Course evaluation for Mechanics of Fiber Networks and Materials (SE2152, 8.0 credits, HT 2019)

Artem Kulachenko (Examiner)

Background

The year 2019 was the first time the course was offered to our master and Ph.D. students with a new title (the original course was SE2152 Paper Mechanics, 9.0 credits). A different version of the course is regularly given the same year with a greater focus toward industrial users.

The course encompassed 20 lectures, 3 labs, 10 homework assignments (including 3 lab reports). There were 3 lecturers in the course, Artem Kulachenko, Sören Östlund, and Mikael Nygårds. We used "Mechanics of Paper Products" ed. Niskanen as a course book. The intentions and the principles behind the book were about learning through case studies, although not all the lectures followed this principle.

The grade was given as a weighted average of the grades earned in the home assignments. The maximum grade that could be earned through homework was A, but any grade could be improved by two steps through oral examination.

The total number of students who took the course was 13 (10 regular master students and 3 PhD students). The attendance of the lectures was good throughout the course. The majority of the students were engaged in the studies and received a good grade.
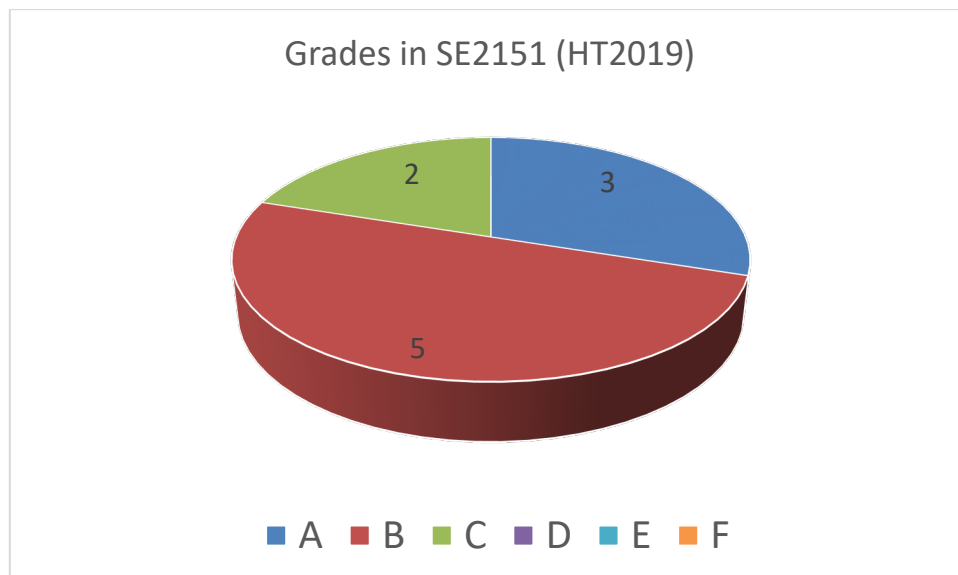

Figure 1. Grade distribution in 2019 among students who opted for a grade (the PhD students opted for Pass/Fail).

Problems identified in the <u>current</u> course round

There were no major problems identified in the course.

Problem 1: Some students still felt that the criteria for the grading were unclear.

This is a recurring problem for open tasks. Although the students were offered to ask questions about the criteria, very few students used that option in the end.

Solution proposed: Give concrete examples of the homework and the grades received from the past rounds during the first lecture.

Problem 2: Workbench version of the computer lab had glitches.

Although the lab was reworked, it did not solve the problem completely. The update of the geometry in response to parameter change was not always yielding the correct result for some students.

Solution implemented: The Workbench version has been totally reworked with the help of ANSYS support. It is now stable and there is only one version of the parameterized CAD drawing required.

Problem 3: Students lack interactive moments in the lectures.

The lecture series is in the present form based on the book and consist of conventional lectures without much student-lecturer interaction. However, some level of interaction was offered by Sören Östlund. It was appreciated by the students.

Solution proposed: Consider integrating more interactive moments in the class activities through using students' clickers or other e-learning tools.

Problem 4: Students think the course is not general enough to cover the entire range of fiber network materials.

Solution proposed: We will work on integrating other materials such as electrospan networks, biological tissues.

Problem 5: The workload distribution was not uniform.

Students stated that the work distribution was not uniform with more load in the second period. It was meant to be that way to synchronize the course with other master-level coursed given by the department.

Solution proposed: We will inform the student about non-uniform load distribution and justify so that there are better prepared to this scenario.

Other proposed enhancements

We received funding for adding sustainability aspects to the course and making it more general covering a larger number of network materials. We will the funding to enhance the

course in 2020. We will use the help from KTH Sustainability office to achieve the goal. The sustainability-related questions will be added to the homework assignments.

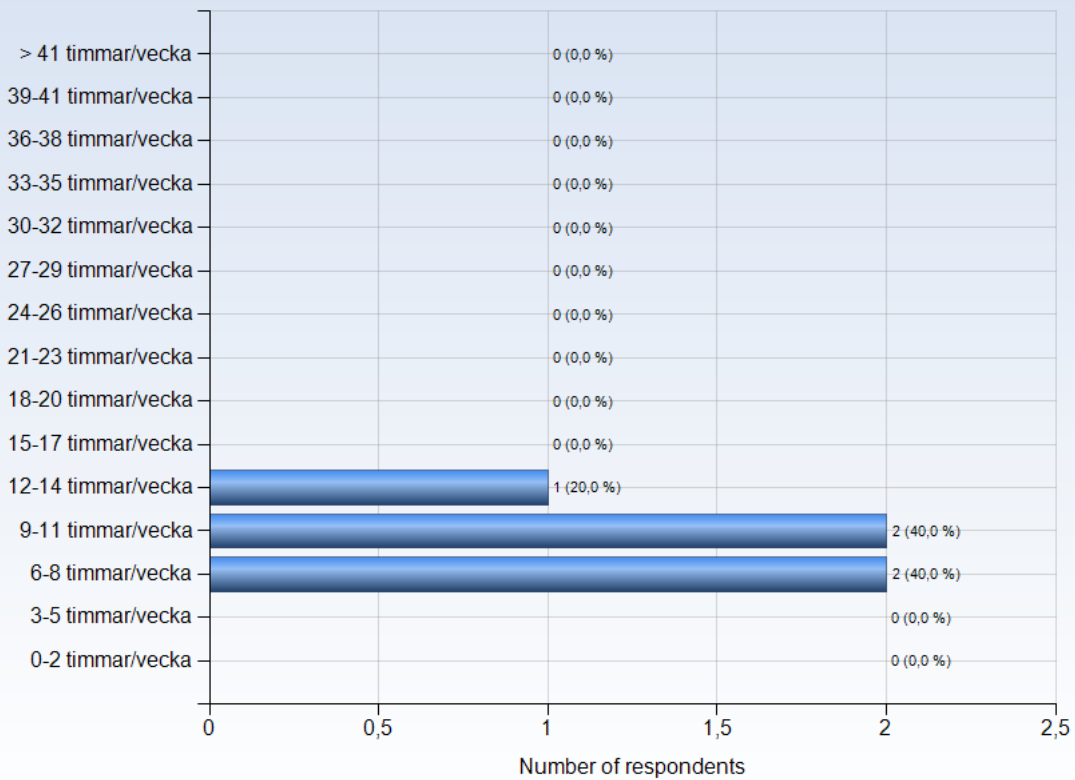**Students' responses to course evaluation questionnaire**

SE2152 - 2019-12-16

Antal respondenter: 13
Antal svar: 5
Svarsfrekvens: 38,46 %

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 (0,0 %)
39-41 timmar/vecka	0 (0,0 %)
36-38 timmar/vecka	0 (0,0 %)
33-35 timmar/vecka	0 (0,0 %)
30-32 timmar/vecka	0 (0,0 %)
27-29 timmar/vecka	0 (0,0 %)
24-26 timmar/vecka	0 (0,0 %)
21-23 timmar/vecka	0 (0,0 %)
18-20 timmar/vecka	0 (0,0 %)
15-17 timmar/vecka	0 (0,0 %)
12-14 timmar/vecka	1 (20,0 %)
9-11 timmar/vecka	2 (40,0 %)
6-8 timmar/vecka	2 (40,0 %)
3-5 timmar/vecka	0 (0,0 %)
0-2 timmar/vecka	0 (0,0 %)

Comments

Comments (I worked: 6-8 timmar/vecka)

Mainly the weeks with assignments and lab reports where more time consuming. This was mainly more in the 2nd period. It would be nice if the workload would be spread out a bit more over the 1st period as well.

Comments (I worked: 9-11 timmar/vecka)

The first period was much calmer than the second, which has led to a rather low work distribution overall. Would say that during the first period it was around 4 – 8 hours each week, while during the second period it was closer to 14 – 18 hours each week.

Very unevenly distributed workload. Too many assignments in period 2, especially since the course is supposed to be 4.5 HP in P1 and 3.5 HP in P2. We barely did anything in P1 and then had hand-ins almost every week for P2.
And there is not any reason to wait until the last week with the computer lab, especially since we had to prepare the presentations as well.

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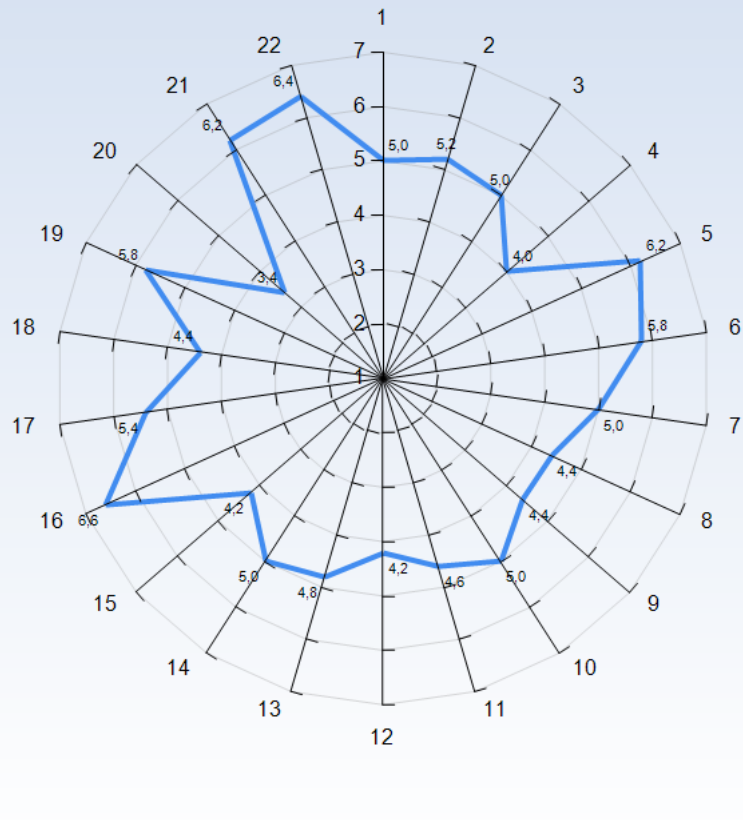
1 = No, I strongly disagree with the statement
4 = I am neutral to the statement
7 = Yes, I strongly agree with the statement

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

Literature

Bain, K. (2004). *What the Best College Teachers Do*, Chapter 5, pp. 98-134. Cambridge: Harvard University Press.

Biggs J. & Tang, C. (2011). *Teaching for Quality Learning at University*, Chapter 6, pp. 95-110. Maidenhead: McGraw Hill.

