

# Student Perceptions of Reflections as an Aid to Learning

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## ABSTRACT

An important aspect in any learning situation is the approach that students take to learning. Studies in the 1980's built an increasingly convincing case for the existence of three learning approaches; deep, surface and achieving. These approaches are not mutually exclusive, and a single student may use any or all of them in combination. In addition, a connection has been demonstrated between deep learning approaches and understanding of the material being learned.

Encouraging deep learning behaviour, however, is a much more complex issue, since choice of learning approach seems to be dependent on the manner in which the student experiences the learning environment. This paper explores the use of reflections in the instructional design of two computing courses based on the text of the reflections and student feedback regarding the reflection exercise collected through surveys and interviews. Student's learning approaches are inferred from a textual analysis of the reflection texts. Results describing student's perceptions of the utility of reflections as a learning tool are explored using interview data collected from students in one of the study cohorts.

## 1. INTRODUCTION

Some of the most influential work on tertiary student approaches to learning is that of Marton and Säljö [7]; subsequently extended and complemented by studies of Entwistle [3], Biggs [1, 2] and Ramsden [8]. These works argued for the existence of two, now well known, learning approaches; deep and surface learning. Subsequently a number of other studies have attempted to link learning activities and environments to student's pre-disposition to adopt deep vs surface strategies in their learning.

While the deep and surface classifications are certainly the best known in computing education circles, many studies of learning approaches also focus on other aspects of the learning experience. Fox [4] observes that mis-matches in student and teacher expectations of the structure of learning can result in student frustration and increases the likelihood that students adopt a surface learning approach. This is not surprising since, as Entwistle and Ramsden have observed, choice of learning strategy depends strongly on the context in which the learning takes place. It is not the case that a "clever" or "high achieving" student always avails themselves of a deep learning approach. This observation lead Biggs to propose a further learning approach, "achiever" [1], where pragmatism and context play a large role in the choice of learning approach used.

A common theme in the literature on student learning, and encouraging deep learning and learner autonomy, examines on the role of reflection. This can also be linked to the work of Schön [9] which in part deals with the role of reflection in professional education. A number of studies in higher education also report increased focus on deep learning in student cohorts that were encouraged to actively reflect on what they had learned [10].

Given this body of literature and the implication that reflection can motivate deep learning behaviour amongst learners introduction of curricula elements related to reflection seems potentially fruitful. Having introduced reflection exercises in order to encourage greater student engagement and increased deep learning behaviour another question arises. What effect is this intervention actually having on the learning behaviour of students, and what do students think that these new exercises are about?

This paper reports on several aspects of student's use of, and perceptions in relation to, reflection exercises in two computing courses. We present results based on the student's own reflections, which reveal several distinctly different student approaches to writing reflections. Students were also interviewed and asked to discuss the reflection elements of the course. Our analysis of interview data focuses on student perceptions of the purpose and utility of the reflection exercises.

The paper is structured as follows. In the next section we describe the course designs, student cohorts and study methodology. Section 3 presents selected extracts from the data and develops arguments based on our observations. This is followed in section 4 by a discussion of the implications of the study for the use of reflections to encourage deep learning behaviour, as well as student's assessments of the usefulness of reflection as an element of their learning activity. Section 5 contains our conclusions and outlines areas of future work.

## 2. STUDY

### 2.1 Study Context

#### 2.1.1 Cohort 1

Study group 1 consisted of 22 third year students in Science and Technology Studies (STS) at Uppsala University studying in the 6th semester of tertiary studies. The median age of the sample was 24 years. The youngest student was 22 and the oldest 25 years of age. Nine of the twenty two study participants were women.

The course undertaken by the cohort was *Distributed Information Systems*. Students are assessed continuously

through-out the course, and the exam was only mandatory for students that wanted to try for the highest course grade. The cross-disciplinary structure of the program results in a course package that covers several different disciplines. This affects the distributed information systems course in two ways:

- The typical STS student entering the course has only taken two previous computing courses - a basic programming course and a course on algorithms and data-bases.
- As students are expected to be able to take other advanced courses in computing after this course, it needs to cover a broad area.

The course consists of condensed variants of four other computing courses: *computer networking*, *operating systems*, *network and data security*, and *distributed systems*.

Learning outcomes in the course are assessed using a variety of approaches.

