**KTH Computer Science
and Communication**

DT2118: Speech and Speaker Recognition
Course Analysis VT2014

Course analysis carried out by (name, e-mail):

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COURSE DESIGN

Briefly describe the course design (learning activities, examinations) and any changes that have been implemented since the last course offering.

In VT2015 the course consisted of 10 lectures, 3 computer labs evaluated with a report each and a final project evaluated with a written report and a poster session. The main differences with previous years was the introduction of 3 completely new computer labs and one lecture on Deep Learning applied to speech recognition. The labs were introduced in order to better align the teaching activities with the expected learning outcomes. All labs were based on Python. The first two labs required implementation of concepts and methods learned during the lectures. The third lab used a software package for speech recognition and the task was to analyse in details the results obtained with different parameters and configurations. Because of time constraints, the part on Speaker Recognition was not covered this year.

THE STUDENT'S WORKLOAD

Does the students' workload correspond to the expected level (40 hours/1.5 credits)? If there is a significant deviation from the expected, what can be the reason?

The students who participated in this course belonged to eight different programs (CDATE, CINTE, CMIEL, D, TMAIM, TMETM, TMLEM, TSCRM) and had, therefore different backgrounds. Consequently, the workload exhibits large variations, ranging from 4-6 hours/week for a particular student to 19-21 hours/week for another. Most of the students reported workloads between 10 and 18 hours/week that roughly corresponds to 22-40 hours/1.5 credits. Some students who reported lower loads specified that they had worked harder for the final project. The ones that reported the higher loads seemed to be happy about it, for example, quoting one of the comments: "The course had a good pace, the assignments were well planned and quite balanced in terms of workload."

THE STUDENTS' RESULTS

How well have the students succeeded on the course? If there are significant differences compared to previous course offerings, what can be the reason?

There were 26 students applying to the course, 23 of which officially registered. Most of them attended the lectures, but only 15 students handed in the assignments and carried out the project. Some of the inactive students reported that they could not carry out the assignments this year because of schedule clashes, but that they would like to take the course again next year. All the active students passed.

OVERALL IMPRESSION OF THE LEARNING ENVIRONMENT

What is your overall impression of the learning environment in the polar diagram? If there are significant differences between different groups of students, what can be the reason?

Out of the 15 active students, 11 responded to the survey. The overall impression is that the students highly enjoyed the course and found it stimulating (Q1=6.5). They find the course challenging but also rewarding (Q4=6.0). They especially enjoyed the availability of the teacher, mainly through the forum on KTH Social (Q22=6.6). They find the activities aligned (Q12=6.2, Q13=5.5), and the organization seems to work well (Q7=6.2, Q8=6.3). The lowest scores are 4.9 on Q5, 5.4 on Q14 and Q21 which are related to togetherness. These are, however, still relatively high scores.

It is probably not meaningful to compare subgroups when only 11 students answered to the survey, however, the only difference I can see between male and female students are the answers to Q2 and Q18, where female students answered with lower scores than males. Both questions related to working on one's own and self reflection. It is however hard to draw conclusions because the low number of responses. The group international master returned extremely high responses with many questions obtaining 7.0. This is surprising because at least 3 students must be part of a group in order for the group to be displayed on the graph, which means that all the students in this group gave the maximum score to those specific questions.

ANALYSIS OF THE LEARNING ENVIRONMENT

Can you identify some stronger or weaker areas of the learning environment in the polar diagram - or in the response to each statement - respectively? Do they have an explanation?

From the numeric results of the survey, it seems that the course does a good job in most of the areas. Something that could be improved is the feeling of "togetherness with other course participants". This is perhaps because I allowed the students to work by themselves if they did not want to form groups. In previous years I was requiring them to form groups, but I always had some of the students complaining that they had enough with group work (apparently most of the courses at this level stimulate group work) and that they wanted to work alone for once. For this reason I have decided to allow both. The answer to the open questions do not indicate that this should be a real problem, so I will allow this next year as well. I might find ways to let the students interact more during the labs (for example via KTH Social). I have seen some of this interaction already this year, but perhaps this behavior could be stimulated even more.

ANSWERS TO OPEN QUESTIONS

What emerges in the students' answers to the open questions? Is there any good advice to future course participants that you want to pass on?

The answers to the open questions are heart warming in most cases :) It is a real blessing considering the work that went into developing the course and the fact that I am responsible for another course in the same period which makes everything enormously more difficult.