Elmgren, M. & Henriksson, A-S. (2014). *Academic Teaching*, Chapter 3, pp. 57-72. Lund: Studentlitteratur.

Kember, K. & McNaught, C. (2007). *Enhancing University Teaching: Lessons from Research into Award-Winning Teachers*, Chapter 5, pp. 31-40. Abingdon: Routledge.

Ramsden, P. (2003). *Learning to Teach in Higher Education*, Chapter 6, pp. 84-105. New York: RoutledgeFalmer.

Average response to LEQ statements - per gender
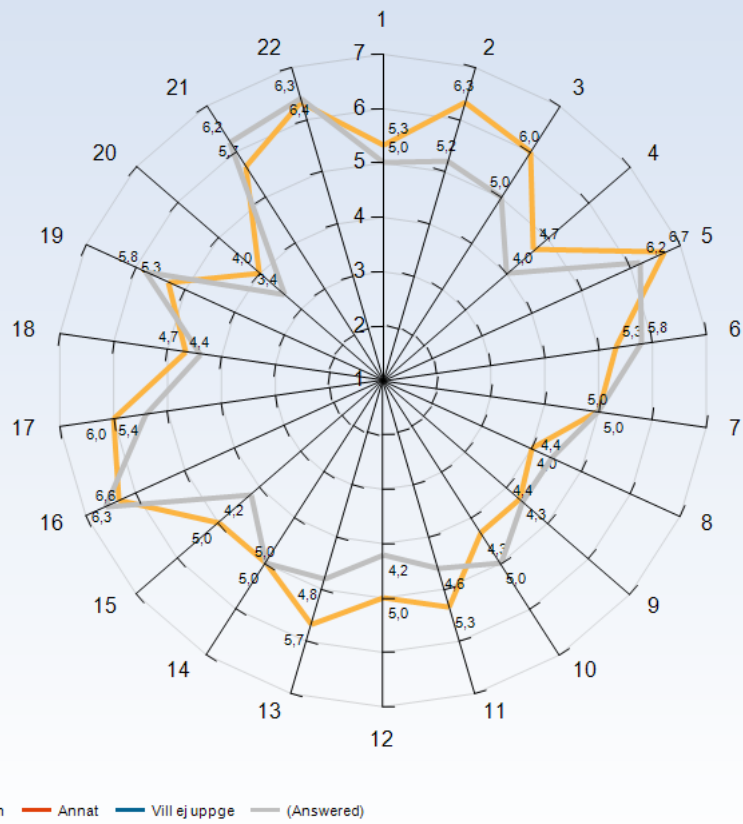
Comments

Comments (I am: Kvinna)

nothing to coment

Average response to LEQ statements - per type of student

Legend:
- Internationell masterstudent
- Internationell utbytesstudent
- Svensk student i årskurs 1-3
- Svensk student i årskurs 4-5
- Annan typ av student
- Vill ej uppge
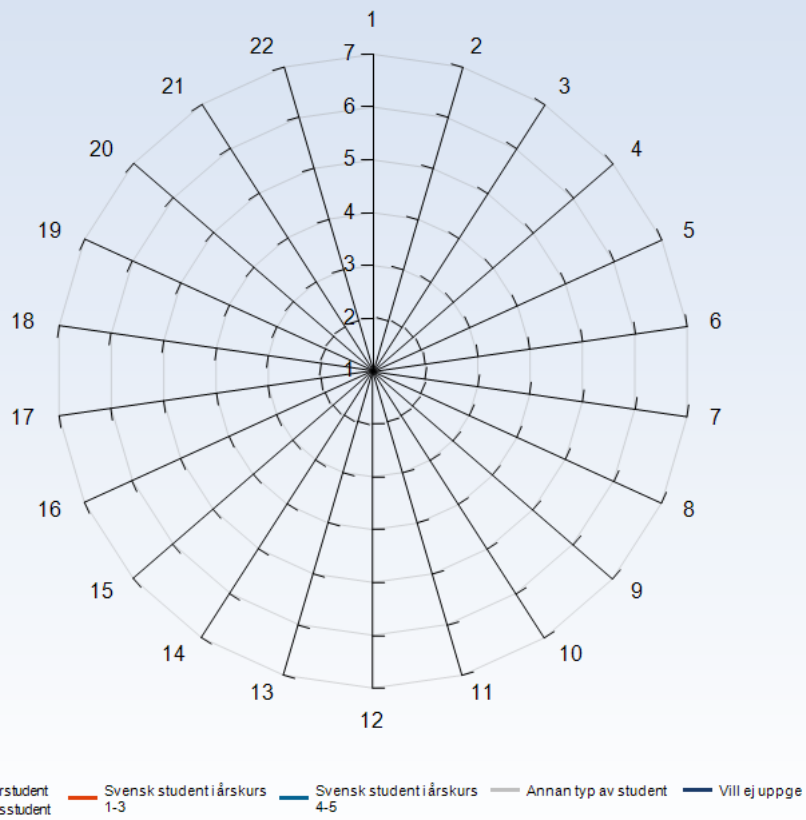
Comments

Comments (I am: Annan typ av student)

I'm a PhD student without background in solid mechanics, so it was hard to me to follow everything in the course. However, I liked the course and what I've learned. Some exercises were too depth for me.

Average response to LEQ statements - per disability

Ja — Nej — Vill ej uppge
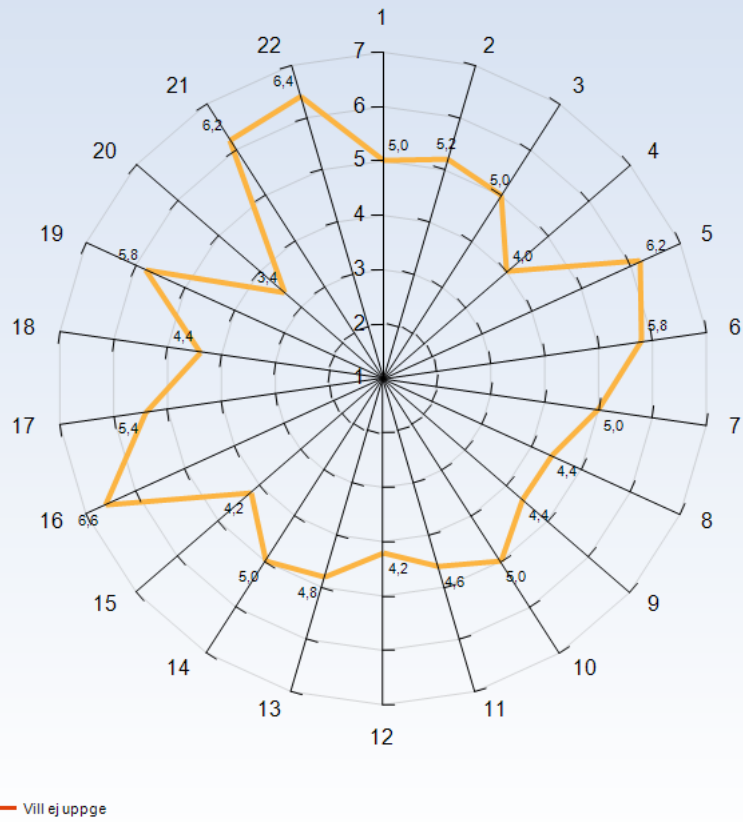
Comments

GENERAL QUESTIONS

What was the best aspect of the course?

What was the best aspect of the course? (I worked: 6-8 timmar/vecka)

To work in groups and make pratical classes (like the labs).

The small group which worked together sometimes. The personal approach was very good.

What was the best aspect of the course? (I worked: 9-11 timmar/vecka)

I loved the FEM-lab, and I feel that it could be a larger part of the course.

The lab at RISE. It was nice to perform some experiments in an actual lab environment.

What was the best aspect of the course? (I worked: 12-14 timmar/vecka)

Different aspects of fiber network modeling

What would you suggest to improve?

What would you suggest to improve? (I worked: 6-8 timmar/vecka)

Decrease the numbers of homeworks. I think it was a little too much (regarding to the complexity of the exercises and their periodicity)

In my opinion the course is way too specific on paper mechanics. The course title suggests that other fibre networks are examined as well, but it didn't. Although the learning objectives describe the specific look on paper, but due to the course title I was distracted. The paper mechanics could form a very good fibre knowledge in the first period, but I would like to see some other fibre networks as well. I think by spending so much time and such detail on all the ins and outs of paper, you loose a lot of interest and enthusiasm. Even when paper needs to be the only item in the course, than it would be better I think to keep the course in just one period. The technical view could be more broad by spending time on recycled paper for instance and its mechanical properties.

What would you suggest to improve? (I worked: 9-11 timmar/vecka)

Change the work distribution, put a larger part of the course in period 1. I think we had 3 HW:s in the first period and 7 in the second (this includes the lab reports).

A more even distribution of the workload. It was also weird, and kind of unfair, that different things were required for lab 3 depending on if APDL or Workbench was used. It felt like you were punished if you did not use APDL becuase you had to do a lot of extra work. Especially, since we already had to do extra work as the Workbench file did not work properly.

What would you suggest to improve? (I worked: 12-14 timmar/vecka)

It was incoherent between the lectures. If looking at an individual lecture they were great. But could not correlate or combine with other parts of the course

What advice would you like to give to future participants?

What advice would you like to give to future participants? (I worked: 6-8 timmar/vecka)

Make sure the you have enough bases in solid mechanics and computer simulation.

Don't lose the track of the course and try to follow the classes.

Know that the course is about paper and paper only. Don't expect it to be about other fibre materials (unless the course content changes).

What advice would you like to give to future participants? (I worked: 9-11 timmar/vecka)

Make sure to read the book before the lecture and come prepared, I believe that this would contribute to it being much easier to keep track of the lectures.

Start the assignemnts in time.

What advice would you like to give to future participants? (I worked: 12-14 timmar/vecka)

Be more active in doing assignments. They might be tricky and can take your understanding to a next level

Is there anything else you would like to add?

Is there anything else you would like to add? (I worked: 6-8 timmar/vecka)

I think is a very interesting course.

Although the knowledge from both teachers is great and intriguing, I think that the way the lectures are presented are very different. No bad personal intentions, but I enjoyed Sörens lectures more than the ones from Artem due to the more interactive approach. This made it a lot more positive, interesting and therefore enjoyable.

Is there anything else you would like to add? (I worked: 9-11 timmar/vecka)

I liked that both Sören and Artem was really helpful if you had any quesstions or issues with the course. However, the home assignments were very unclear at times. In many assignments I did not really know what the questions were. Especially "Artem's assignments" were difficult to understand, and know what to do about. For instance, asking us to propose experiments to evaluate something we only touched on in class and that is rarely mentioned in the textbook does not help me learn or understand the subject any better, because I have no idea what I am doing or what is even feasible. At times the learning objectives were really vague, and I did not feel that I learnt that much.

SPECIFIC QUESTIONS

Beskriv förändringar i laborationerna som skulle förbättra DITT lärande.

Beskriv förändringar i laborationerna som skulle förbättra DITT lärande.

I think the labs were well planned.

For the computer simulation lab, for those who don't have basic knowledge in these softwares it could be more well explained or another version should be made.

I think the important is to understand why we are comparing the two results, so if you are planning to accept others students without previous knowlegde in this kind of areas, it would be good to create a diferent kind of exercicie.