- A personal portfolio (mandatory), 5%
- Written reflections (up to 10), 4% per reflection
- Host a lecture (mandatory), 15%
- Oral presentation of an assigned topic (mandatory), 25%
- Self-evaluation, 10%
- Course evaluation, 5%

In the personal portfolio, the students present themselves, their background and what ambitions and goals they have in relation to the course. These were later revisited during a self-evaluation, at which point the personal interview took place. Each lecture is "hosted" by 1-2 students, meaning that they take notes that are made available to everyone. They also use 5 minutes at the beginning of the subsequent lecture to give a summary of what was covered last time, together with 1-2 questions directed to the teacher. Some of the lectures consist of 2-3 20-minute student presentations with subsequent discussion. In conjunction with each lecture students may choose to write a reflection in which they discuss what was important, interesting, uninteresting and hard to grasp.

### 2.1.2 Cohort 2

Study group 2 consisted of 42 computer science students in their second semester of tertiary studies. Prior tertiary course structure and assessment experiences had been entirely in the traditional Swedish model of lectures, obligatory practical work and final five hour written exam. The median age of sample was 21 years. The youngest student was 20 and the oldest 33 years of age. Two of the forty two study participants were women.

The course undertaken by the cohort was *Digital Technology and Computer Architecture*. This course is taught in a non-traditional manner, with grades being determined by participation in discussions and presentations. Non-verbal assessment in the form of written reports and personal reflections also contribute to the final grade.

The course material was divided into six topic modules. Possible grades in the course and associated result codes are unsatisfactory (U), pass (G) and distinction (VG). In order to obtain a pass grade of "G" students were required to participate fully in four of the six modules and complete four online reflections related to the content of those modules. A distinction or "very good" (VG) grade in the course required students to not only participate in five of the six modules, but also achieve a distinction in four of their group's written reports.

Each module consisted of an introductory lecture, two group discussion sessions, and a group seminar presentation. Seminar presentations covered a section of the textbook material. Each group was assigned seminar material to discuss and present to the rest of the class. After the classroom presentation the group had a week to prepare and upload a report on their seminar material to the course Wiki.

Attendance at lectures, discussion sessions and the presentations was noted in order to determine if students had actively participated in the given module. After the completion of each module those students who had taken the module were asked to write a 300 to 400 word reflection related to their learning in that module. There was no final examination. The intention was to both motivate and reward active participation in activities that we believe promote good learning outcomes.

## 2.2 Methodology

Systematic analysis of textual material can be conducted in a number of established research traditions. The approach in this study is influenced by qualitative approaches, in particular Phenomenography [6] and content, or textual, analysis [5]. In the current context content analysis is more relevant, since we are interested in structural characteristics in the nature of the reflections generated by the students, and in assessing the frequency of occurrence of different qualitative categories of reflection.

The reflections from Cohort 2 have been studied in order to identify distinct but characteristic ways in which students have engaged in the reflection process. We are particularly interested in exposing the manner in which students have approached the reflection exercise, as well as their perceptions of the purpose of reflections. This argument is built upon an analysis of the reflections themselves.

When exploring students' perceptions of the intent of the reflection exercises, as well as the utility of this type of written reflection as a self learning tool, we have used interview data from Cohort 1. Here the approach taken identifies common trends observed in the data.

## 2.3 Data Collection

### 2.3.1 Cohort 1

Student reflections were managed using a Wiki system, which allows users to add, remove or otherwise edit content quickly and easily. Thus, all reflections are available as web pages on the course homepage, but permissions have been set so that reflections can only be read by the student who wrote it and the teaching staff. For each reflection, there is an editing history which can be used to study the temporal aspects of how the reflection was produced. Moreover, it is possible to view an access log

for each reflection to study how students return to the reflection at different times throughout the course. Some instructions about the content and structure of a reflection were supplied on the course web page. The following quotation is an English translation of the original instructions in Swedish, the full instructions are reproduced in Appendix A.

In a reflection you should reflect about a lecture or a mini-seminar.

- Was there something that was especially interesting?
  - If so: what and why?
  - If not, why not?
- Was there something that was confusing or unclear?
  - If so: what?
  - If not, what was the least clearly explained in what was covered?
- Was there something that was totally irrelevant or felt meaningless?
  - If so: what and why?
  - If not, what was the least clearly explained in what was covered?
- What was the most important thing you learned and why?

Halfway through the course, students were asked to volunteer to be interviewed about their progress and the assessment methods used in the course. A considerable fraction (73%) of the students were willing to assist us and were interviewed. In the interviews, which lasted 45-60 minutes each, a number of questions were asked about the different forms of assessment used. These interviews were recorded with permission from the students and parts of them transcribed. The script used to guide the interview is presented in Appendix B.

