DD1388 focusses on program design with C++, including good programming style, procedure at object-oriented development in C++, support for modularisation, memory handling, making the program code more efficient, common errors and traps, static and dynamic linking, namespace management, portability and more.

Students must pass an exam (P/F: 1,5hp) and their final grade is then determined through their performance on 11 lab assignments (A-F, each lab P/F: 6hp).

Summary of course changes

New course responsible assigned and new website established to provide better structure and communication.

Course assessment changed from physical labs to online assignment submission, due to both Covid but also to reduce pressure on students and limited TA availability for physical lab sessions.

Course assessment restructured/clarified in line with student feedback. Course assessment sub-questions regrouped according to level of abstraction and open-endedness i.e. more abstract and open-ended questions moved to higher grade assignments.

Due to the pandemic, the physical exam was converted into five separate, spread-out Canvas quiz sessions.

Overview

Aspect	Feedback and action
Grading and feedback very slow. Continuous feedback is important for learning.	The course team agree with this assessment and we apologise for the extensive delays in grading. There were substantial issues in the course this year relating to a variety of factors, including finding a way in which all assignments could be graded using a reduced available TA pool and clearing a backlog from students of previous years. Most of these issues are structural in relation to the course design e.g. the number of assignments and grading method. However, be aware that the advised submission dates were voluntary and there to ensure that students had knowledge of when they should submit in order to be able to keep up with the course assignments i.e. so that they did not reach the end of the course with too much work still to do. A problem in the course has been a significant number of students coming back to later course rounds to finish assignments from previous years. This year, our approach enabled us to clear a significant proportion of this backlog. In future, we will improve our communication about when the grading will take place. We will also provide more opportunities for faster, direct and formative feedback, as well as reducing the workload, which was also an issue of feedback.

Some lab assignment instructions unclear. Labs were unbalanced. Some labs (e.g. lab 4) take a much longer time than others. Too much course assessment.	We used feedback questionnaires and interviews with students about the various labs to identify those that cause the main problems. We have engaged in the first of a number of intended iterations of assignment regrouping, clarification and scoping.
A passing grade of 'E' is awarded for completion of seven long and individual labs. More difficult to achieve a higher grade.	We intend to update the assessment, particularly lab assignments, to enable students to achieve a better variation of grades in the course.

Details

This course has a strong foundation in terms of basic content i.e. lab assignments and lectures that students find interesting, accessible, fun and educational. However, structural and operational issues, especially availability of TAs, effect the robustness of the course given the number of students that take it and number of programming assignments. This year, while many students found the course interesting, stimulating and focussed in terms of key concepts, LEQ points, especially 15 (formative feedback) and 21 (collaboration opportunities) were very low (rated 2.8/7.0).

Issue 15 stemmed from the need to recruit a large, dependable and organised TA team for the course that was not always available. Because of this, previous physical lab settings were not robust if adequate numbers of TAs were not available (e.g. due to sickness and so on), leading in the previous year to long waiting times and a stressful situation for both TAs and students. To alleviate this, assignment submissions were moved online to Canvas submissions that could be graded in a more flexible way by the available TAs. Nevertheless, TAs still remained difficult to recruit in the numbers needed for high throughput of graded assignments resulting in long delays in feedback to students. While this situation was not good, it was estimated to be a least-worst alternative in comparison to excessively long waits In labs and stressful situations arising for both TAs and students sometimes associated with previous physical lab settings. The main solution to this problem lies in TA recruitment and course restructuring to allow more flexible and direct grading opportunities, which will be iterated on again next year.

Issue 21 arises inherently from the assessment design, which is focussed on individual work and does not enable groupwork. It was likely exacerbated by the Covid situation this year, which provided even fewer opportunities for individuals to work together e.g. to engage in pair-programming and problem solving together. As the course is restructured, we would especially like to add groupwork components but this will require careful thought and for other issues in the course to be addressed first.

Overall, it is likely that a number of course round iterations will be needed to alleviate robustness issues in relation to this course. The main issue now relates to the interactions between the scope of lab work and grading method with the TA pool available for grading. Beyond that, more possibilities for groupwork and continued iteration on improving the clarity of lab materials will be explored, although Covid places some constraints on possibilities.

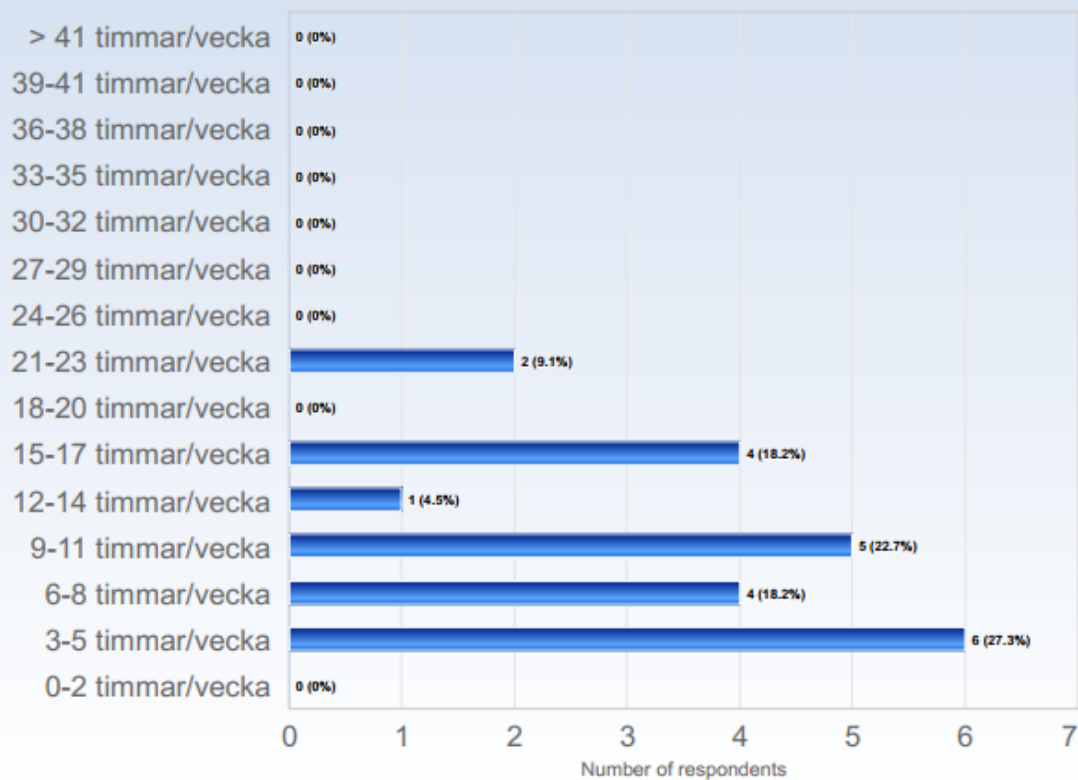LEQ Course evaluation data follows:

