENDIX

Tilslutt: revisjon. Gjennomgang av de to dagene.

Revisjon er lurt hvis man oppdager at noe er feil, men ikke vet hvor. Hvis det er flere ark som er koblet sammen kan det være vanskelig å finne uten revisjon.

Slutt.

A.2 Intervju

A.2.1 Telefonintervju med Brigitte Heitmann

20/4 2004.

Hun jobber for Ajourit i Norge etter at Siemens ble kjøpt opp av Ajourit. Hennes stilling er Instruktør/senior konsulent i avdeling for brukeropplæring.

Hva kunne vært bedre?

Hun har 20 års erfaring i dette yrket. Tidligere jobbet for Siemens (internasjonalt konsern) i Tyskland.

De bruker ganske like ”programmer” for å lære bort Excel grunnkurs/vid.g. Men i tyskland brukte de dobbelt så lag tid på det samme stoffet.

Hun kommer med et eksempel: Da hun skulle ta et kurs i printer programmering (rundt 1990) sto det ikke på papirene når kurset var ferdig. Det sto en start, men ikke en slutt. Da hun ringte til kursholder ble hun overrasket da sekretæren (på en rapp-kjeftet måte) fortalte at de kunne jo ikke sette en slutt tid på når hun var ferdig med stoffet. De visste jo ikke hvor lang tid hun ville bruke på oppgavene (!).

De legger opp kurset på en slik måte at før lunch, for eksempel, så har de undervisning i stoffet. Etter lunch jobber deltagerne selvstendig med oppgaver. Dette gjør de så lenge de vil. De som er ferdig tidlig, går tidlig. Mens de jobber med oppgaver er læreren tilstede for å kunne hjelpe og veilede. De som ikke er så raske får hjelp til å bli ferdig i løpet av dagen. Dette er en meget effektiv måte å drive opplæring på, men dessverre også dyrt. I dag har de gått bort fra denne type kurs i Tyskland fordi det blir for dyrt.

Datakortet – noen venner av henne i tyskland har tatt datakortet for å ”komme seg videre” i jobben. Tok dette privat for då får ikke tilbud om så intensivt kurs gjennom jobben. ...Microsoft’s tester er bedre. De er mer praktisk anlagt. Datakortet er mer gjetting. Kryss av på riktig. – for enkelt.

Viktig, men som mangler i de fleste kurs er oppfølging. Når deltagerne går ut døren siste dagen, så er de ferdige. Da hun jobbet i Siemens i Tyskland var hun ansvarlig for intern opplæring også. Da kunne hun komme og hjelpe dem i deres ”rette miljø” hvis det trengtes.

Hva ser du som vanskelig i Excel? For deltagerne å lære?

Noe som hun ser ofte er at problemet ofte er mangelfull matematikk kunnskap hos enkelte. Ikke lett å lære noen et program, hvis de ikke har bakgrunnskunnskapene som er nødvendig. I tillegg til jobb som instruktør i Brukeropplæring (Excel og annet tror jeg), så har hun også jobbet som lærer i matematikk i den videregående skolen. Noen ganger finner hun at deltagerne har problemer med enkle utregninger som subtraksjon og dividering. Ofte forteller hun at de må passe på og ikke stole blindt på programmet. Noen ganger kobler man celler feil og det vil man helst oppdage. Derfor legger hun noen ganger inn små feil i en oppgave for å se at de får dette med seg.

Ville du si det hadde vært bra at en del av undervisningen skjedde uten maskinene?

Ja så absolutt! Jeg ville gjerne ha hatt alle rundt et bord for å snakke litt om stoffet før vi begynte med maskinene, men som regel er det ikke plass til det i undervisningsrommene.

Kan maskinene virke som en distraksjon?

Det vil jeg si, ja.

Her takker jeg for hjelp, og spør om det er ok at jeg kontakter henne senere. Kjempe fint. Jeg må love å gi henne et eks av ferdig oppgave. Dette er noe hun brenner for og vil gjerne se hva utfallet blir.

A.2.2 Intervju med Geir Arveng

Torsdag 9. desember, kl 09.30 – 10.10

Stilling: Kurskonsulent

Rikshospitalet HF

Personalavdelingen, Seksjon for kompetanseutvikling

- 1. Kunne du kort fortelle hva jobben din går ut på?*
- 2. Hvordan jobber denne avdelingen?*

Har ansvaret for IT-opplæring av RH. Standard kurs gjøres av et firma utenfra; AjourIt. Kursopplegget deres er Siemens, men det er blitt kjøpt opp av AjourIt. Valget av partner er gjort på tilbud. AjourIt har kontrakt for fire år og kontrakten går ut på nyåret og nye tilbud skal vurderes. Spesialkurs holdes også for de avdelinger som måtte ha behov for det. Da sender de interne instruktører fra Kompetanseavdelingen eller ITavdelingen. Ved noen anledninger har de gjort undersøkelser på forhånd for å finne bedre ut hva behovet for den aktuelle avdelingen er.