"I really liked this course, one of the best I have had so far"

"There was not something that I didn't like."

The newly introduced labs were a success!!

What was the best aspect of the course?

"The labs were great."

"The lab materials was well prepared."

"Lab1 and lab2"

"That the assignments were understandable and very practical and I was able to go deep into the concepts!"

just to mention a few. Also the fast feedback from me was greatly appreciated:

"The quick feedback from the teacher"

"Teacher is very active. He will answer our questions ASAP, even though during the holidays. According to his help, we could finish our labs on time. Then we had enough time to do our project."

There were many suggestions for improvement which I will take into account for next year:

"Lab session to interact with the other students. More details about what is expected on the project."

"It was a shame that there was no time for the 'speaker-part' of the course [...]"

"Lab 3 needs to be improved for understanding. [...]"

"I felt, I could have a learnt a bit more about the speech synthesis and ASR part with one more assignment on it, but then this course was just for one study period, which made it quite intensive in itself. We did not get a lot of time for the project, which was abit unfortunate, as I feel, I could have worked more on the project and come up with more results."

Some students also suggested to make accelerated hardware available to them to run more complete training (for the deep neural networks projects)

PRIORITY COURSE DEVELOPMENT

What aspects of the course should primarily be developed? How could these aspects be developed in the short or long term?

One of the complaints from the students was about the lack of speaker recognition topic this year. In order to have enough time, for next year I have added one lecture in the schedule. The first two labs were more appreciated than the third, which was based on a software package for speech recognition. I will reconsider the third lab, and try to design it in a way that students

can implement the methods themselves as in the first two labs. The poster session for the presentation of the projects was a success this year.
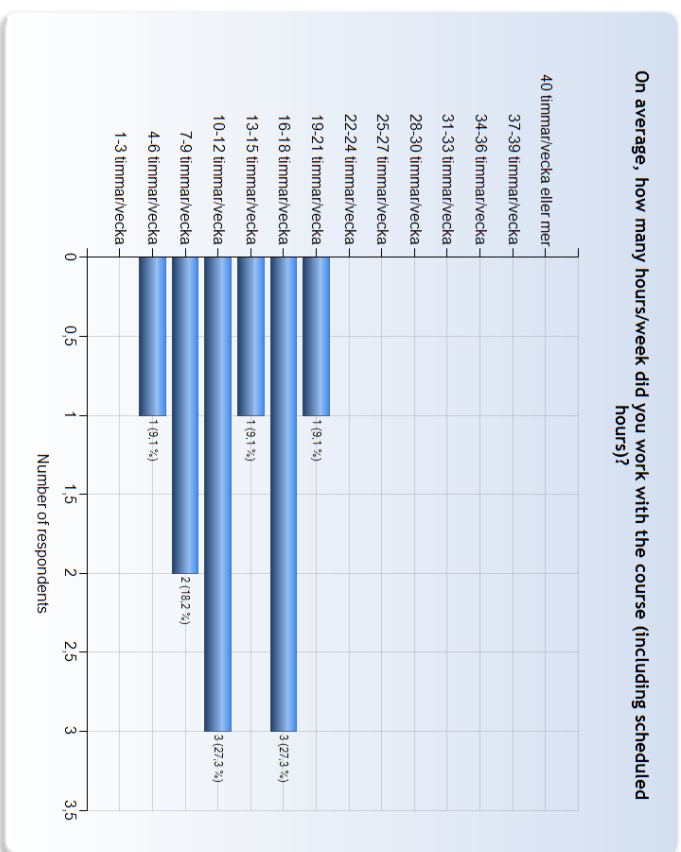
The next year I want to take this even further and simulate a conference where the students submit their reports in the form of papers and are assigned papers to review from their peers. All students will of course be accepted for presentation, but they will get feedback from the other students according to a predefined set of questions. This has a number of advantages:

1. it make more clear to the students what is expected of them because they see the set of questions at the beginning of the project,

2. it exposes them to the typical publication cycle in research where you submit your work and get evaluated by your peers,

3. it increases interaction within the class (and hopefully the feeling of togetherness).

ESTIMATED WORKLOAD

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

Comments

Comments (I worked: 10-12 timmar/vecka)
For the project, it was more like 15-17h/week

Comments (I worked: 13-15 timmar/vecka)
Very rough estimation, I certainly haven't kept count.

Comments (I worked: 16-18 timmar/vecka)
The course had a good pace, the assignments were well planned and quite balanced in terms of workload.