DD1388 - 2021-06-21

ESTIMATED WORKLOAD

On average, how many hours/week did you work with the course (including scheduled hours)?

| Category	Number of respondents
> 41 timmar/vecka	0 (0%)
39-41 timmar/vecka	0 (0%)
36-38 timmar/vecka	0 (0%)
33-35 timmar/vecka	0 (0%)
30-32 timmar/vecka	0 (0%)
27-29 timmar/vecka	0 (0%)
24-26 timmar/vecka	0 (0%)
21-23 timmar/vecka	2 (9.1%)
18-20 timmar/vecka	0 (0%)
15-17 timmar/vecka	4 (18.2%)
12-14 timmar/vecka	1 (4.5%)
9-11 timmar/vecka	5 (22.7%)
6-8 timmar/vecka	4 (18.2%)
3-5 timmar/vecka	6 (27.3%)
0-2 timmar/vecka	0 (0%)

LEARNING EXPERIENCE

The polar diagrams below show the average response to the LEQ statements for different groups of respondents (only valid responses are included). The scale that is used in the diagrams is defined by:

1 = No, I strongly disagree with the statement
4 = I am neutral to the statement
7 = Yes, I strongly agree with the statement

Note! A group has to include at least 3 respondents in order to appear in a diagram.

Average response to LEQ statements - all respondents

— Medelvärde
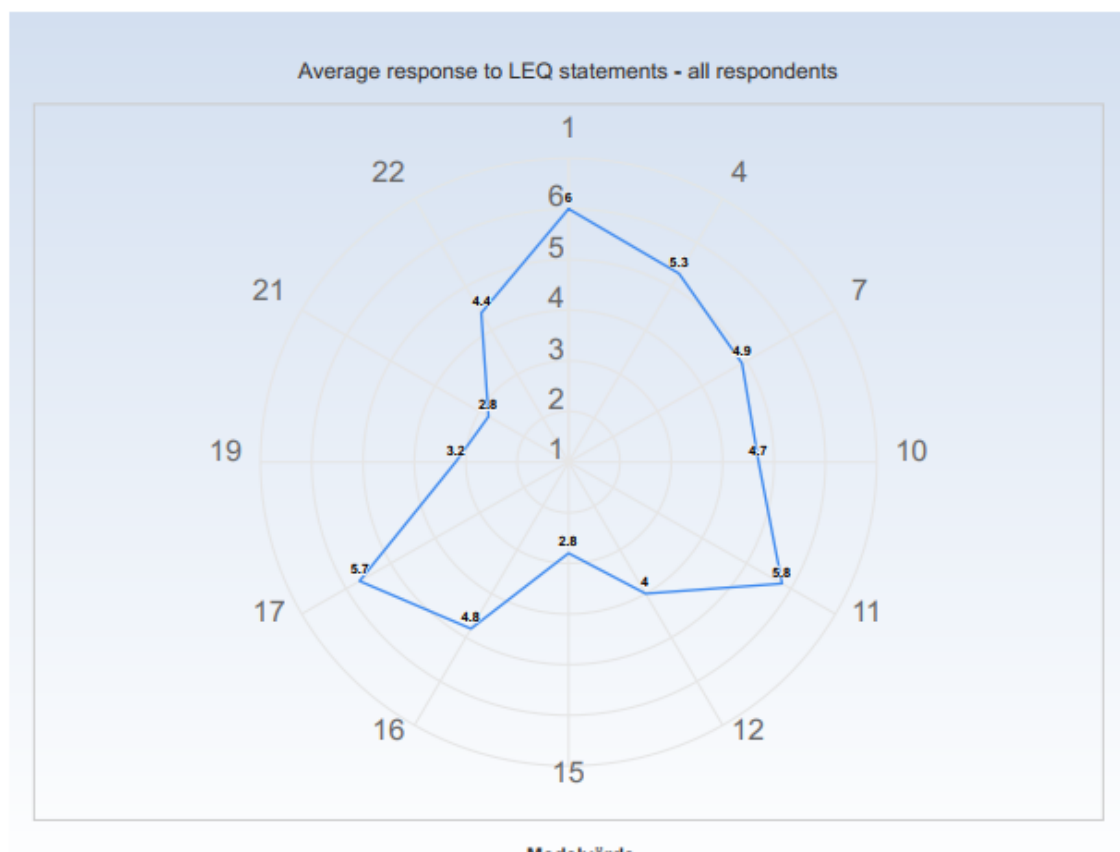
KTH Learning Experience Questionnaire v3.1.4

Meaningfulness - emotional level

Stimulating tasks

1. I worked with interesting issues (a)

Exploration and own experience

2. I explored parts of the subject on my own (a)
3. I was able to learn by trying out my own ideas (b)

Challenge

4. The course was challenging in a stimulating way (c)

Belonging

5. I felt togetherness with others on the course (d)
6. The atmosphere on the course was open and inclusive (d)

Comprehensibility - cognitive level

Clear goals and organization

7. The intended learning outcomes helped me to understand what I was expected to achieve (e)
8. The course was organized in a way that supported my learning (e)

Understanding of subject matter

9. I understood what the teachers were talking about (f)
10. I was able to learn from concrete examples that I could relate to (g)
11. Understanding of key concepts had high priority (h)