Although it would take a bit more time, it would be interesting to also make the boxes in cross direction. The will give interesting comparisons.

Laboratories were well-planned to correlate between experimental and simulation

I would have liked to have a bit more knowledge about the theory behind the experiments. For instance, why is bending stiffness evaluated at 15 degrees in the folding experiments?

RESPONSE DATA

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

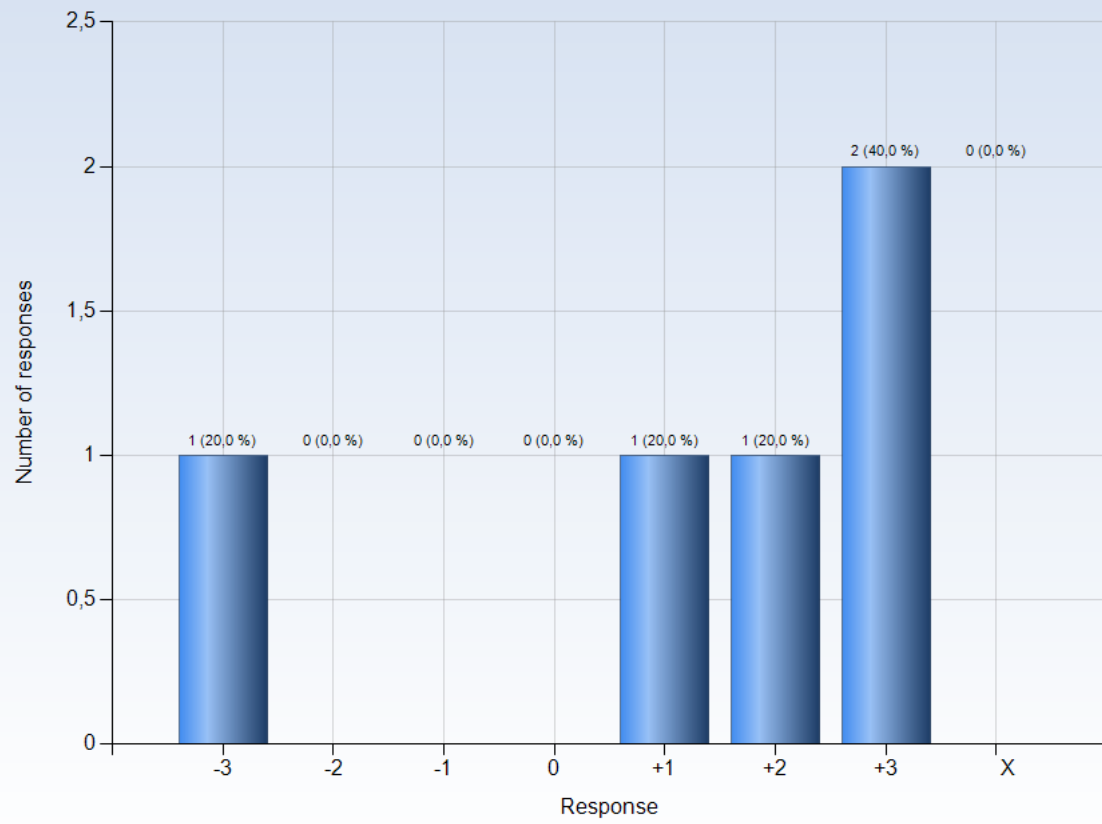-3 = No, I strongly disagree with the statement
0 = I am neutral to the statement
+3 = Yes, I strongly agree with the statement

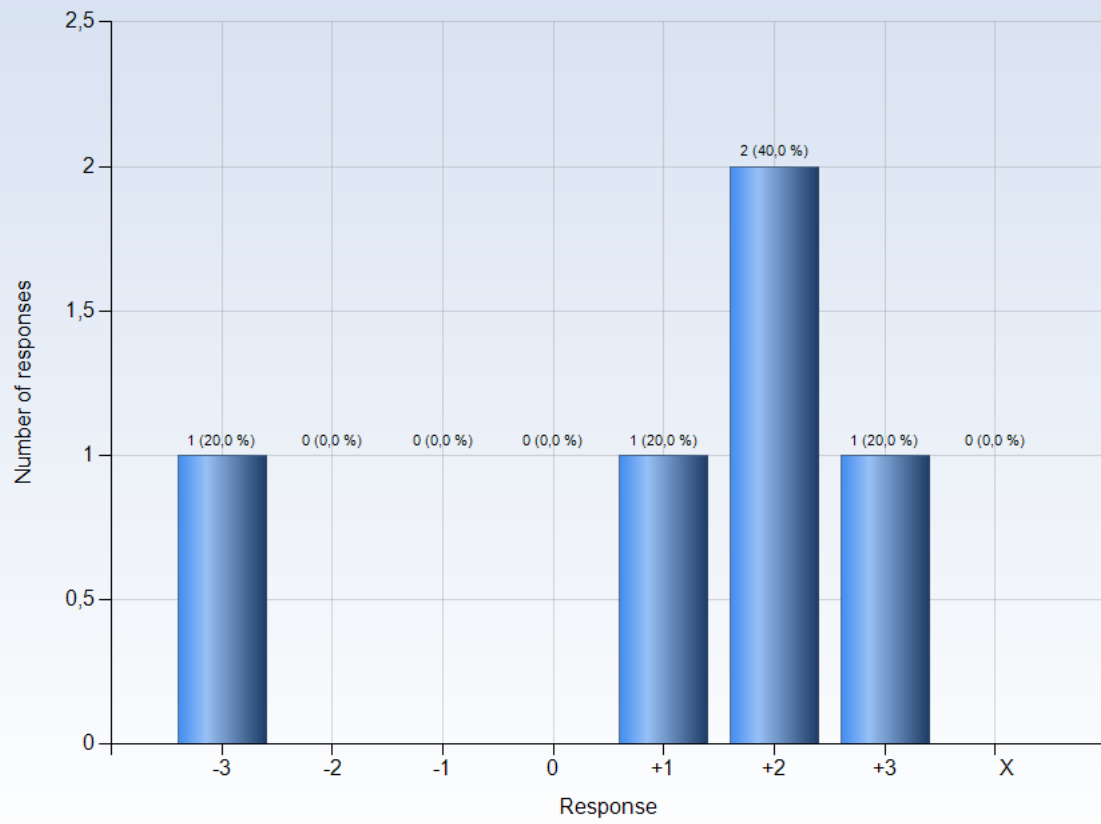X = I decline to take a position on the statement
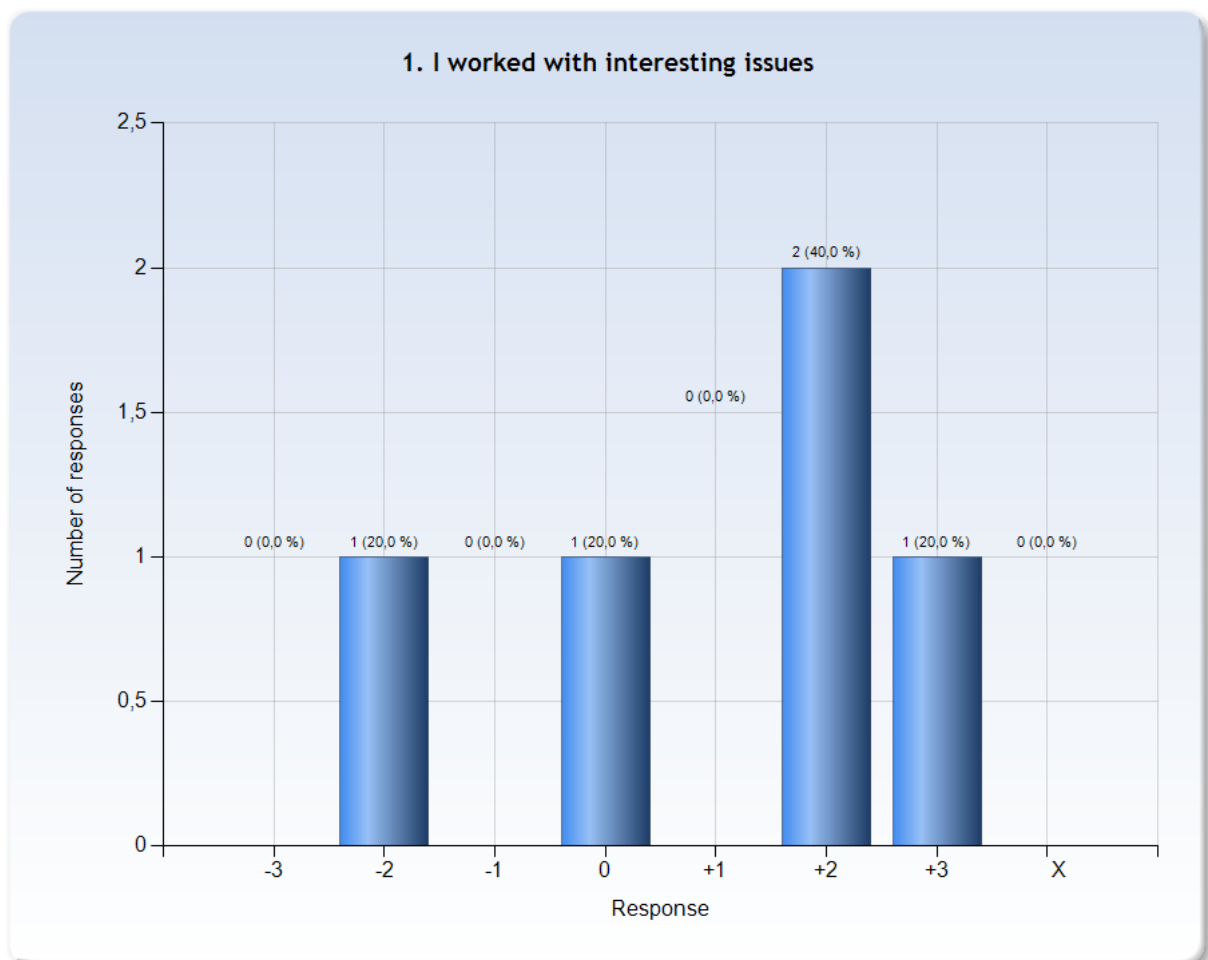
Comments