After the end of the course, students were invited to write an evaluation about the assessment techniques used in the course. In this written evaluation, one section was entirely about the usage of reflections - how they had been perceived and used throughout the course. There were also questions about students reaction to the idea that reflections can be used as a study technique in other courses. The questions asked in relation to reflections in that evaluation are given in Appendix C.

### 2.3.2 Cohort 2

Student reflections for this group were also collected using the the departmental Wiki system. The same editing history data and access permissions were used as for Cohort 1. What differs is the instructions given about the content and structure of a reflection. The instructions given to students regarding the reflections were as follows.

Each reflection should comprise approximately 300-400 words dealing with the following aspects of the last phase of the course.

- What was the phase/module was about?
- What aspect surprised you most?

- What is the most unclear part of the material?
- Your impression of how well you understand the material, perhaps use a scale of 0-5 where 0 means understood nothing, 1 a little, 2 some, 3 at least half, 4 most, 5 all.

## 3. ANALYSIS

### 3.1 Student Perceptions

On the course web pages, both student cohorts were given instructions about how to produce their reflections. However, no motivation for including reflections in the assessment process was given. Consequently the students made their own assumptions about the instructor's motivations for including reflections among the assessment criteria.

In the evaluation questionnaire data from Cohort 1, the following question was asked: "**What do you think the motivation for this part of the assessment was?**". To this question, a majority of the students responded that they felt that the primary motivation was to act as a feedback mechanism for the teaching staff. Those who stated a secondary motivation expressed it as a way to improve the learning process for the students.

This result was unexpected, and also slightly disturbing. Clearly, a majority of the students considered use of reflection exercises to be motivated by the needs of the *teachers* rather than those of the students. Useful as reflections might be for feedback purposes, the main instructor motivation for them was to have students think more about what they were taught to support deeper understanding of key topics. While deep learning processes might have been encouraged anyway it is interesting to note that this was not a goal shared or perceived by the majority of students.

This result can be contrasted with the results of the textual analysis of the data from Cohorts 1 and 2. Coding of the nature of the content of reflections recorded for both cohorts reveals three broad categories.

- a) Those who fulfilled the formal requirements without engaging in significant deeper reflection (also few edits/revisions)
- b) Those who spent time and effort on their reflections, often correlated to a larger number of revisions, and comments about relationships to other aspects of the material.
- c) Those who used the reflection as a medium to communicate with the lecturer.

In the following discussion extracts are labeled with fictitious names and the number refers to the cohort to which the student belonged. Gender has been preserved in the names for completeness, though we do not feel that this has a bearing on the present analysis.

Examples that typify the categories are found in the reflection texts of both cohorts. It is worth noting that by far the largest number of reflections are those of type (b), which leads us to conclude that reflections were a worthwhile technique in terms of encouraging reflective behaviour related to the subject matter to be learned.

An example of a type (a) reflection is that of Jones2:

The first module covered the basic computer components; CPU, primary memory, secondary memory and I/O units. My group's area was secondary memory, primarily magnetic discs. Studying in groups helps to motivate me (and most others too I think), however one downside is you don't learn as much of the other groups' material as of your own. I will need to read more about the others' topics next module. Overall the material wasn't very complicated ("Basic" afterall).

Note that this type of reflection occurred very seldom. The few examples are also related to the first module, where people were still getting used to the idea of writing regular reflections, or were made by students who did not complete the course.

A more interesting and personal approach to reflection is provided by Sam2 who says the following while reflecting on the content of the module that covered assembly programming. The quotation is translated from the Swedish original by the authors.

"

I knew beforehand that this module would be difficult because I understood that Assembler is not the easiest code to write. But, what I thought was the most problematic were the seminars held by the other students, I think it went very quickly, and here we really needed more time to go through Assembly. It felt like a hassle to be cast into programming in a language but on the other hand the practical work was very good. And, with the help of the lab assistant I understood more what it was all about. In this module I learned the most from the prac work and I guess that I understood more of the big picture after my prac partner and I had handed in everything.....

What I thought that this was the most interesting in this module was the actual coding [of an assembly program] we did even though that was hard and we really had to work hard to see what mistakes we had made no and then, that we started to understand how close to the hardware and memory we really were. I learned to save a lot of time by planning on paper first and then try to create functions. If you first try to write the function on paper and see how it will work one avoids a lot of the problems and effort which otherwise needs to be put in [to make things work]. That was very useful to learn. Earlier one maybe hasn't structured the program or how the functions should work in advance. But, now we have learned that programming can go pretty well.