Constructive alignment

12. The course activities helped me to achieve the intended learning outcomes efficiently (i)
13. I understood what I was expected to learn in order to obtain a certain grade (i)

Feedback and security

14. I received regular feedback that helped me to see my progress (j)
15. I could practice and receive feedback without being graded (j)
16. The assessment on the course was fair and honest (k)

Manageability - instrumental level

Sufficient background knowledge

17. My background knowledge was sufficient to follow the course (f)

Time to reflect

18. I regularly spent time to reflect on what I learned (l)

Variation and participation

19. The course activities enabled me to learn in different ways (m)
20. I had opportunities to influence the course activities (m)

Collaboration

21. I was able to learn by collaborating and discussing with others (n)

Support

22. I was able to get support if I needed it (c)

Learning factors from the literature that LEQ intends to examine

We tend to learn most effectively (in ways that make a sustained, substantial, and positive influence on the way we think, reflect, act or feel) when:

a) We are trying to answer questions, solve problems or acquire skills that we find interesting, exciting or important

b) We are able to speculate, test ideas (intellectually or practically) and learn from experience, even before we know much about the subject

c) We are able to do so in a challenging and at the same time supportive environment

d) We feel that we are part of a community and believe that other people have confidence in our ability to learn

e) We understand the meaning of the intended learning outcomes, how the environment is organized, and what is expected of us

f) We have adequate prior knowledge to deal with the current learning situation

g) We are able to learn inductively by moving from concrete examples and experiences to general principles, rather than the reverse

h) We are challenged to develop a true understanding of key concepts and gradually create a coherent whole from the content

i) We believe that the work we are expected to do will help us to achieve the intended learning outcomes

j) We are able to try, fail, and receive feedback before, and separate from, each summative assessment of our efforts

k) We believe that our work will be considered in an honest and fair way

l) We have sufficient time for learning and devote the time needed to do so

m) We believe that we have control over our own learning, and not that we are being manipulated

n) We are able to collaborate with other learners struggling with the same problems

RESPONSE DATA

The diagrams below show the detailed response to the LEQ statements. The response scale is defined by:

-3 = No, I strongly disagree with the statement
0 = I am neutral to the statement
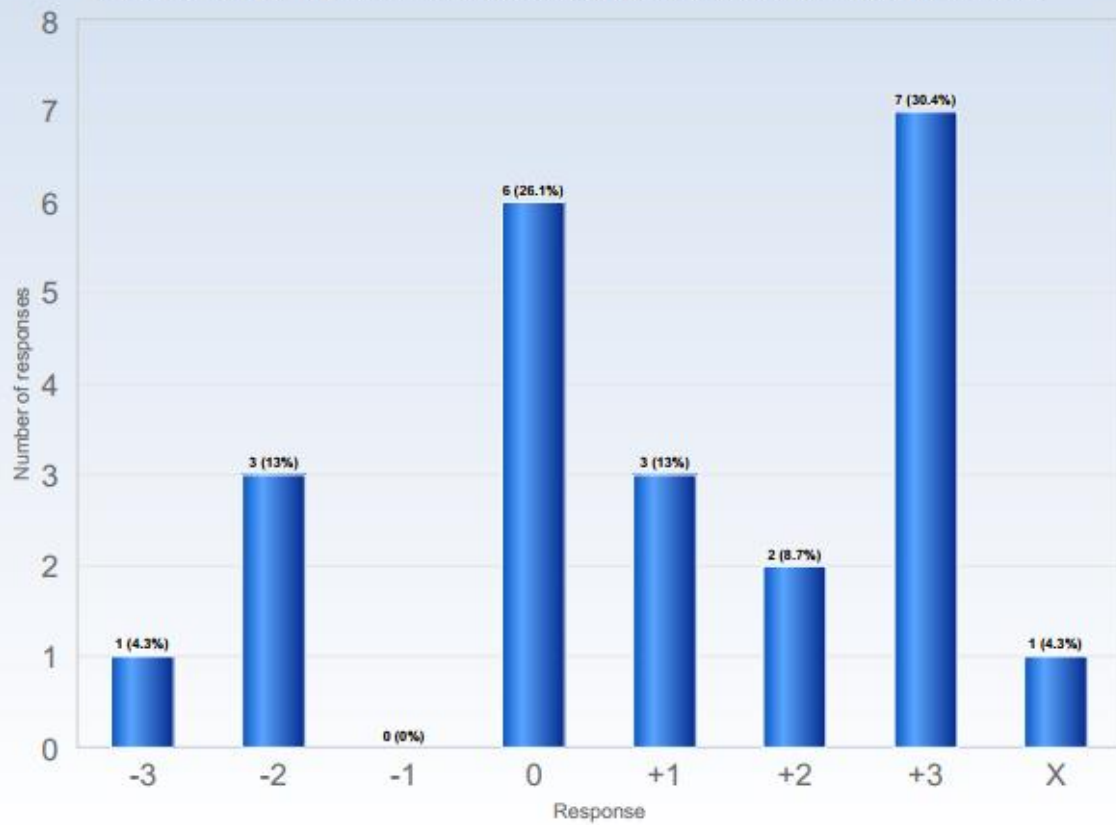+3 = Yes, I strongly agree with the statement