Avdelingen har ansvaret for all opplæring. Ikke bare IT-opplæring men også videreutdanning for sykepleiere ved Loisenberg., tilbud om lederutviklingskurs ved Handelshøyskolen. For leger holder de på med et nett -undervisningstilbud for Øre-Nese-Hals spesialisering. Til våren skal de også få ansvaret for studenter som har praksis ved RH. Før var det UiO som hadde ansvaret. Det gjelder da sykepleiestudenter, medisinerne og hospitanter, (som er utdannet f. eks. innen sykepleie eller farmasi), som kommer til RH for å få erfaring. RH er spesialister på mange områder som ikke finnes rundt i landet og som folk kommer for å lære mer om. Disse er ikke lønnet av RH men fra det stedet de er ansatt. Perioden de er ved RH er relativt kort – rundt to måneder.

3. Hva er målet til avdelingen? Hva jobber dere mot? Hva er drivkraften?

4. Hvordan går en ansatt fysisk frem for å melde seg på kurs? Ser kurs i katalog som alle ansatte får?

Katalogen med alle kurstilbudene sendes ut i 1000 eksemplarer. Den er nå blitt litt mindre (for å spare noen trær) og den fulle informasjonen til alle kursene ligger nå ute på nett. Katalogen blir sendt ut til alle med personalansvar og alle med undervisningsansvar. I tillegg sender de den til de som spesielt har bedt om den. Katalogen har et lite hull med bånd i hjørnet. Dette gjør det lettere når de henger den opp på pauserom slik at folk kan bla i den. De merker at folk ikke er så tålmodige lenger. Før ventet de til katalogen kom i november. Nå vil de gjerne ha informasjonen med en gang. Hvis det på et kurs ikke er så mange påmeldte på et kurs som Kompetanseavdelingen tror kan være interessant for en gruppe mennesker så sender de ut en påminnelse e-post tre uker i forveien. For eksempel har IT-avdelingen kommet med et hint om at noen burde få en oppfriskning i filbehandling. De hadde funnet ut det da de ryddet på en disk.

Det er et påmeldingsskjema i katalogen og et på nett. De fleste bruker det elektroniske påmeldingsskjemaet. Når den ansatte har fylt ut skjemaet sendes det til Kompetanseavdelingen. Her blir den lagt på vent. En e-post blir sendt til lederen til den ansatte. Det er lederen som avgjør om den ansatte får ta kurs eller ikke. Lederen kan f. eks si ja, men at et annet tidspunkt passer bedre. I tillegg kan hun/han avgjøre hvor bevilgningen skal tas fra. Prisen på kurs varierer litt. Noen kurs er gratis. Når lederen sender en bekreftende e-post tilbake blir den ansatte satt opp på kurs. Noen dager før kurs får de påmeldte en påminnelse sendt til e-posten sin med tidspunkt og sted for kurset. Hvis de ikke møter opp blir de allikevel

belastet for kurset. For de kursene som er gratis, så er det en bot på 500,- hvis de ikke møter opp.

5. Kan de ansatte selv bestemme om de ønsker å melde seg på grunnkurs eller videregående kurs?

De velger selv hva de vil melde seg på. Om lederen deres har noen innvendinger så kan det forandres.

6. På hvilken måte får dere tilbakemelding fra de avdelingene på RH som dere hjelper med kompetanseutvikling?

Kurset

7. Når de ansatte er på kurs fikk jeg inntrykk av at de lagrer tingene sine på et område på RH's server.

Har hver enkelt ansatt et eget område under RH som de kan lagre tingene sine på? Hvordan fungerer dette?

Vet alle ansatte om dette? Er dette et tilbud til alle de ansatte?

Alle ansatte har plass på en disk. De har 20 mb plass på e-post kontoen sin.

8. På kurset deler instruktøren ut et evalueringsskjema på slutten av siste dag. Hva gjøres med disse? Lager dere statistikker av dem? Er det mulig å få se dem?