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 three respondents in order to appear in a diagram.

Average response to LEQ statements - all respondents
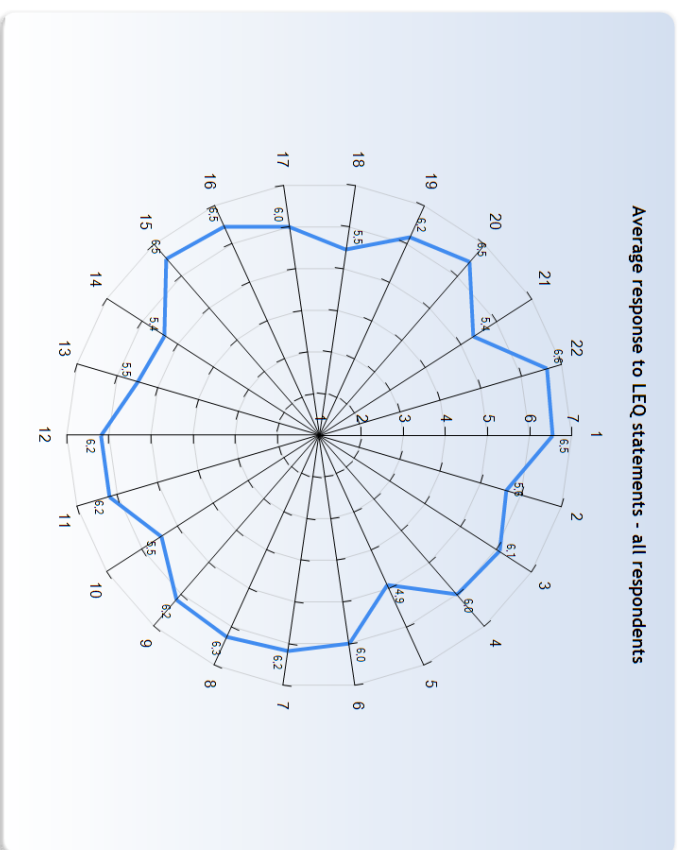
KTH Learning Experience Questionnaire v3.1.1

Meaningfulness - emotional level

Stimulating tasks
1. I worked with interesting issues

Exploration and own experience
2. I explored parts of the subject on my own
3. I could learn by trying out my own ideas

Challenge
4. The course was challenging in a stimulating way

Belonging
5. I felt togetherness with other course participants
6. The atmosphere in the course was open and inclusive

Comprehensibility - cognitive level

Clear goals and organization
7. The learning objectives helped me understand what I was expected to achieve
8. I understood how the course was organized and what I was expected to do

Understanding of subject matter
9. I understood what the teachers were talking about
10. I could learn from concrete examples that I was able to relate to
11. Understanding of key concepts was given high priority

Constructive alignment
12. The course activities helped me to reach the learning objectives efficiently
13. I understood what I was expected to learn in order to get a particular grade

Feedback and security
14. I regularly received feedback that helped me see my progress
15. I could practice and receive feedback without any grading being done
16. The assessment on the course was fair and honest

Manageability - instrumental level

Sufficient background knowledge
17. My background knowledge was sufficient to follow the course

Time to reflect
18. I regularly spent time to reflect on what I learned

Variation and choices
19. I could learn in a way that suited me
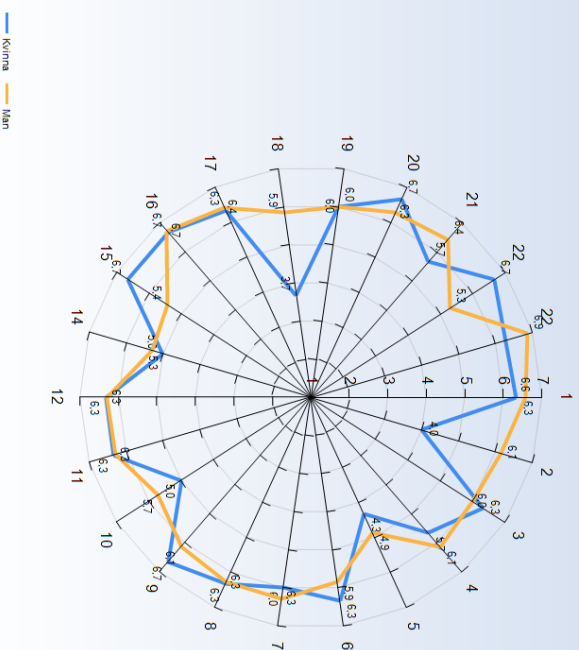20. I had opportunities to choose what I was going to do