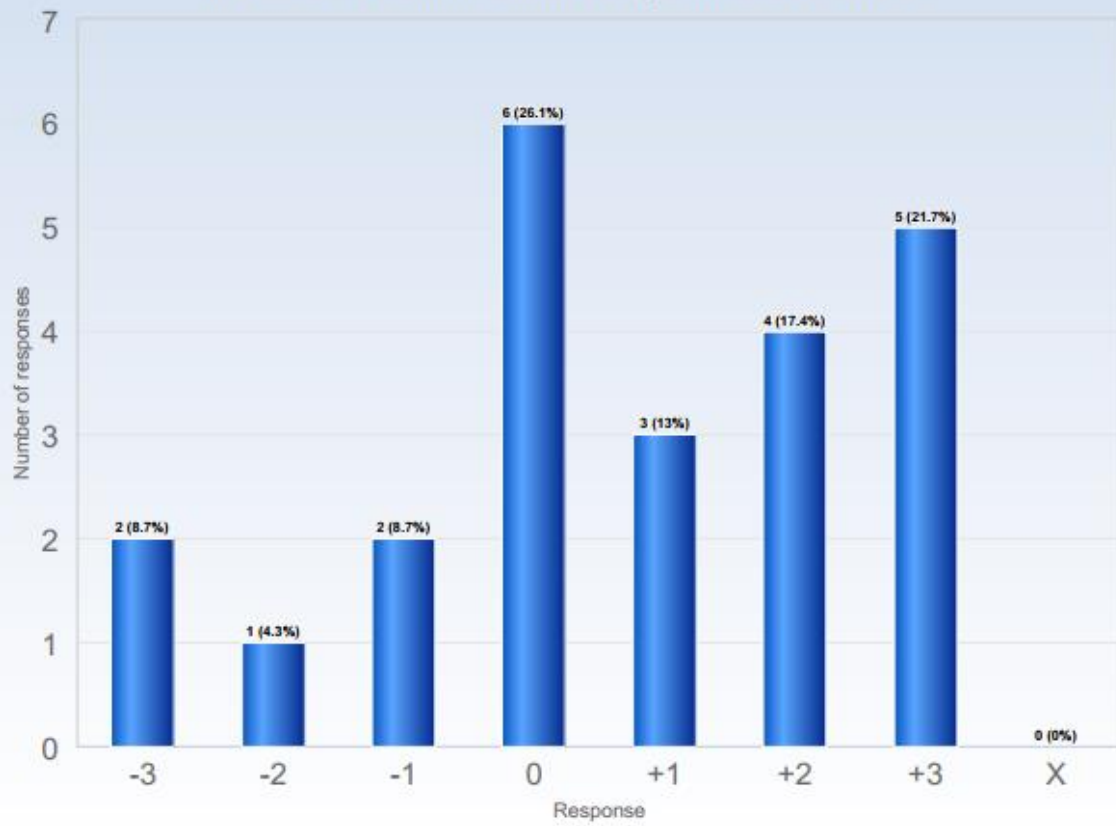X = I decline to take a position on the statement

1. I worked with interesting issues

Response	-3	-2	-1	0	+1	+2	+3	X
Number of responses	1 (4.3%)	0 (0%)	1 (4.3%)	0 (0%)	2 (8.7%)	10 (43.5%)	9 (39.1%)	0 (0%)
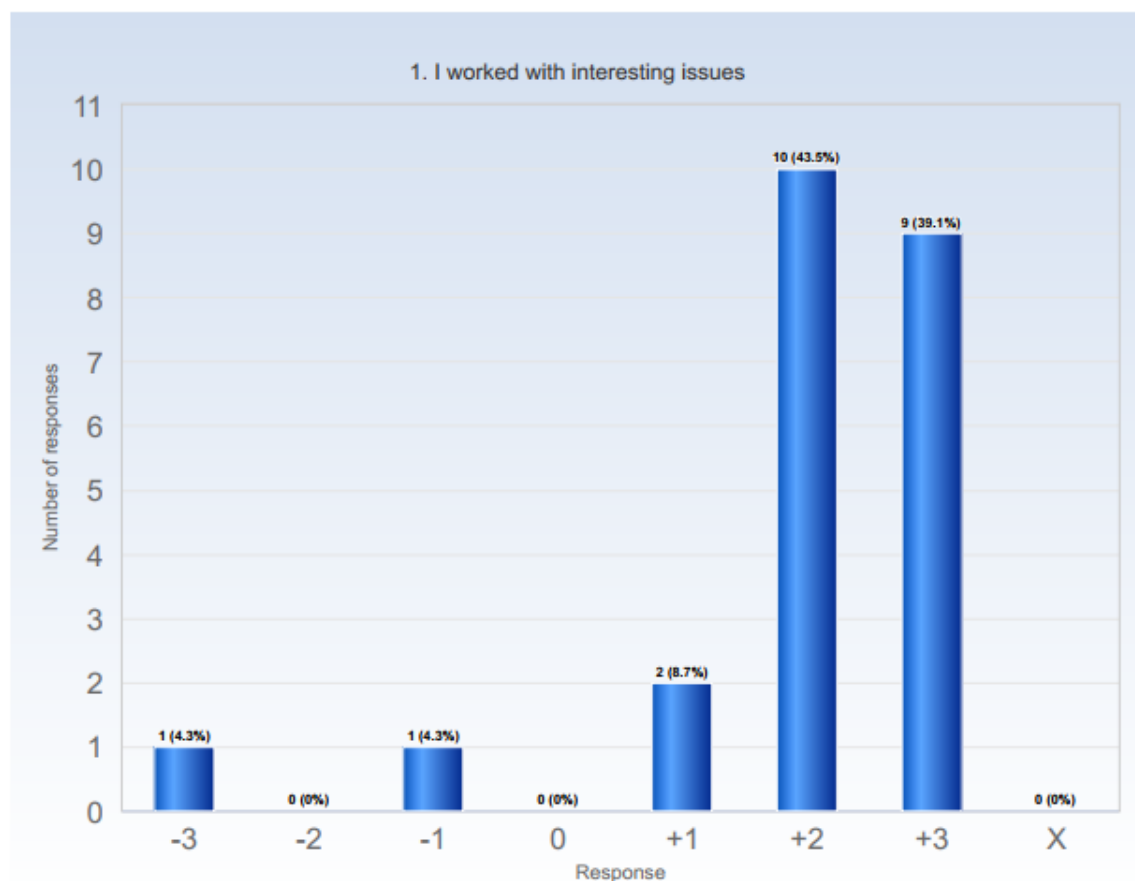
4. The course was challenging in a stimulating way
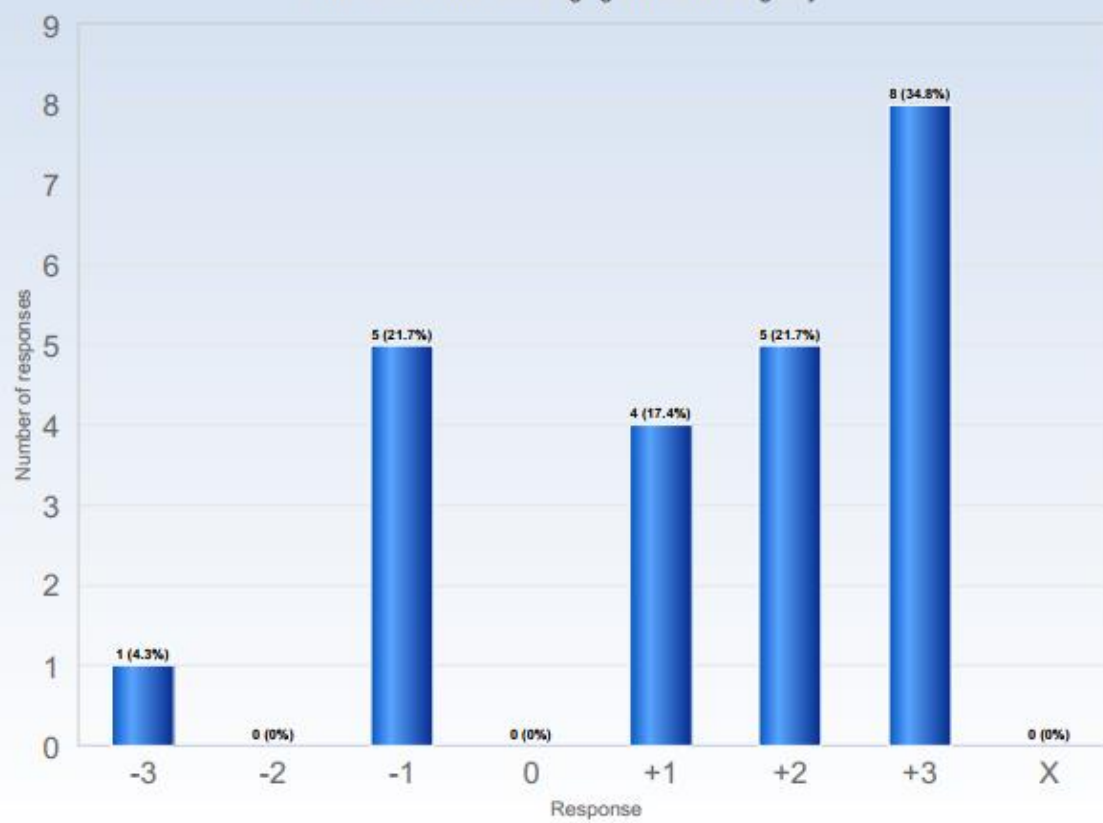
7. The intended learning outcomes helped me to understand what I was expected to achieve