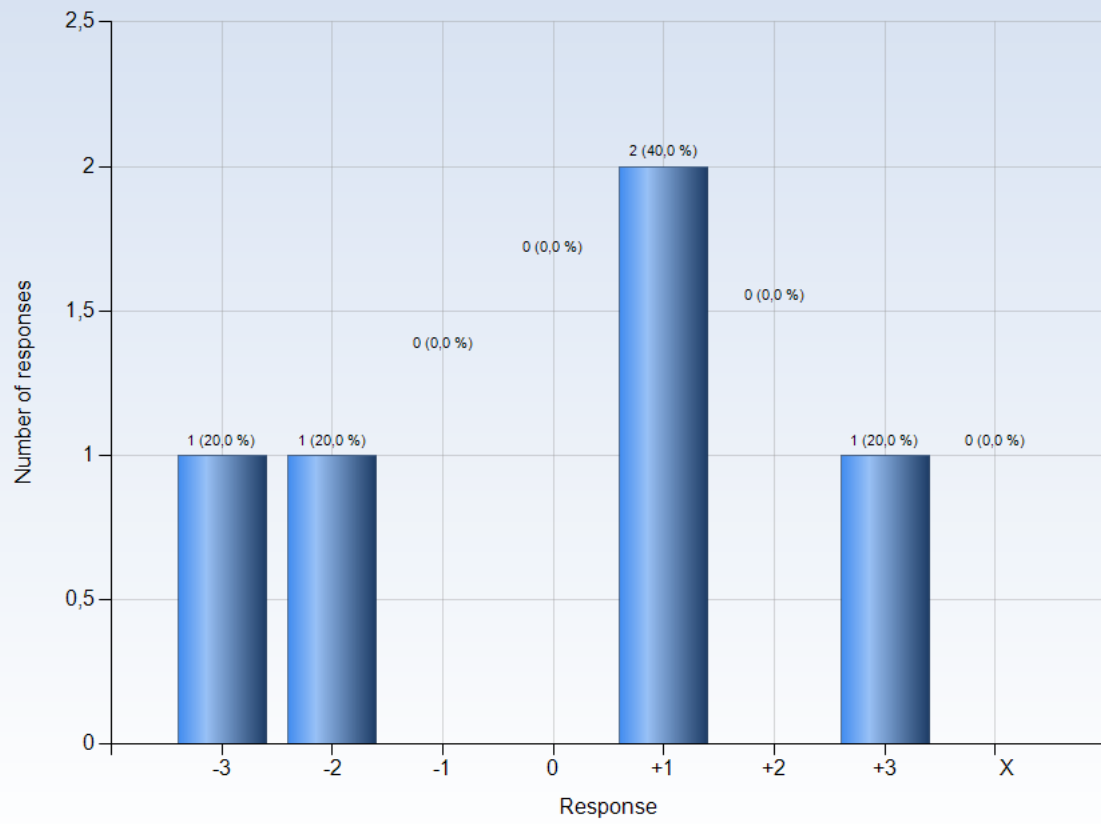**2. I explored parts of the subject on my own**

Comments

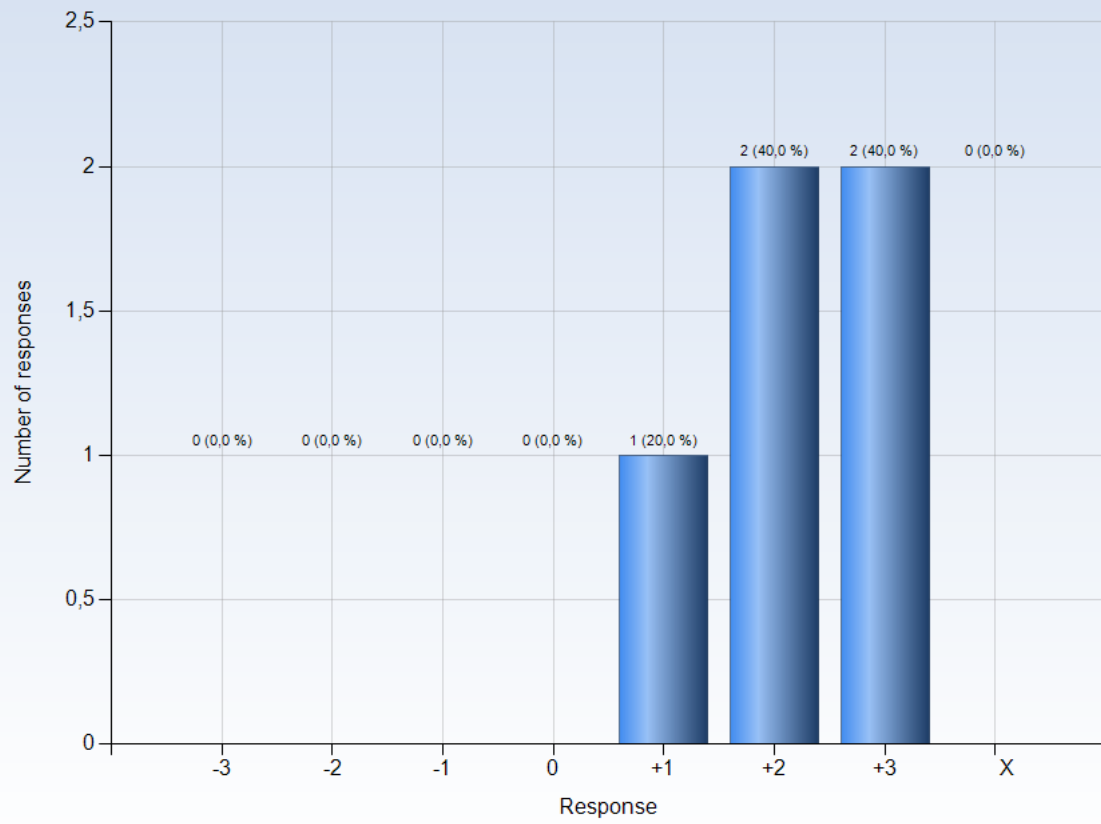**3. I was able to learn by trying out my own ideas**

Comments

4. The course was challenging in a stimulating way

Comments

5. I felt togetherness with others on the course

Comments

6. The atmosphere on the course was open and inclusive
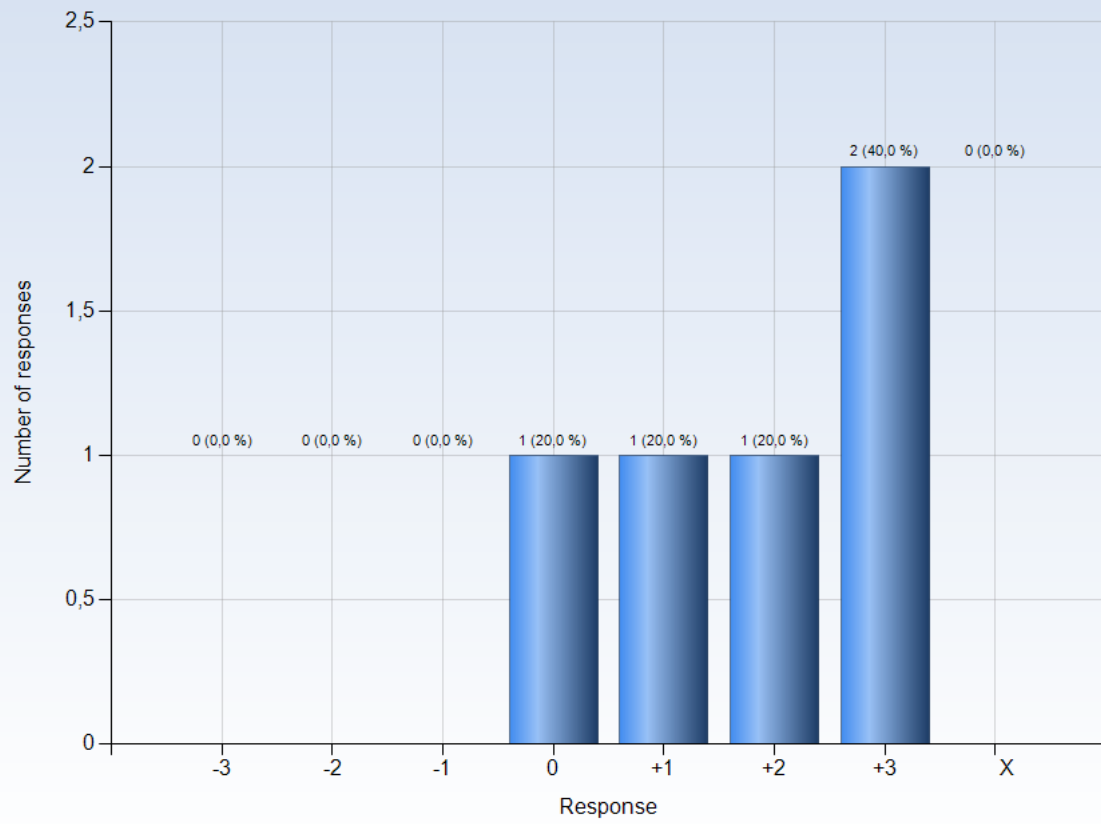
Comments

7. The intended learning outcomes helped me to understand what I was expected to achieve
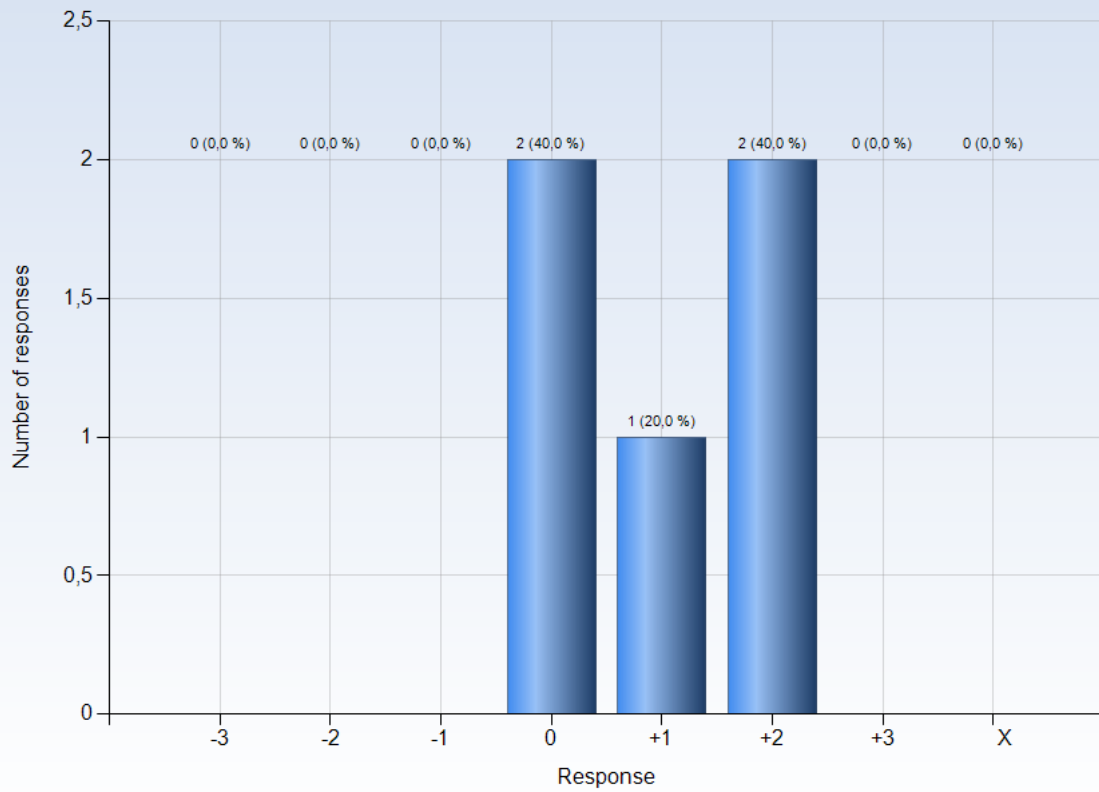
Comments