Evalueringsskjemaene blir tatt vare på. De settes i en perm. Etter hvert kurs blir de gjennomgått av de som er ansvarlige for opplæring. Hvis det er tydelig mindre tilfredshet med kurset enn det er etter andre kurs gir de beskjed til AjourIt. Hvis det for eksempel er lite tilfredshet med instruktøren ber de kanskje om å få en annen instruktør neste gang. AjourIt står selv for materialet som brukes på kurset. RH har møter med AjourIt en gang i året.

De merker at det videregående Excel-kurset er best hvis det samles en bestemt gruppe mennesker (f. eks økonomer, ingeniører) og skreddersyr opplæringen til å passe for dem. Noen ganger gjør de dette.

9. Undersøker RH hva deltakerne på kursene synes om kursene i ettertid? F. eks 3 mnd etter kurset.

Nei.

a. Spørreskjema som sendes til de ansatte?

b. Om de synes det er nyttige kurs?

- c. Om de får utbytte av dem?
- d. Er det relevant for dem?
 1. Undersøker RH om de som deltar på Excel-kurs føler at arbeidsoppgavene går lettere i ettertid av kurset?
 2. Undersøker dere på noen måte om undervisningen gir forandringer i de ansattes atferd i forhold til jobben (jobbsituasjon)?
 3. Hvordan får dere tilbakemelding om de ansattes reaksjon på kurs?

*10. Hvis det sendes ut spm-skema; er de anonyme for å sikre ærlig svar?
Eller vil de svare at kursene er bra for å ikke miste muligheten til å gå på dem?*

11. Er det lovpålagt at man i staten får x-antall dager med undervisning i året?

12. Er Rikshospitalet som kunde i denne sammenheng fornøyd med produktet til firmaet som leverer kurset og undervisningen?

Ja, men nå skal kontrakten ut på anbud igjen så får se hva som skjer.

Takk!

A.3 Spørreskjemaene

A.3.1 Spørreskjema for Excel Grunnkurs

Spørreundersøkelse til deltagere på Excel-kurs

5. Hvor mye tid bruker du Excel i ditt arbeid? Sett "x" for det som passer.

Mindre enn 1 gang i måneden	Ca 5-7 timer i måneden	Ca 1-2 timer i uken	Ca 4-5 timer i uken	Ca 1 time pr dag	Ca 1-2 timer pr dag	Mer enn angitt i alternative ne

6. Kan du beskrive hva du bruker Excel til i ditt arbeid?

7. Hvilke funksjoner i Excel har du mest nytte av?

8. På en skala fra 1 til 7, hvor 7 er best, hvor stor nytte har du hatt av kurset, Excel grunnkurs?

1	2	3	4	5	6	7

9. Nå, en stund etter kursslutt, har du oppdaget noen punkter du skulle ønske var belyst i kurset? Gi gjerne spesifikke svar!

10. Føler du at kurset har vært til nytte til privat bruk?

Ja	Nei

11. Etter kurset har det dukket opp spørsmål du gjerne skulle hatt svar på?

12. Hadde det vært behov for en dag hvor kursdeltakere og kursholder møtes igjen for litt oppfriskning?

Ja	Nei

13. Nevn en (eller flere) av egenskapene til en celle.

14. På disse bildene er det to modeller som ser identiske ut. Hvilken modell er mest fornuftig laget? (Hvilken modell som er lettest å gjenbruke.)
Angi hvorfor.

APPENDIX

	A	B	C
1	Eksempel A		
2	Enkel lønns beregning		
3	Timelønn	125.5	
4			
5	Antall vanlige arbeidstimer	60	
6	Ant overtid hverdag	8	
7	Ant overtid lø (14-16)	5	
8	Ant overdif lø (16-18)	1	
9	Overtid sats:		
10	Overtid hverdager	24	
11	Overtid lørdager (14-16)	42	
12	Overtid lørdager (16-18)	84	
13	Utdata:		
14	Vanlig lønn	7530	
15	Overtid hverdager	192	
16	Overtid lødager (14-16)	210	
17	Overtid lødager (16-18)	84	
18	Brutto lønn	8016	

	A	B	C
1	Eksempel B		
2	Enkel lønns beregning		
3	Timelønn	125.5	
4			
5	Antall vanlige arbeidstimer	16	
6	Ant overtid hverdag	7	
7	Ant overtid lø (14-16)	2	
8	Ant overdif lø (16-18)	1	
9	Overtid sats:		
10	Overtid hverdager	24	
11	Overtid lørdager (14-16)	42	
12	Overtid lørdager (16-18)	84	
13	Utdata:		
14	Vanlig lønn	2008	
15	Overtid hverdager	168	
16	Overtid lødager (14-16)	84	
17	Overtid lødager (16-18)	84	
18	Brutto lønn	2344	