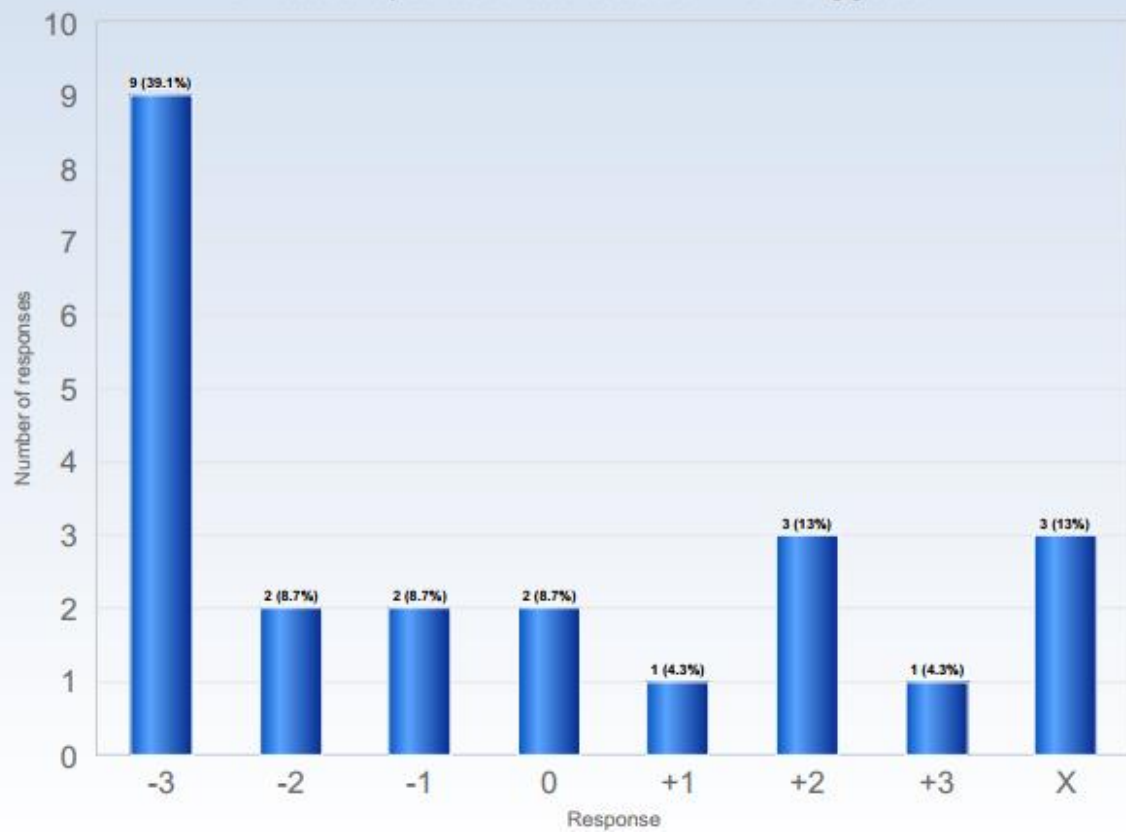10. I was able to learn from concrete examples that I could to relate to