"

Another reflection that has evidence of both reflection, identification of weakness in personal knowledge or understanding, as well as intent to connect to other areas is that of Andrew2, who says:

" The content of the third module consisted of the Assembly Language level. The module described how the assembly language is implemented as a translation rather than interpretation, what the basic instructions and pseudo-instructions of an assembly language often are, and how it can be used in practice. The chapter described the format of the assembly language statements, common time complexity gains when rewriting high-language level code in assembly, macros and pseudo-instructions, the process of the assembly translation and the property and working scheme of the linking process and it's [sic] different ways (timing) of replacing virtual addresses into real addresses.

The most surprising section of the chapter was the part about the relocation problem and how an object module is structured. Also new was the different times when the actual binding of symbolic addresses into absolute physical memory addresses can be made, with benefits depending on what system the code will be run upon.

I didn't find any sections completely unclear or extremely difficult, though the part about windows DLL files was somewhat difficult at first.

I think my understanding of the chapters in the module is equivalent to a 4 on the reflection page scale. I feel I understand most things, except perhaps for some parts in the dynamic linking sections. I need to study more in detail the process of linking and how object modules are interconnected.

One thing to mention is I realized when I saw my attendance in the course manager for the third module (U) that I must have forgotten to write down my attendance on one of the lectures, I think it was the lecture on the 24th of April.

Watching the presentations of the groups have been informative, and it gives me a feel for how I should prepare myself for my own presentation. Working on the assembly lab provides a good feel for the language, as well as a realization of how frustrating it can be sometimes :).  
"

Note that Andrew2, despite demonstrating several of the desirable characteristic categories of a reflection, also uses the reflection in the type (c) sense to communicate directly with the teacher. Towards the end of the course one of the modules did not run well. This stress prompted a number of students who had otherwise generated type (b) reflections to revert to a unique type (c) behaviour. One clear example of this is Jim2.

" the lesson & lecture the [date] was cancelled... why? If i should write about this module anyway, tell me "

However not all students reacted to the situation in this manner, and several wrote quite detailed reflections. Even in the later modules.

Another type of reflection that has been categorised as type (c) is typified by a series of questions posed to the lecturer. A good example of this type of reflection is that of Luke1

" ... Also I have a question about edge-chasing. If we have twenty processes which are all sitting waiting for each other we can solve that by one process choosing to kill its transaction, it is not so hard to understand that this opens up the chain for the others. But, who decides what transaction should die? Can it happen that all the processes decide to kill their transaction (more or less at the same time) and then there will be none left to execute. Then I wonder how often this happens in today's operating systems.....  
"

In summary the content analysis shows that all students who completed the courses generated at least one reflection with significant introspective content.

### 3.2 Time consumption

To the question *How much time did you normally spend on writing a reflection?*, students in Cohort 1 gave answers in the range of 15-90 minutes. Some also expressed that once they had learned how to write reflections, they could actually start writing it during, or directly after the lecture itself. Some students stated that they intentionally waited until the day after the lecture before writing the reflection, in order to be able to think more of the material before putting it down in writing.

Here it seems that students can be categorized into two groups from their answers: those who wanted to do a good reflection and get as much out of it as possible, and those who wanted to do a sufficiently good reflection as fast as possible. The first group typically spends 30-90 minutes on writing the reflection, while the second group spends only 15-30 minutes. Cross-referencing against the previous question regarding the motivation reveals that all the students that did their reflections in less than 30 minutes on average assumed that the reflections are solely or mainly for the purpose of providing teachers with a feedback mechanism. There is also a stronger usage of the phrasing "...being forced to..." in the description of reflections among those who spent less time on the task.

### 3.3 Utility of Reflections

#### 3.3.1 Feedback to students

For each reflection, the grading teacher commented on the reflection - especially on what the students had perceived most strange or ungraspable during the lecture. These comments were added at the end of the reflection together with its grading. In this way, students could return to read the comments. Although we could rely on the access logs to find out whether students actually did this, we also asked them *Have you read the feedback you've received on your reflections?*

On this questions, all students but one answered yes. Some of the student expressed it a positive way to get personal feedback to things they did not understand, and many

appreciated the quality of the feedback. One student expressed that he/she mainly read the feedback to understand why he/she had not received the highest grade.

Clearly, feedback is something that is much appreciated. A few students have expressed it as useful to have this "...personal, individualized communication channel with the teacher" as a complement to asking questions during lecture hours.