8. The course was organized in a way that supported my learning
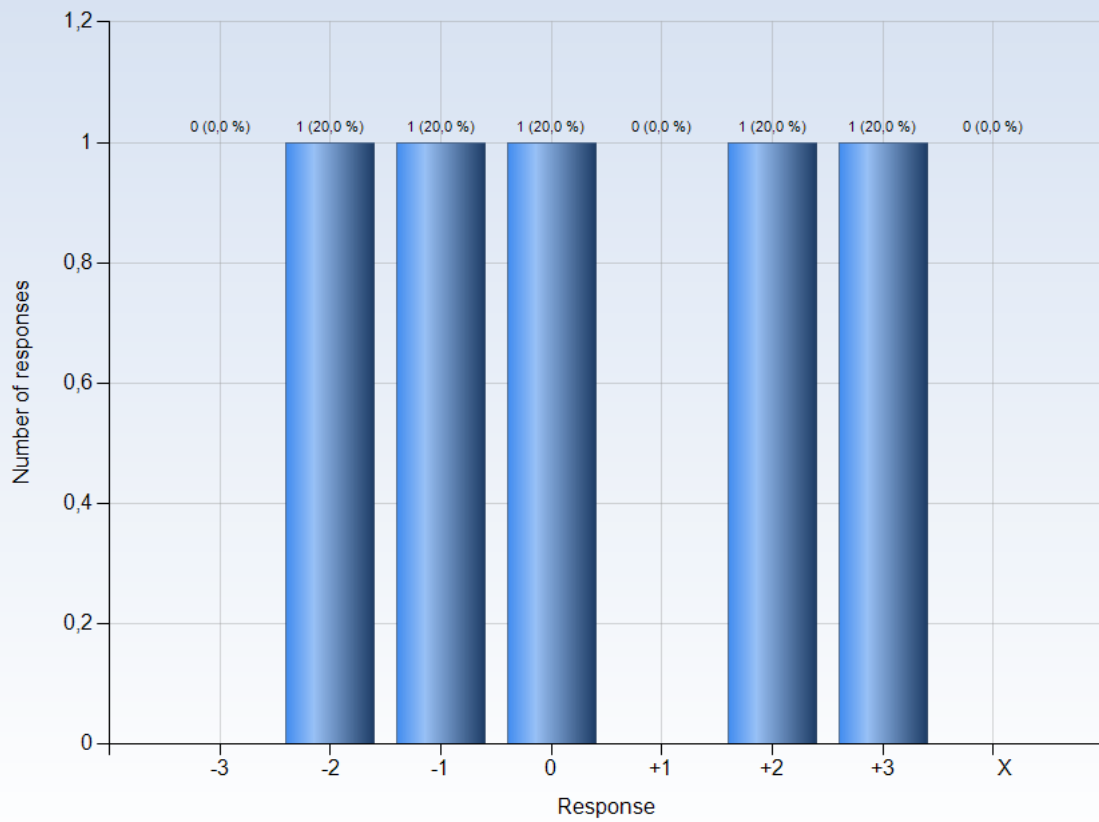
Comments

Comments (My response was: -1)

In my option were some of the HW:s a bit unclear, though I suspect that the determination of what was asked was also a part of the exercise. This can be a good teaching approach, though the problem is that some of these HW:s mostly just made me confused about what was expected out of us.

9. I understood what the teachers were talking about

Number of responses

Response	-3	-2	-1	0	+1	+2	+3	X
	0 (0,0 %)	0 (0,0 %)	2 (40,0 %)	1 (20,0 %)	0 (0,0 %)	2 (40,0 %)	0 (0,0 %)	0 (0,0 %)
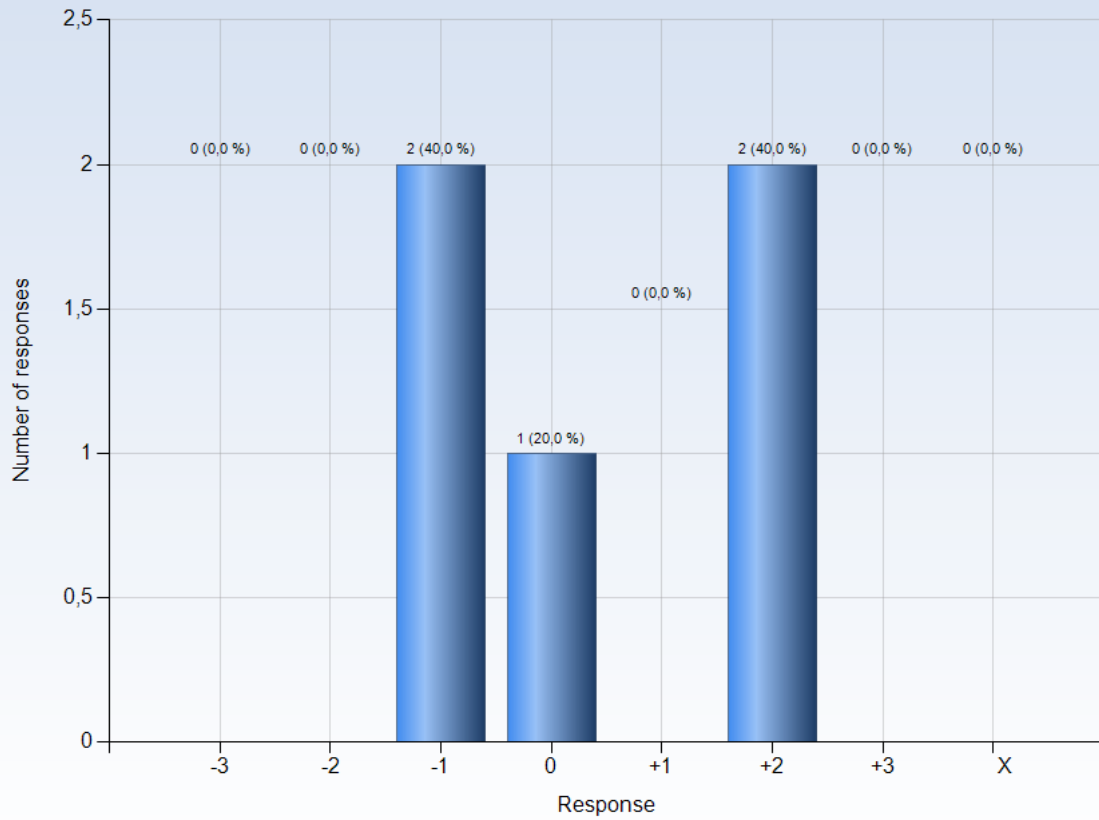
Comments

Comments (My response was: 0)

Most of the time, though there were incidents when I couldn't keep up. The lectures were often very advanced, and I could sometimes feel that the pace was a bit too high for me (too much information to process). This could also be due to that I didn't spend time reading the course book before the lecture in order to prepare, which is something that I believed would have helped a lot.

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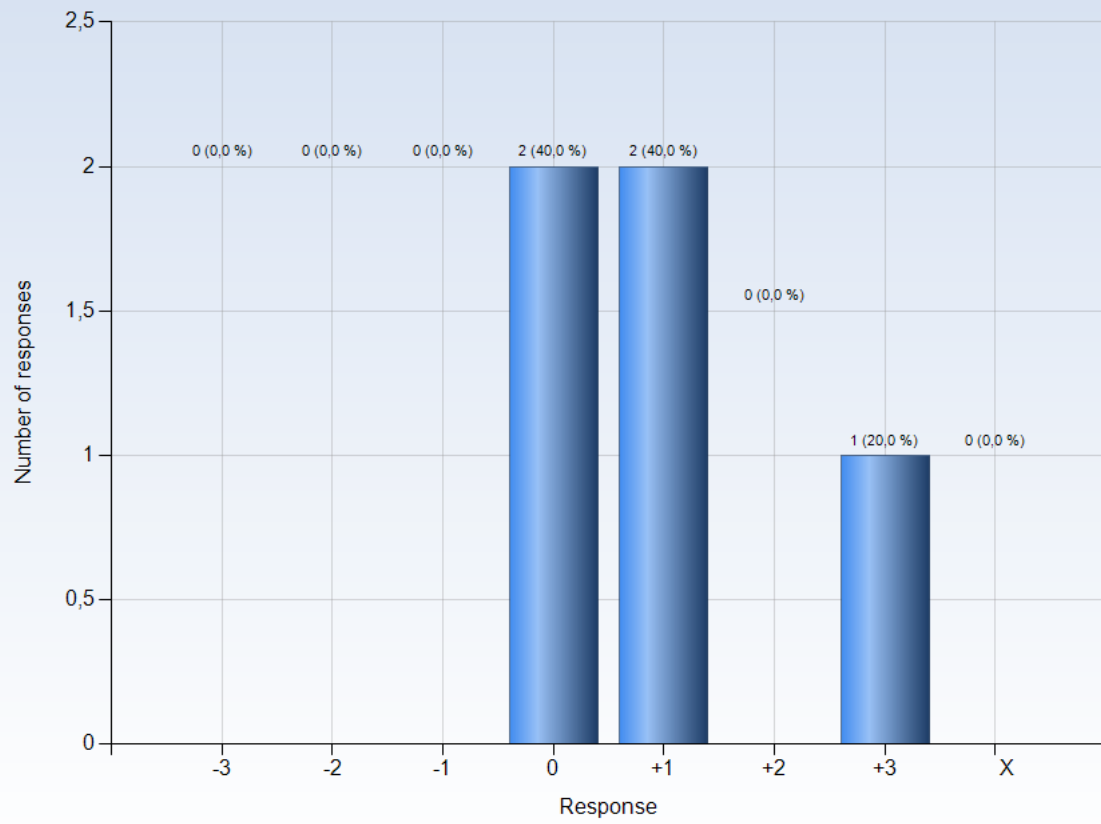
Comments