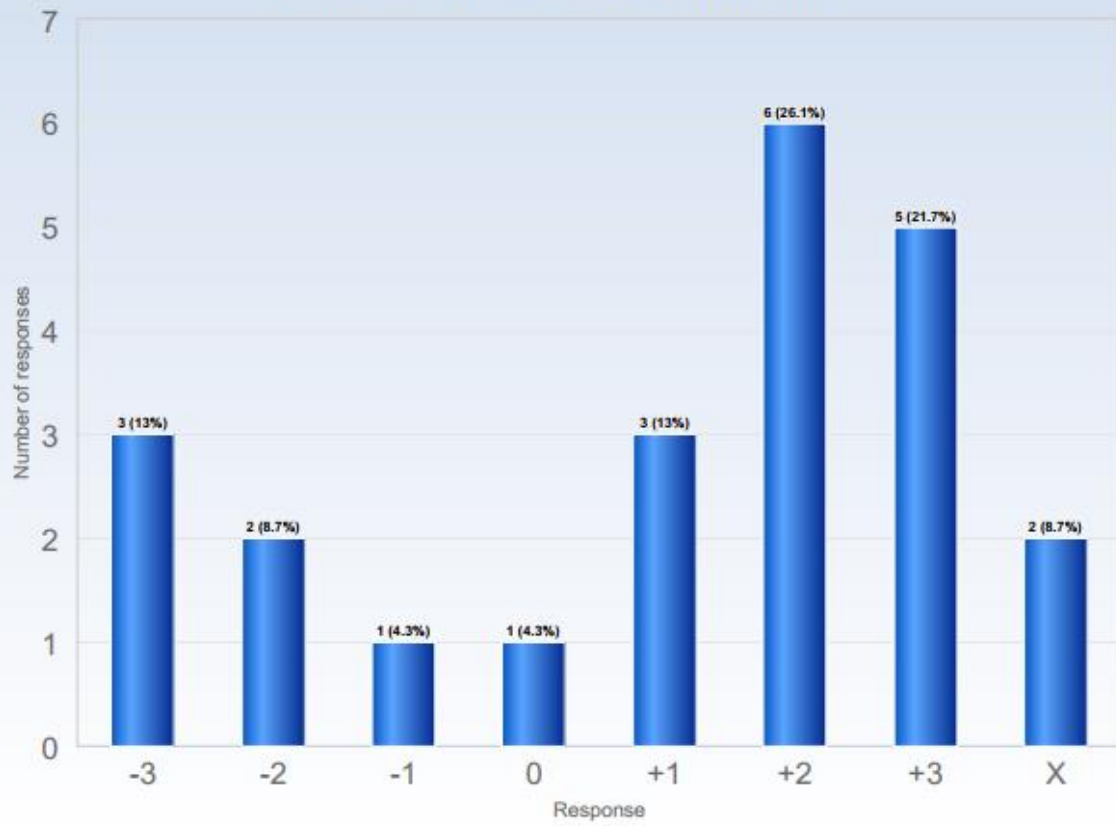11. Understanding of key concepts had high priority
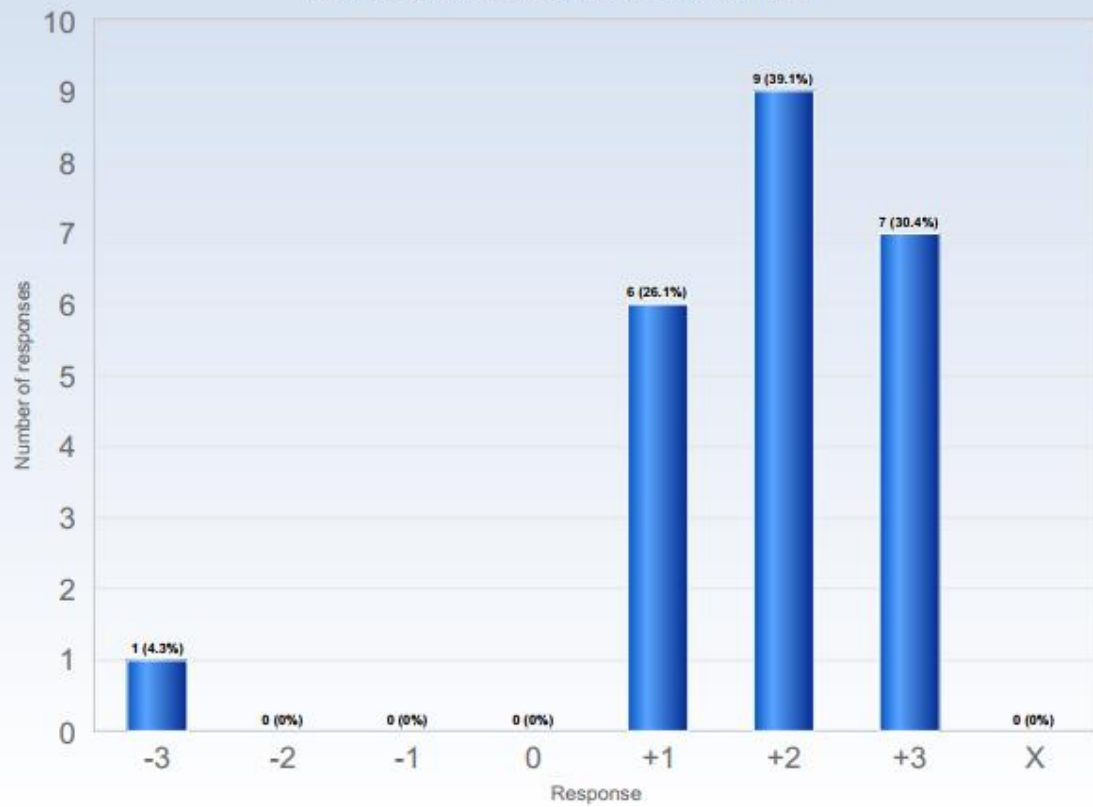
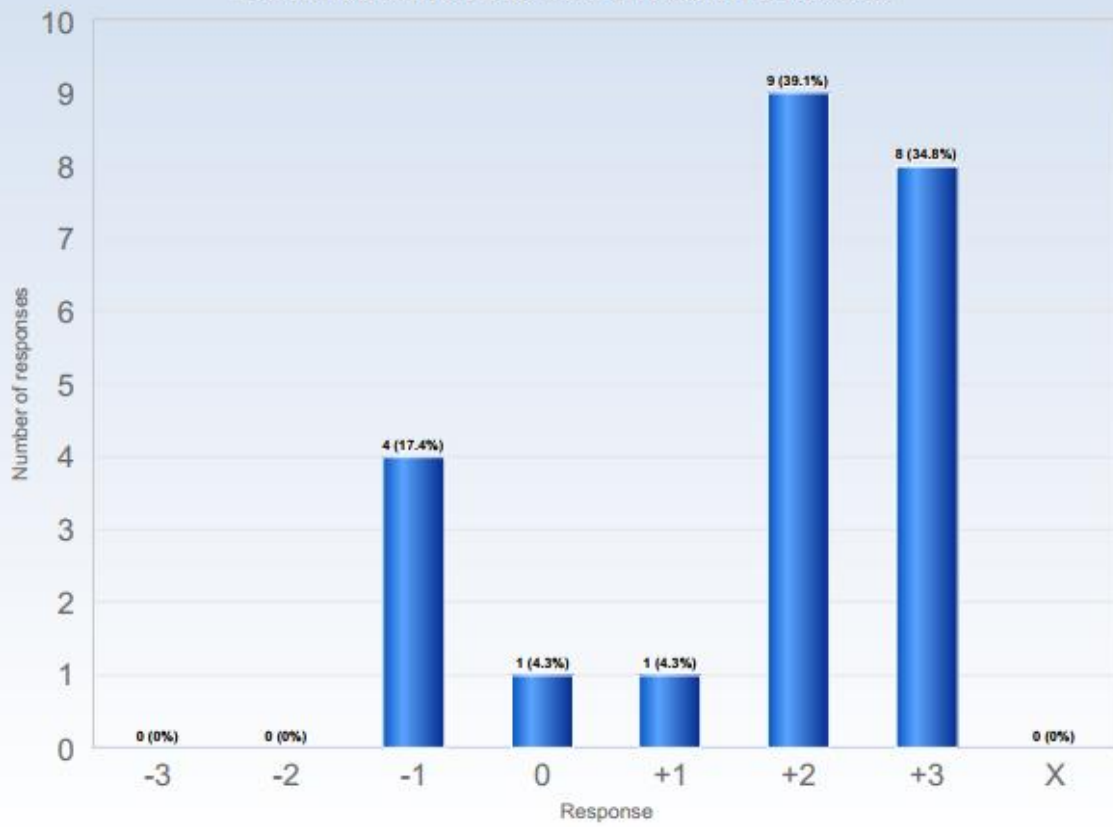12. The course activities helped