#### 3.3.2 Using the reflections

Students were asked whether they returned to the reflections they had produced (other than to just read the feedback) later throughout the course. On this question, it turned out about half of the students had returned to their reflections later in the course, in particular during the home exam and when preparing for the final exam. On a follow-up question on how useful they perceived their own reflection, several students stated that it was not the reflection in itself that was most useful, but rather the state of their mind that it represented. By reading their own text, they better remembered the rest of the lecture that was not covered in the reflection itself.

This way of using the reflection as a method to remember not only the material included in the reflection in itself, but also other things not documented in the text was a surprising usage of reflections that had not been foreseen. In retrospect, it is by no means surprising that a reflection can help its author to remember other things as well.

#### 3.3.3 Student benefits

One interesting question is what benefits student perceive themselves to have obtained from producing reflections. There are several different answers from this, but the dominant one is that they perceive that they have learned more by having to think about what they heard during the lecture and what they really did not understand that well. The feedback from the teacher was appreciated as it tended to focus on the questions they had. Some students also value the exercise in producing constructive thoughts and questions.

When reading the answers, it seems like most students have appreciated the inner process involved in reflecting upon a lecture and putting it down in writing. Several answers claims that they perceive they have learned more than normally, and that they feel more alert throughout the lectures as well in order to get good material to reflect upon.

#### 3.3.4 Reflections as a study technique

The final question about reflections that were given to students was *Would you consider using reflections in another course, even if you were not required to do it as a part of the examination?* All but one students were positive to this idea, but most of them also said that it could be hard to maintain the motivation if they did not have to do it. Two students clearly stated that they were going to try this out in other courses, and then particularly in courses that they perceived more difficult to understand. Although most students perceived a number of benefits from writing reflections in the previous question, few of them think that they would be able to maintain the motivation to produce them in a course where it was not required and motivated by a reward in the assessment.

## 4. DISCUSSION

There are clearly benefits to using reflections as a part of the instructional design of courses. In the course followed by Cohort 1 the combination of reflections with the personal portfolio means that one gets to learn quite a lot about the students. This includes information about their relevant background, how they perceive the same thing differently and what their weaknesses within the subject are. This knowledge about the different capabilities of the students is something that can be used in the classroom to increase the student activity. For instance you can use illustrative examples that relate to the personal background of some students and encourage them to share their experiences with the others.

The categories of reflections that emerge from the content analysis of Cohort 2 should not come as a particular surprise. However, what was surprising to us was that more than eighty percent of reflections written by both cohorts are of type (b). We interpret this to mean that many students do use reflections in the manner that we (the instructors) had intended, whatever their perceptions might have been. Many of the reflections contain references to discovery of lack of knowledge or insight and the need for further study, as well as attempts to link the subject matter of the reflection to other areas of the course material. We consider this to be evidence of deep learning strategies being deployed by these students.

Another clear benefit is the implicit feedback you get on your teaching. Given the questionnaire responses and the outcomes of the content analysis it seems that this aspect of reflections does not pass unnoticed by students, so its "implicitness" can well be questioned. Feedback of this sort it is nonetheless useful. If a large number of the students are confused about a specific part of a lecture, you can return to that in the next one. Moreover, students seem more alert during the lectures and it feels comforting to know that some ratio of the students had made a serious attempt to absorb and review the material covered in the previous lecture.

There are significant instructor costs associated with using reflections. As students tend to produce quite a lot of the reflections early on in the course (in order to have done that so they can focus on other parts of the course), the workload is not evenly distributed. For the types of course structure reported here, one should be prepared to spend much more time giving feedback on reflections during the first half of the course.

A problem of a more technical nature has also emerged. As there was no support system for managing and grading reflections, legacy tools have been used. Students wrote their reflections in a Wiki, after which an email was sent to the instructor. The teacher then consulted the emails received, visited the Wiki pages that had been submitted, to which comments and the grades were then added. Grades were tracked of in a spreadsheet, and the overall grades were collated using a customized web based tool. Grading, consequently, involved using 4 different applications (Wiki, email, spreadsheet and an online learning management system) in the right way. To ensure all went well and no results were mislaid was a time-consuming process in which a support system for reflections would have been most useful. We intend to develop such a system during the fall in preparation for future courses.

## 5. CONCLUSION

The experiences from using reflections as a form of assessment in two computing courses are positive. Students perceive that they learn more from it, and that the time they spend to produce the reflections is reasonable. When returning to their own reflections during the course, the reflection can help students recollect not only things mentioned in the actual reflection, but also other things they did not document. Although most students are positive, few believe that they would use it as a study technique in another course, unless they had to.