Svar:

15. Hva burde vært skrevet i cellen markert X? (Eller i formellinjen).

- A. $(126 \cdot 43) + (48 \cdot 4)$
- B. $=B2+B3+B4+B5$
- C. $=B1 \cdot B2 + B3 \cdot B4$
- D. $=SUM (B2:B6)$

	A	B	C	D
1	Timelønn	126		
2	Antall time	43		
3	Overtidsats	48		
4	Ant. Overti	4		
5	Sum lønn			
6				

Svar:

16. Hva er den beste måten å skrive den logiske setningen for: hvis A er større enn B så skal overtid utbetales, hvis ikke, så ingen overtid betaling?

- D. HVIS A > B SÅ 'overtidtimer * overtidsats' ELLER '0'
- E. HVIS (A > B, 'overtidtimer * overtidsats', '0')
- F. HVIS (A>B) SANN('overtidtimer * overtidsats') USANN (0)



SVAR:

A	B	C

17. Har du deltatt på andre Excel kurs? Excel for viderekommende eller Excel kurs i regi av andre organisasjoner?

18. Føler du at du hadde god nok grunnleggende kunnskap i generell databehandling, (vanlig bruk av Word og lignende), i forkant av Excel kurset?

19. Hvilken av disse måtene er en rask måte å kopiere formatet fra en valgt celle til to andre celler på det samme arbeidsarket?

- A. Bruk CTRL til å velge alle tre celler, og deretter klikke **Paste**  knappen på verktøylinjen
- B. Kopiere den valgte cellen, deretter velge de to andre cellene, klikke på **Style** på **Format** menyen, og så klikke på **Modifiser**.
- C. Klikke **Format Painter**  på **Formatering** verktøylinjen to ganger, deretter klikk i hver celle du ønsker å kopiere formatet til.

Svar:

©Takk for at du tok deg tid til å svare på skjemaet!!

A.3.2 Spørreskjema for Excel Videregående kurs

Spørreundersøkelse til deltagere på Excel-kurs

1. Hva er din stilling innenfor Rikshospitalet?

2. Hvor mye tid bruker du Excel i ditt arbeid? Sett "x" for det som passer.

Mindre enn 1 gang i måneden	Ca 5-7 timer i måneden	Ca 1-2 timer i uken	Ca 4-5 timer i uken	Ca 1 time pr dag	Ca 1-2 timer pr dag	Mer enn angitt i alternativene

3. Hvis ingen av alternativene passer, angi hvor mye tid som blir brukt på Excel her:

4. Føler du at du hadde god nok grunnleggende kunnskap i generell databehandling, (vanlig bruk av Word og lignende), i forkant av Excel kurset?
-

5. På en skala fra 1 til 6, hvor 6 er best, hvor godt synes du kurset var? Ville du for eksempel anbefale det til noen?

1	2	3	4	5	6

6. Kan du beskrive hva du bruker Excel til i ditt arbeid?
-
-

7. Hvilke funksjoner i Excel har du mest nytte av?
-
-

8. På en skala fra 1 til 6, hvor 6 er best, hvor stor nytte har du hatt av kurset, Excel videregående kurs?

1	2	3	4	5	6

9. Nå, en stund etter kursslutt, har du oppdaget noen punkter du skulle ønske var belyst i kurset? Gi gjerne spesifikke svar!
-

10. Føler du at kurset har vært til nytte til privat bruk? Hvis du bruker Excel privat.

JA	NEI	Bruker ikke Excel privat

11. Hadde det vært behov for en dag hvor kursdeltakere og kursholder møtes igjen for litt oppfriskning?

Ja	Nei

12. Hva ville vært fint å få en gjennomgang om?

13. Nevn en (eller flere) av egenskapene til en celle.

14. På disse bildene er det to modeller som ser identiske ut. Hvilken modell er mest fornuftig laget? (Hvilken modell som er lettest å gjenbruke.)
Angi hvorfor.