me to achieve the intended learning outcomes efficiently
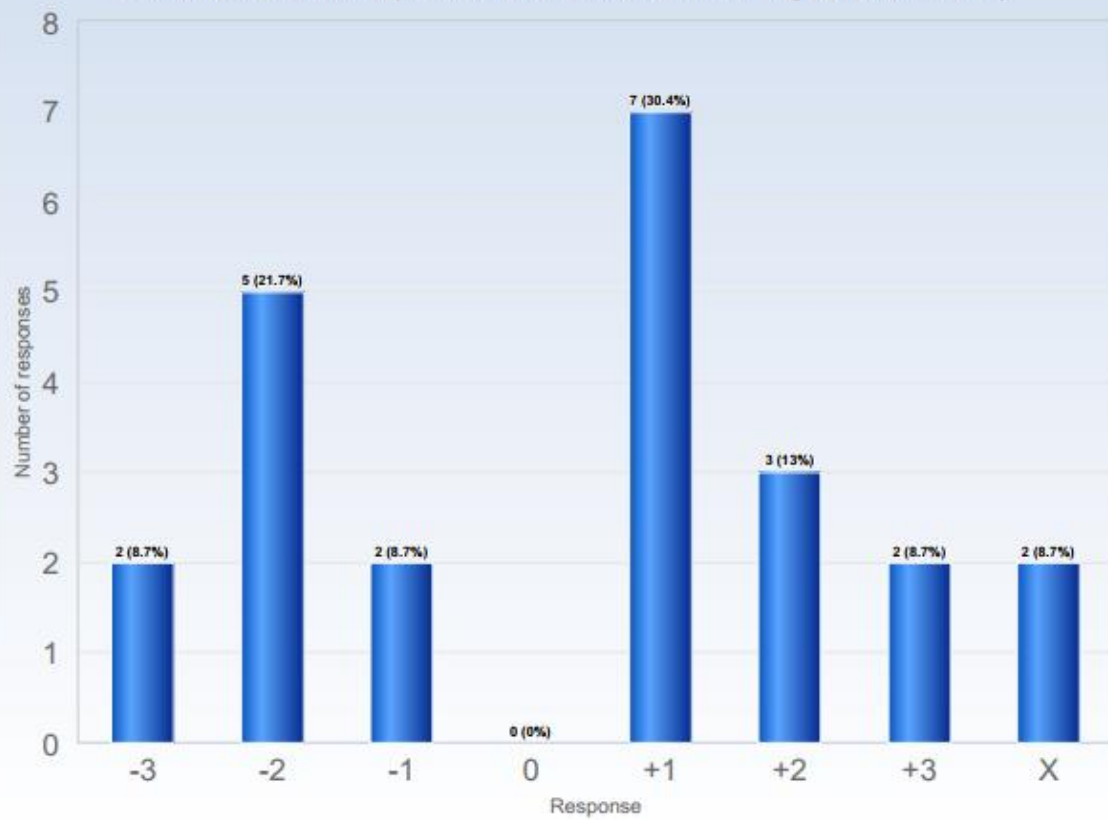
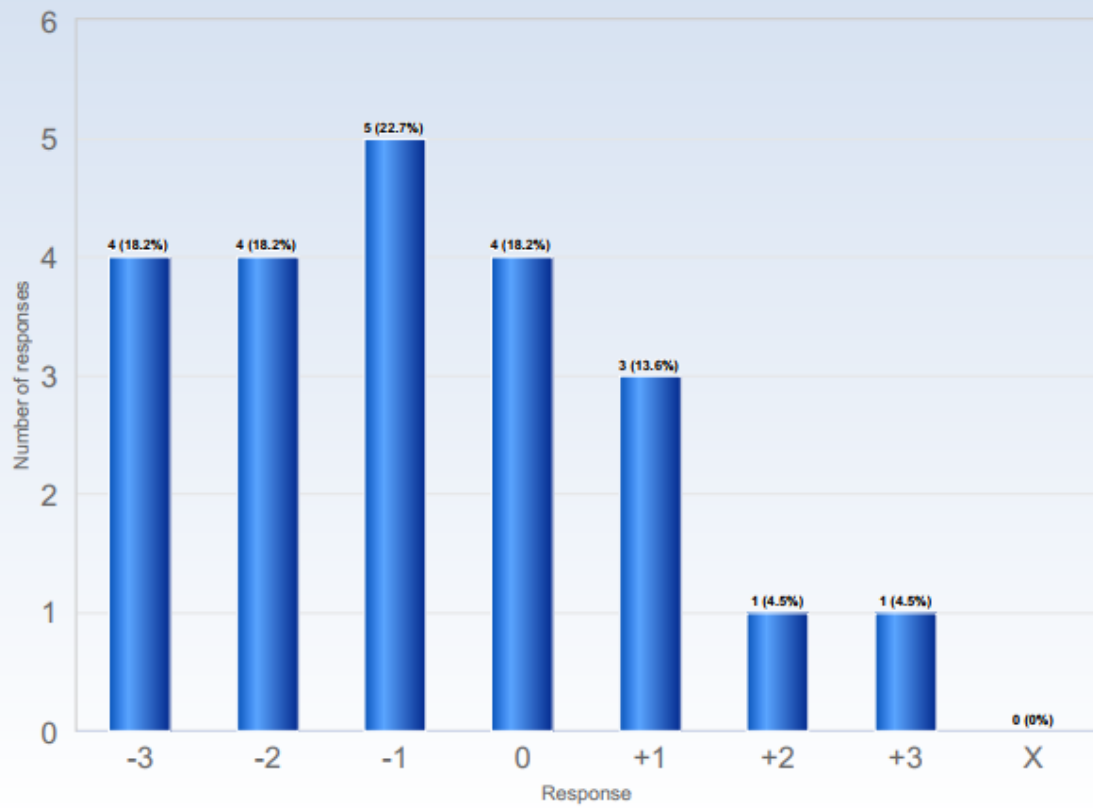15. I was able to practice and receive feedback without being graded