11. Understanding of key concepts had high priority
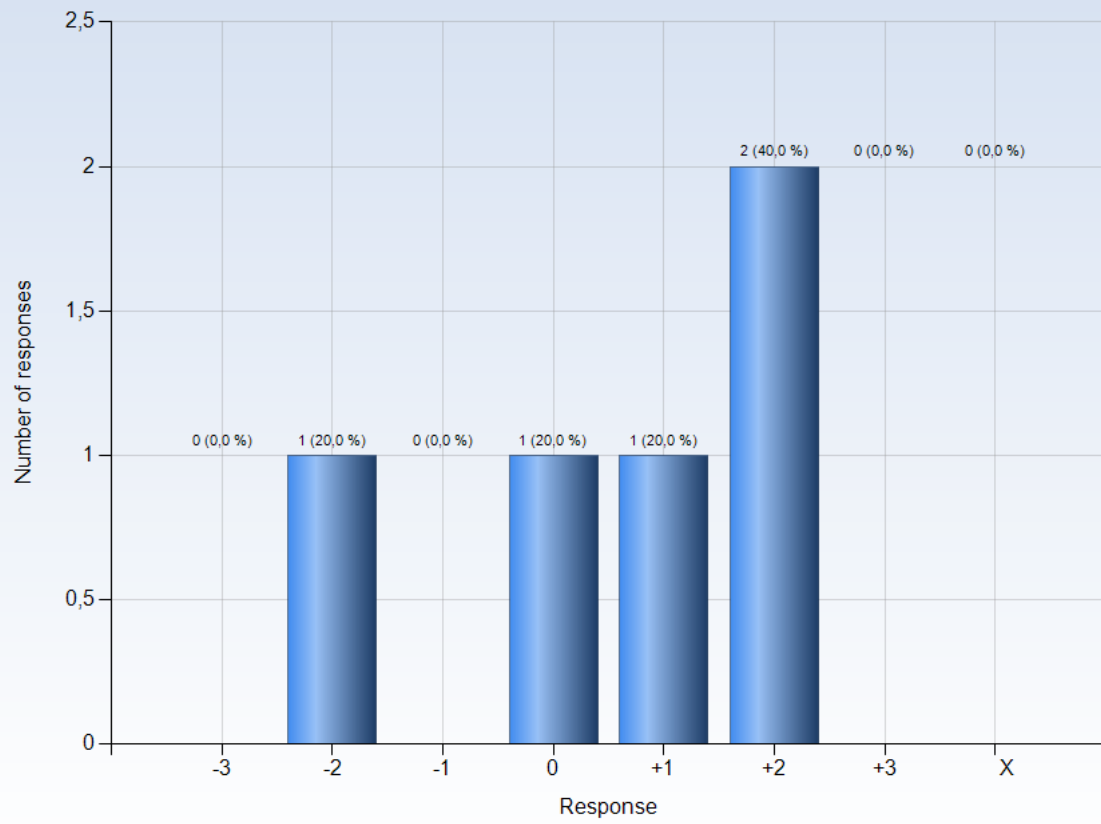
Comments

12. The course activities helped me to achieve the intended learning outcomes efficiently
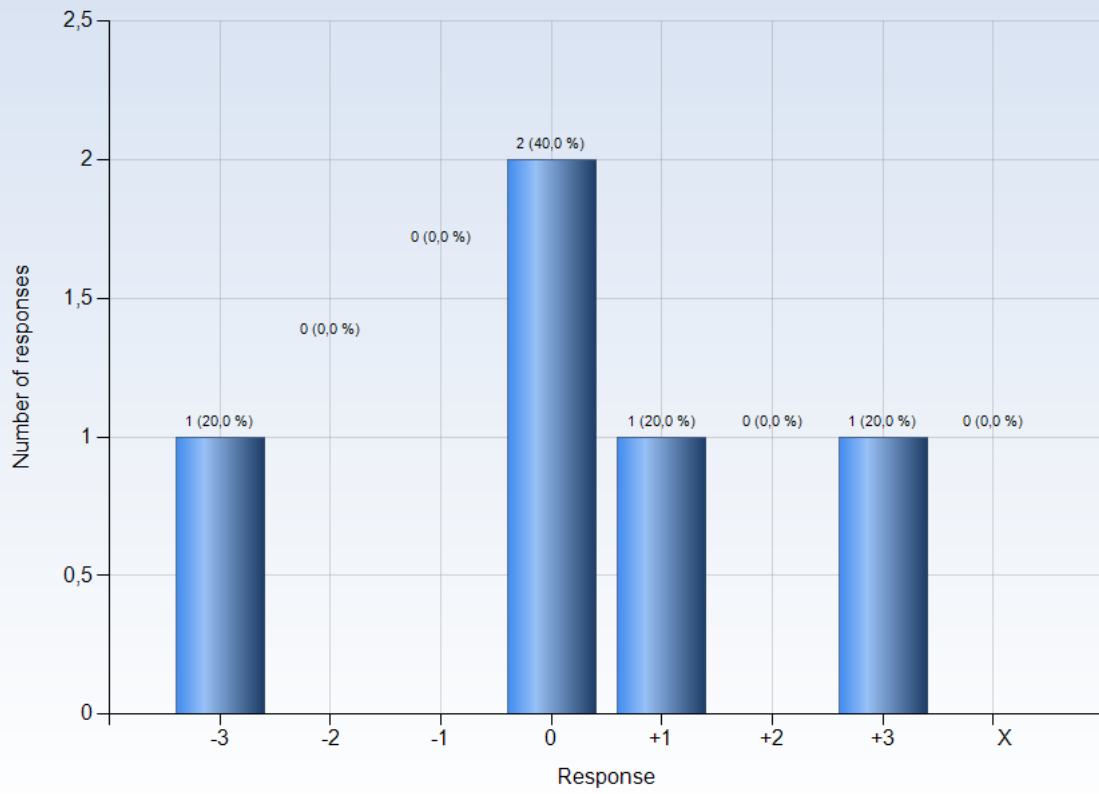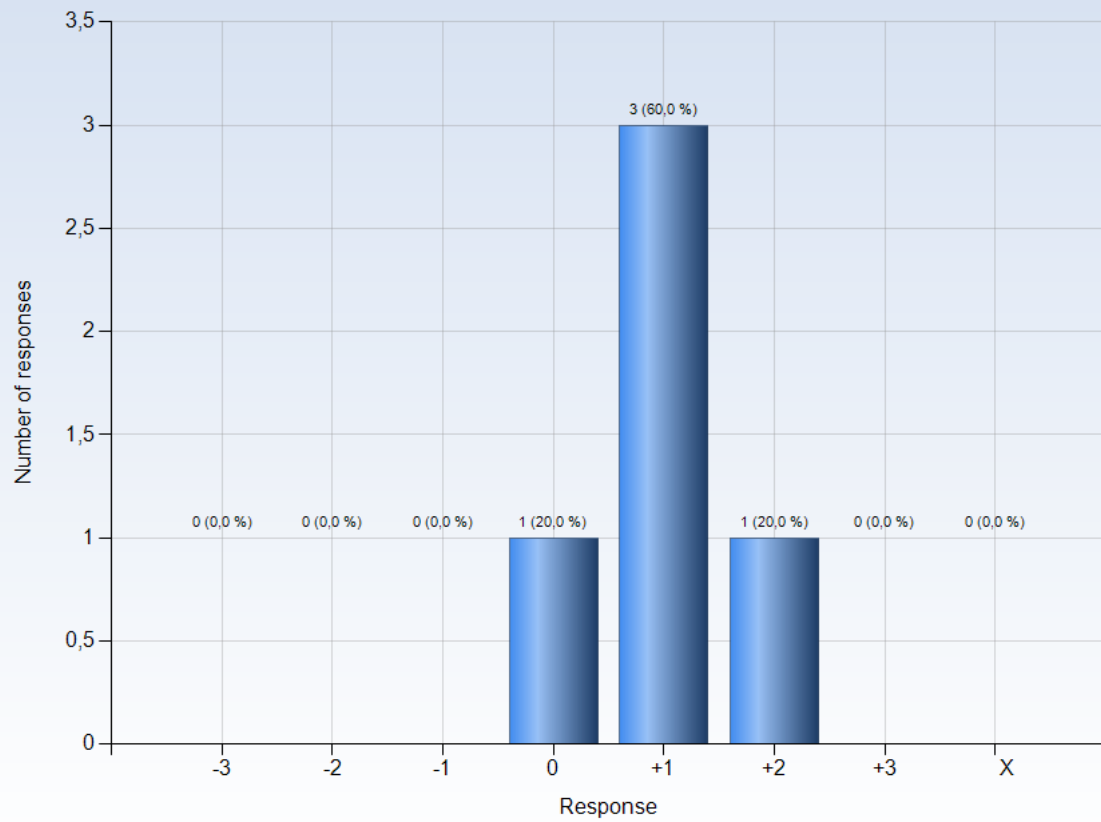

Comments

13. I understood what I was expected to learn in order to obtain a certain grade
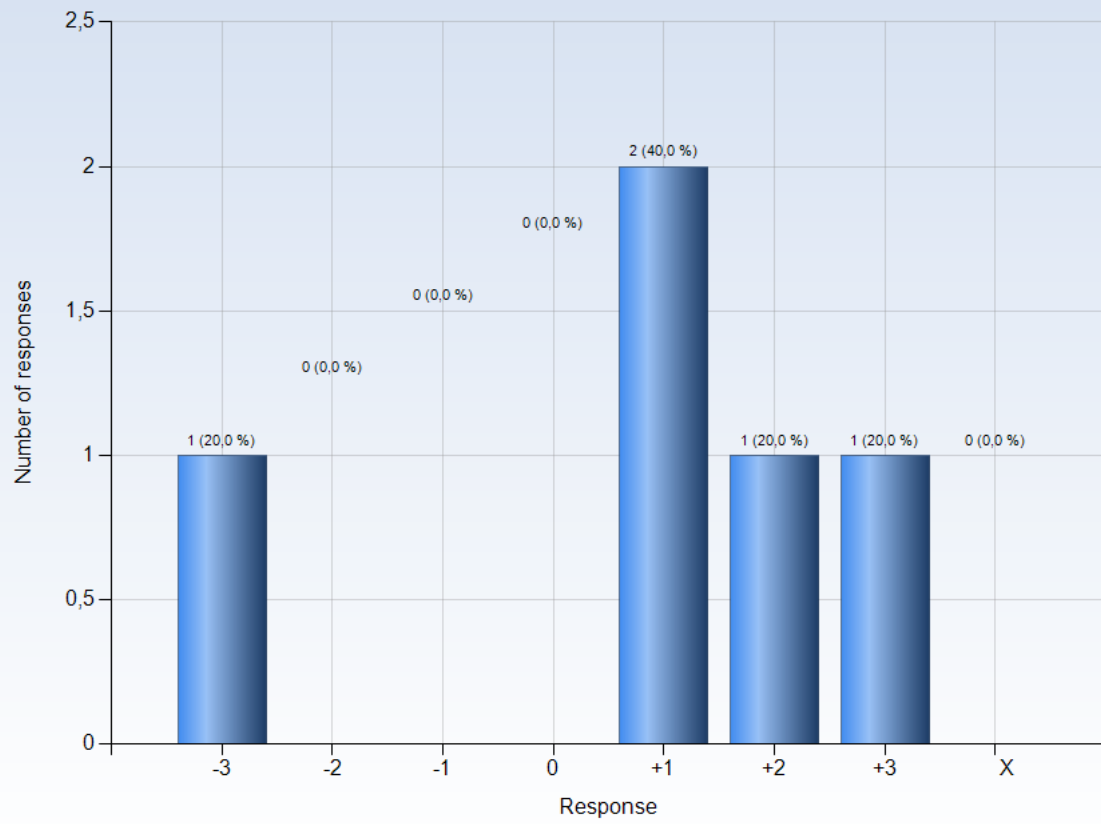
Comments

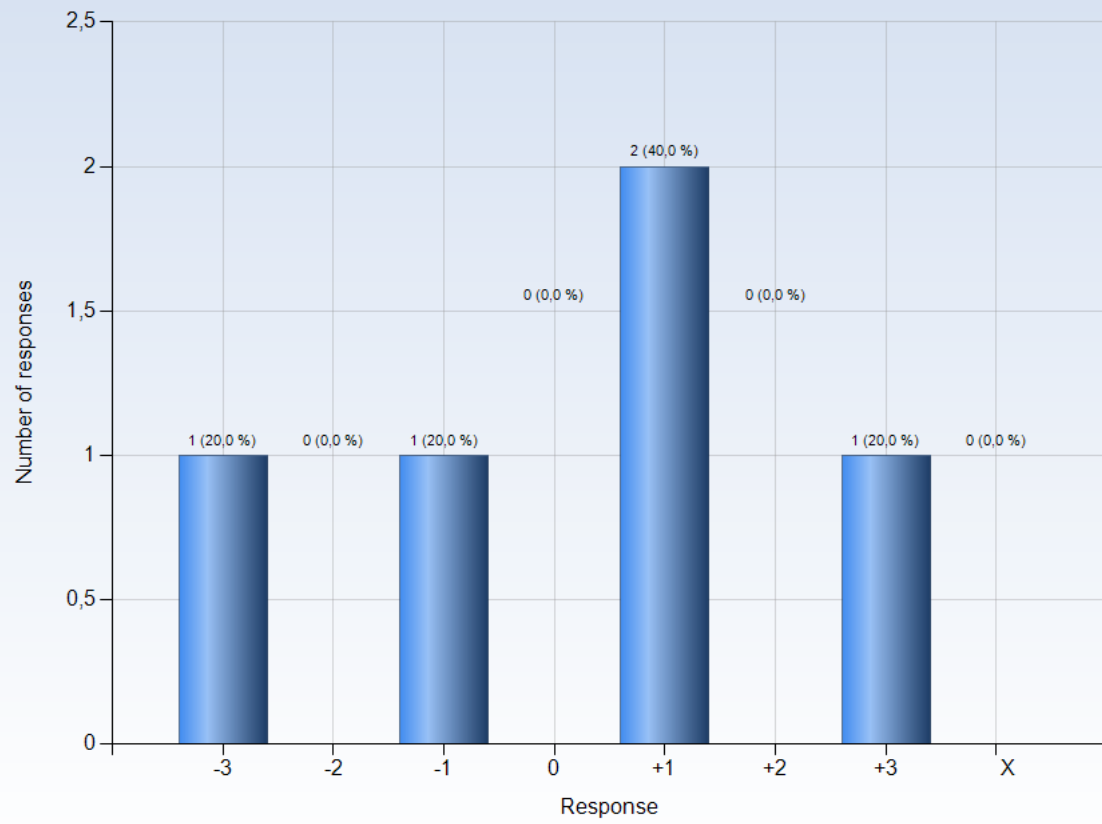**14. I received regular feedback that helped me to see my progress**

Comments

Comments (My response was: 0)

It took a while before we received some of our HW:s, though when we got them the feedback was good.