From a teacher perspective, there are several positive benefits to be expected: you get a better picture of the students knowledge, more alert students during the lectures and the possibility to use examples that relate to students background. The problems in this course instance have mainly been an unevenly distributed workload in grading, plus the lack of a support system that ease the administration of reflections and their grading.

An analysis of the reflections themselves reveals that they appear to be used by the majority of students in a manner consistent with our expectations. That is, the students do indeed reflect on both their own actions and the material in manner that we believe acts to reinforce their learning and understanding. Coding for reflection that identifies lack of knowledge and linking to other areas of the material shows that a large number of students (over 80%) have demonstrated this in at least one reflection.

In general, reflections are heartily recommended as a form of assessment, and our evidence suggests that they encourage behaviours that have been linked to deep learning approaches in earlier studies. In doing so the workload distribution and availability of computer based support systems are important things to consider. Even in courses with relatively few students (40-50), grading reflections becomes a very time-consuming task without the right tools. For future courses, such a tool will be used, and we will also investigate the possibility of using peer assessment of reflections, in which the students would read each other's reflections.

Another dimension of future work includes studying how reflections as a form of assessment are perceived by different segments of the student population. Here we will try to determine if there are systematic differences in approach associated with particular programmes of study. One might also consider if there are observable gender differences in how students reflect.

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## APPENDIX

### A. INSTRUCTIONS ON HOW TO PRODUCE A REFLECTION

In a reflection you should briefly reflect on a lecture or mini-seminar using the following outline:

- Was there something which was especially interesting?
  - If yes, what and why?
  - If not, why not?
- – If yes, what and why?
  - If not, what was the least clear in what was discussed?
- Was there something that seemed irrelevant or seemed pointless?
  - In that case, what and why?
  - If not: What was the least important thing that was discussed?
- What was the most important thing you learned, and why?

### B. MANUSCRIPT FOR INTERVIEWS

#### Self assessment discussion DIS vt 2006

The following notes were used by the interviewer to structure the content of the course evaluation interviews conducted with students.

#### Introduction to the interview

- Is it OK to record this conversation?
- Please don't talk about this conversation with other students in the course before they have also had their interview.
- There are several reasons for having this discussion:
  - to look at the initial questionnaire and get some feedback on it,
  - have a quick look at the reflections,
  - revise the objectives of the course,
  - ask some questions related to a pedagogical study we are conducting,
  - look at the different types of approaches to teaching and working in a course,

#### Expectations

- What expectations did you have in relation to the course before it began?
- What were the sources of these expectations?
- Why did you apply to enrol in this course?
- Would you like to reformulate your expectations?

#### Objectives

- What learning outcomes did you want to achieve through this course?
- What level of result are you aiming for?
- In relation to the portfolio material:
  - Is there any reason to adjust objectives?
  - Can I realise my goals, or do I need to adjust in some way?

#### Good and Bad

- What worked well in the course?
- What could be improved?
- Is there something that you want to point out or criticise?

#### Self Evaluation

- Draw a graph which represents the work you would normally put into a course.
- Draw a graph that represents how you have worked in this course so far.
- Draw a histogram of the work distribution of students in the course.
- Locate yourself on that histogram.
- How do you perceive/experience your work effort in comparison with other students?
- Are you happy with the level of your work put into this course?
- Do you need to change anything in order to achieve the personal goals that you have defined for this course?

#### Pedagogical Stuff

- If you were to guess what are the key principles on which this course is built what would you say they were?
- Let's talk about some key course elements.
- What do you think that the reflections have given you?
- How do you think the lecture host concept has worked;
  - for those that make the presentations?
  - for the audience?

#### Miscellaneous

- Is there anything else unique to the course that you would like to bring up;
  - the course structure?
  - the course content?
  - laboratories?

### C. FINAL EVALUATION QUESTIONNAIRE

After the course students were asked to help improve the course by filling out a questionnaire related to the assessment and learning design that had been used. The section of that questionnaire which was used to collect data presented in this paper was as follows.

- What do you think the purpose of this assessment component was?
- How much time did you spend on writing a reflection on average?

- Have you used the feedback you got on your reflections?
- Have you gone back and looked at your reflections? If so, when and why?
- Do you think that you will want to go back and read your reflections at some point in the future?
- What did you personally get out of writing reflections?
- Would you consider using reflections as a study approach in a course even if you were not "compelled" to do so by it being a part of the course assessment?