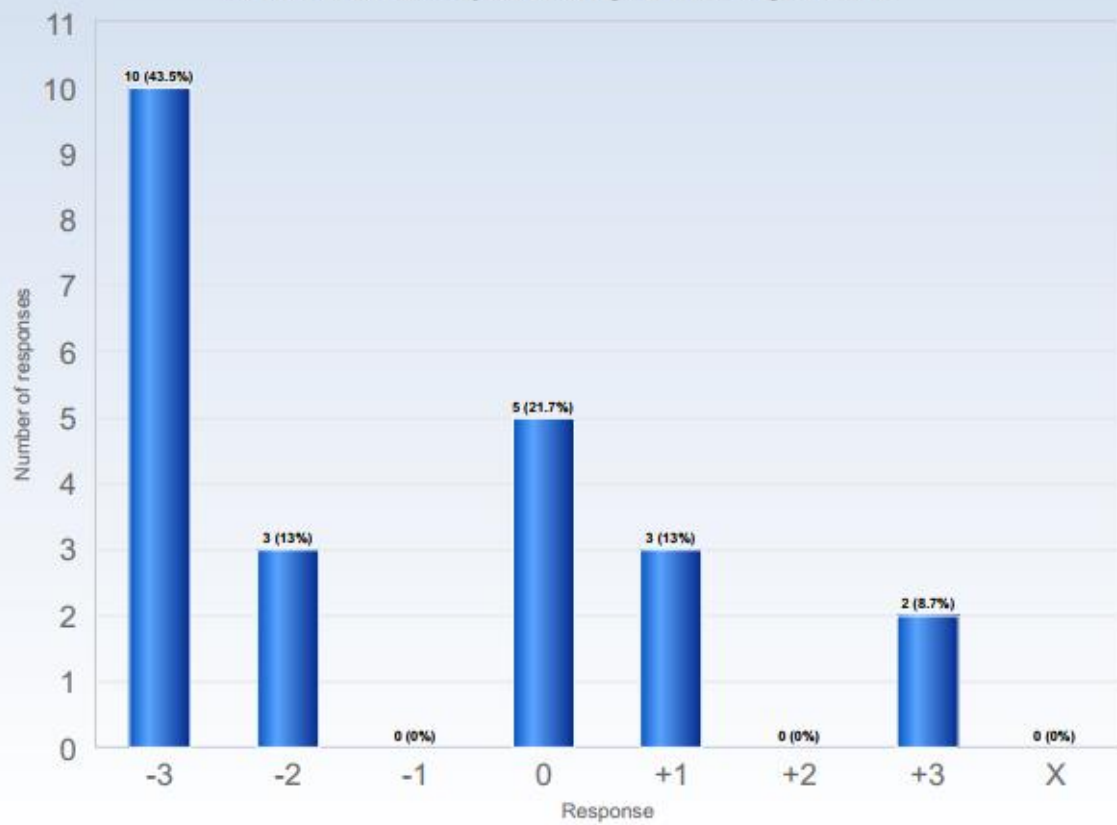16. The assessment on the course was fair and honest

17. My background knowledge was sufficient to follow the course

19. The course activities enabled me to learn in different ways

Chart — Number of responses vs Response

- -3: 4 (18.2%)
- -2: 4 (18.2%)
- -1: 5 (22.7%)
- 0: 4 (18.2%)
- +1: 3 (13.6%)
- +2: 1 (4.5%)
- +3: 1 (4.5%)
- X: 0 (0%)

21. I was able to learn by collaborating and discussing with others

22. I was able to get support if I needed it