Microsoft Excel - Copy of Eks til spørreundersø...			Microsoft Excel - Copy of Eks til spørreundersøkels		
File Edit View Insert Format Tools D			File Edit View Insert Format Tools Data		
B18 fx =SUM(B14:B17)			B18 fx =B14+B15+B16+B17		
	A	B		A	B
1	Eksempel A		1	Eksempel B	
2	Enkel lønns beregning		2	Enkel lønns beregning	
3	Timelønn	125.5	3	Timelønn	125.5
4			4		
5	Antall vanlige arbeidstimer	60	5	Antall vanlige arbeidstimer	16
6	Ant overtid hverdag	8	6	Ant overtid hverdag	7
7	Ant overtid lø (14-16)	5	7	Ant overtid lø (14-16)	2
8	Ant overdif lø (16-18)	1	8	Ant overdif lø (16-18)	1
9	Overtid sats:		9	Overtid sats:	
10	Overtid hverdager	24	10	Overtid hverdager	24
11	Overtid lørdager (14-16)	42	11	Overtid lørdager (14-16)	42
12	Overtid lørdager (16-18)	84	12	Overtid lørdager (16-18)	84
13	Utdata:		13	Utdata:	
14	Vanlig lønn	7530	14	Vanlig lønn	2008
15	Overtid hverdager	192	15	Overtid hverdager	168
16	Overtid lørdager (14-16)	210	16	Overtid lørdager (14-16)	84
17	Overtid lørdager (16-18)	84	17	Overtid lørdager (16-18)	84
18	Brutto lønn	8016	18	Brutto lønn	2344

Svar:

15. Hva er den beste måten å skrive den logiske setningen for: hvis A er større enn B så skal overtid utbetales, hvis ikke, så ingen overtids betaling?

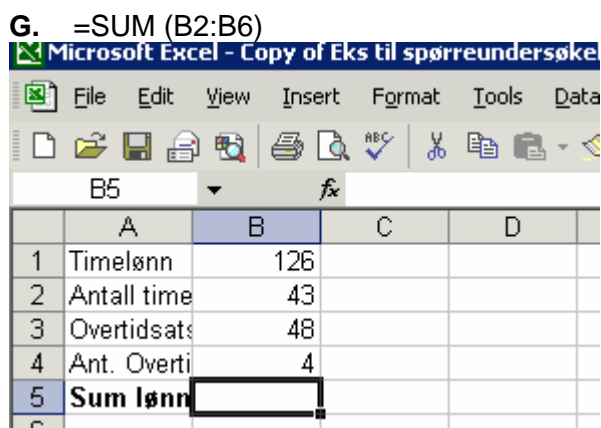
- G. HVIS A > B SÅ 'overtidtimer * overtidsats' ELLER '0'
 H. HVIS (A > B, 'overtidtimer * overtidsats', '0')
 I. HVIS (A>B) SANN('overtidtimer * overtidsats') USANN (0)

SVAR:

A	B	C

16. Hva burde vært skrevet i cellen markert X? (Eller i formellinjen).



- D. $(126*43)+(48*4)$
 E. $=B2+B3+B4+B5$
 F. $=B1*B2+B3*B4$



Svar:

17. Har du deltatt på andre Excel kurs? Excel for viderekommende eller Excel kurs i regi av andre organisasjoner?

18. Hvilken av disse måtene er en rask måte å kopiere formatet fra en valgt celle til to andre celler på det samme arbeidsarket?

- A. Bruk CTRL til å velge alle tre celler, og deretter klikke **Paste**  knappen på verktøylinjen
- B. Kopiere den valgte cellen, deretter velge de to andre cellene, klikke på **Style** på **Format** menyen, og så klikke på **Modifiser**.
- C. Klikke **Format Painter**  på **Formatering** verktøylinjen to ganger, deretter klikk i hver celle du ønsker å kopiere formatet til.

Svar:

©Takk for at du tok deg tid til å svare på skjemaet!!

A.3.3 Rikshospitalets spørreskjema for Evaluering av IT-kurs



Rikshospitalet
Universitetsklinikk

Intern Service
Personalavdelingen
Seksjon for
kompetanseutvikling

KURSVURDERING FOR:	DATO	KURSHOLDER				
Kryss av. (1 er dårlig, 5 er meget bra)	1	2	3	4	5	
1. Grad av innfridde forventninger:						
Kommentarer:						
2. Kursets faglige nivå:						
Kommentarer:						
3. Kursets faglige innhold:						
Kommentarer:						
4. Vekslingen mellom teori og						

APPENDIX

praksis:					
Kommentarer:					
5. Kvaliteteten på kursmateriellet:					
Kommentarer:					
Kryss av. (1 er dårlig, 5 er meget bra)	1	2	3	4	5
6. Kursleders dyktighet i å formidle stoffet:					
Kommentarer:					
7. Egen innsats under kurset:					
Kommentarer:					
8. Forventet utbytte av kurset:					
Kommentarer:					

9. Kursets lengde:						
Kommentarer:						
10. Øvrige kommentarer:						