15. I could practice and receive feedback without being graded

Comments

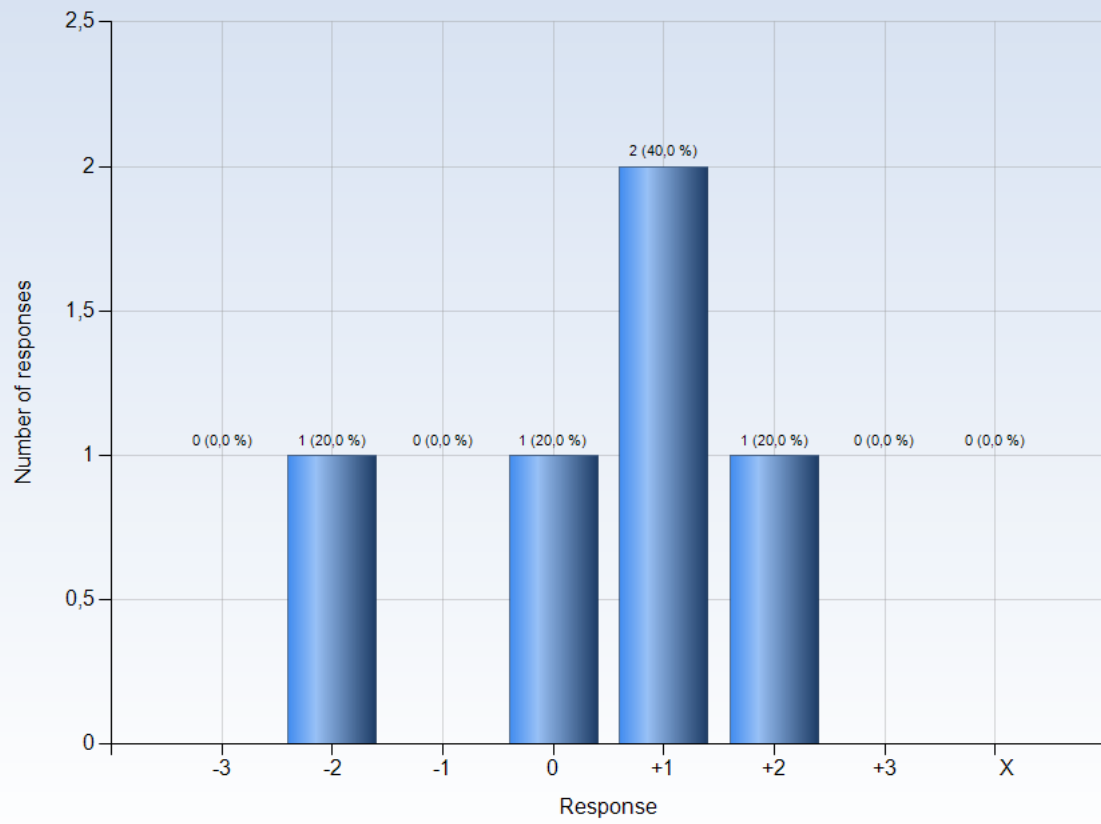**16. The assessment on the course was fair and honest**
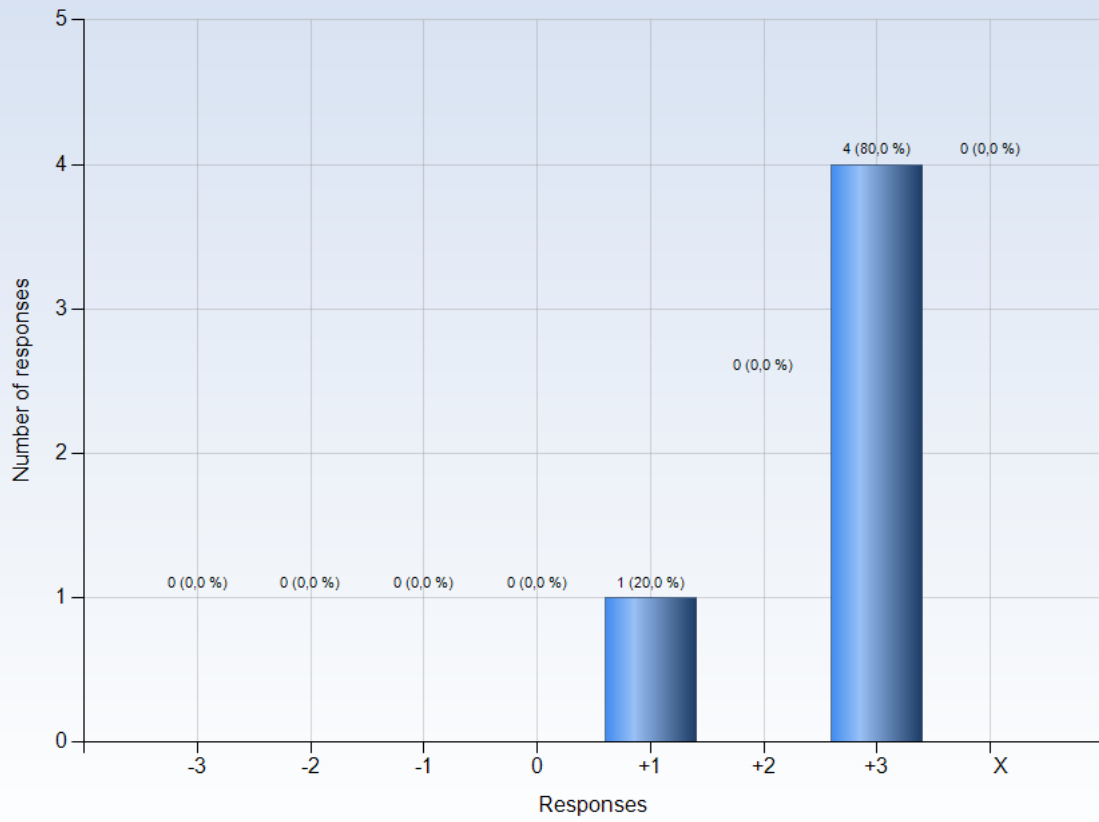
Comments

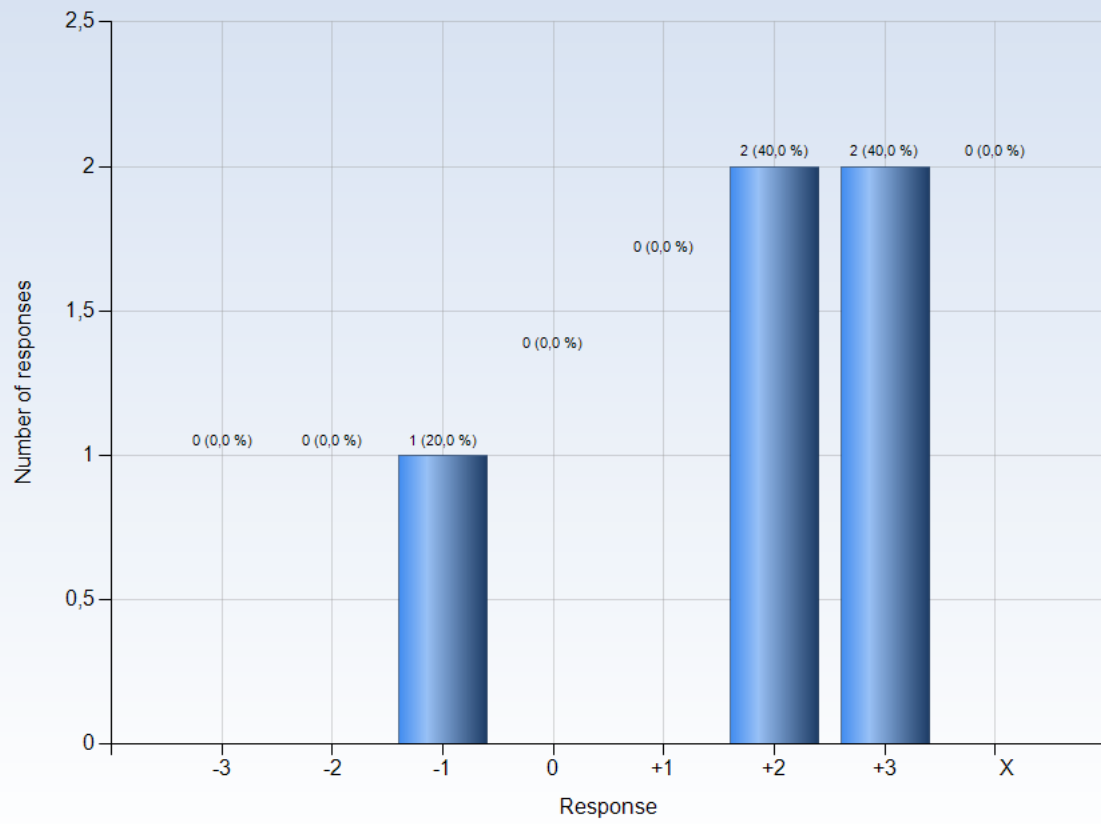## 17. My background knowledge was sufficient to follow the course
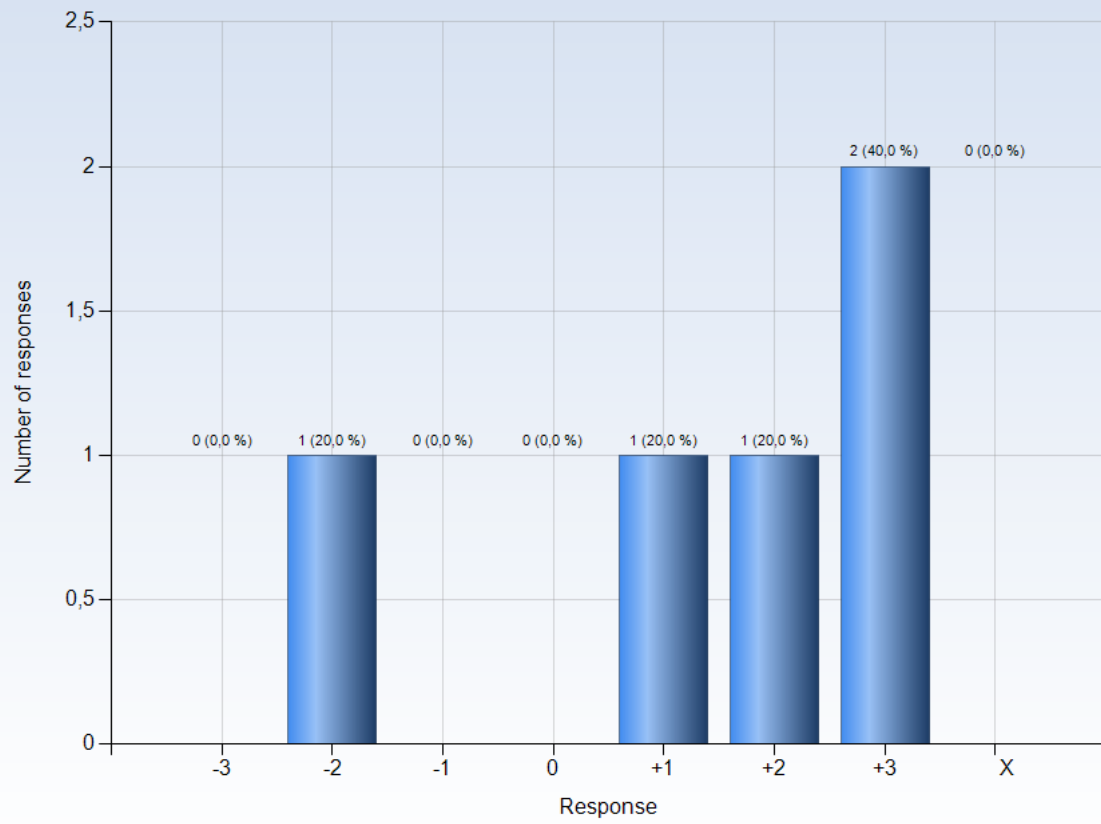
Comments
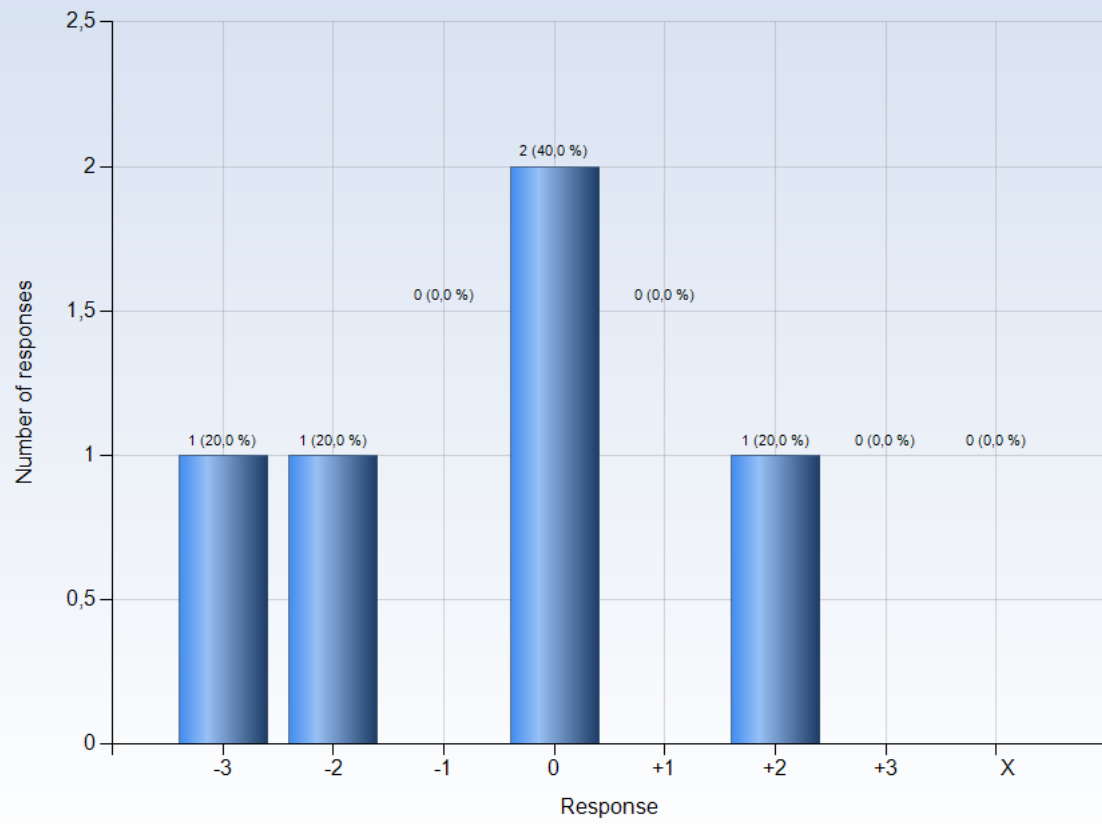
18. I regularly spent time to reflect on what I learned

Comments

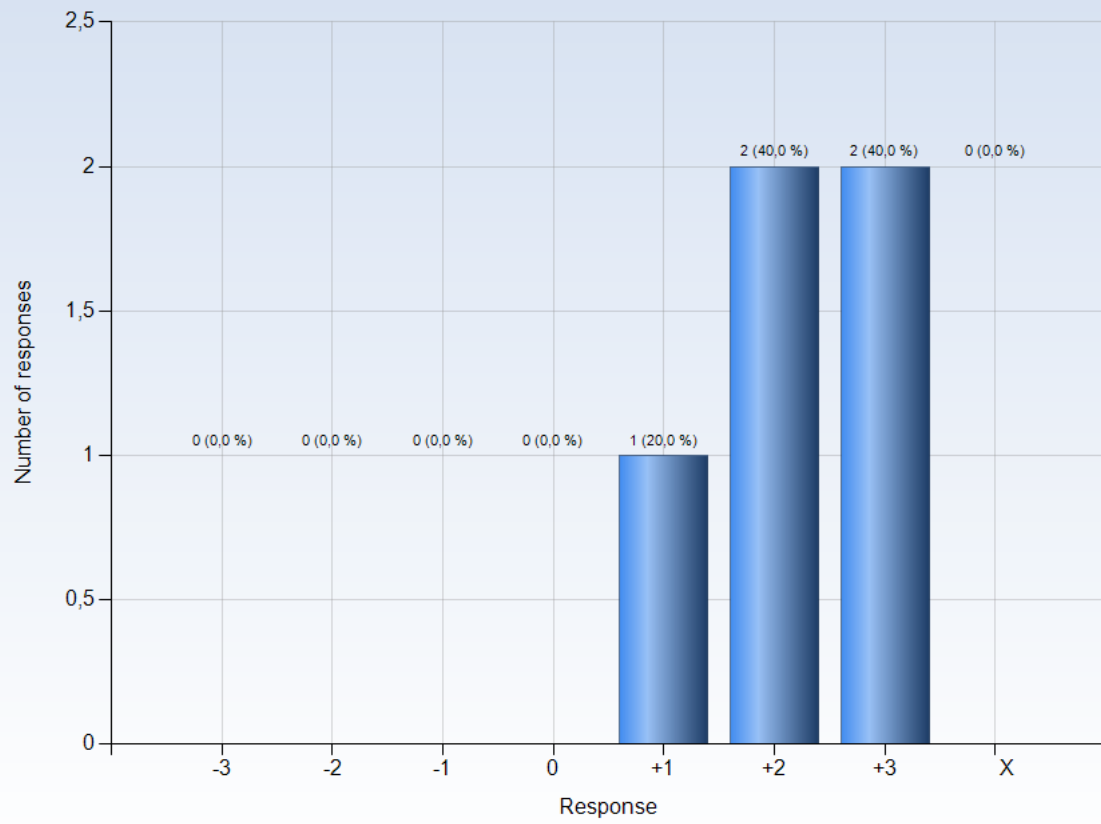**19. The course activities enabled me to learn in different ways**

Comments

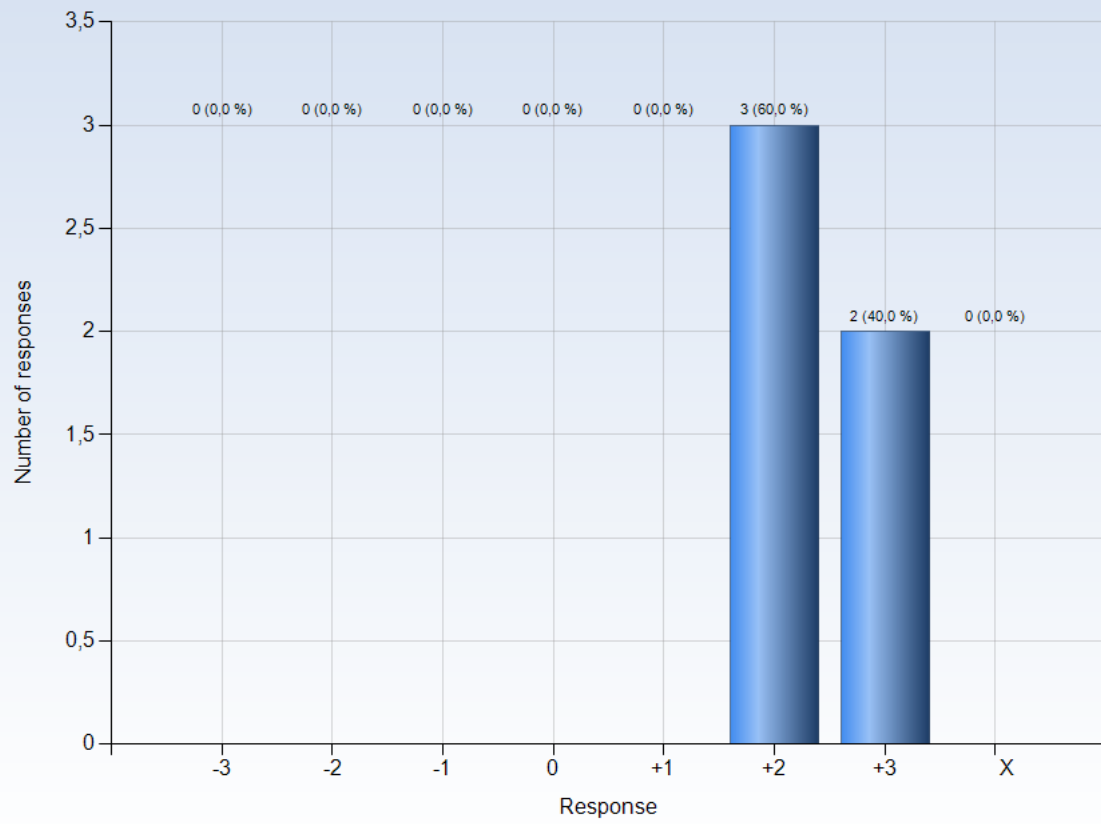# 20. I had opportunities to influence the course activities

Comments

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

Comments

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

Response	Number of responses
-3	0 (0,0 %)
-2	0 (0,0 %)
-1	0 (0,0 %)
0	0 (0,0 %)
+1	0 (0,0 %)
+2	3 (60,0 %)
+3	2 (40,0 %)
X	0 (0,0 %)

Comments