Collaboration
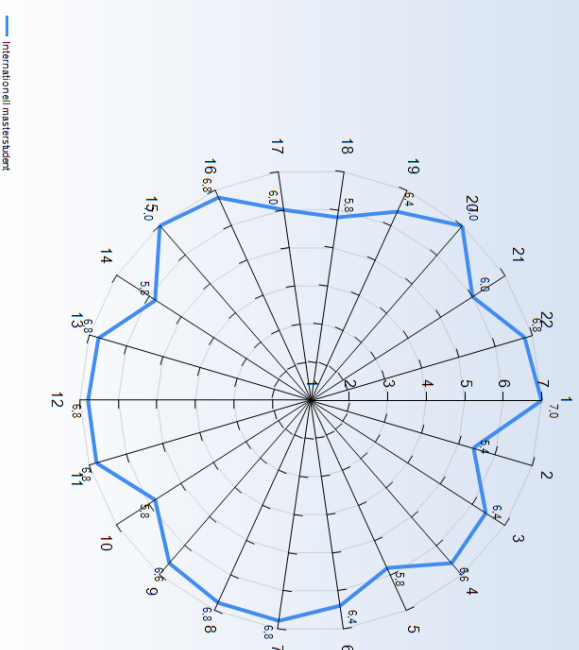21. I could learn by collaborating and discussing with others

Support
22. I could get support if I needed it

Average response to LEQ statements - per gender

Kvinna
Man

Comments

Average response to LEQ statements - per type of student

Internationell masterstudent

Comments

GENERAL QUESTIONS

What was the best aspect of the course?

What was the best aspect of the course? (I worked: 7-9 timmar/vecka)
That the assignments were understandable and very practical and I was able to go deep into the concepts!
The lab materials was well prepared.

What was the best aspect of the course? (I worked: 10-12 timmar/vecka)
the first lab and the project
Challenge of learning a totally new topic
Playing around with CNNs! also, getting to know more how signals are modeled.

What was the best aspect of the course? (I worked: 13-15 timmar/vecka)
Content was both interesting and well thought through.

What was the best aspect of the course? (I worked: 16-18 timmar/vecka)
I liked:
Lab1 and lab2
That all the questions was asked on KTH social
The quick feedback from the teacher
How the course was put togheter
I really liked the assignments, and I think I learnt a lot from the assignments, and I had the freedom to choose a project from a list of topics.
The labs were great.

What was the best aspect of the course? (I worked: 19-21 timmar/vecka)
Teacher is very active. He will answer our questions ASAP, even though during the holidays. According to his help, we could finish our labs on time. Then we had enough time to do our project.

What would you suggest to improve?

What would you suggest to improve? (I worked: 7-9 timmar/vecka)
There was not something that I didn't like.

What would you suggest to improve? (I worked: 10-12 timmar/vecka)
Lab session to interact with the other students. More details about what is expected on the project.
Give slightly more background on signal processing. Provide GPU infrastructure for running the deep nets. We rented a computer with a GPU on Amazon web service to get faster results and be able to try more models.

What would you suggest to improve? (I worked: 13-15 timmar/vecka)
It was a shame that there was no time for the 'speaker-part' of the course. As far as I am concerned quite a bit of the basics regarding for example HMMs and statistical models could be cut out (I found it rather repetitive to give time to more interesting things, but I understand that not all course paticipants have the same background knowledge.

What would you suggest to improve? (I worked: 16-18 timmar/vecka)
Lab 3 needs to be improved for understanding. For example reducing the number of tasks but ask for more information about those that are done. For example when forced alignment is used you can ask the student to briefly explain what forced alignment does.
I felt, I could have a learnt a bit more about the speech synthesis and ASR part with one more assignment on it, but then this course was just for one study period, which made it quite intensive in itself. We did not get a lot of time for the project, which was abit unfortunate, as I feel, I could have worked more on the project and come up with more results.
The course was satisfying as it is.

What advice would you like to give to future course participants?

What advice would you like to give to future course participants? (I worked: 7-9 timmar/vecka)
to use up all the time they have for the assignments, because that way you can really understand them!

What advice would you like to give to future course participants? (I worked: 10-12 timmar/vecka)
try to do your own project, with the validation of the teacher
if u work with DeepNets, don't give up! it can be frustrating, but its awesome when it works.

What advice would you like to give to future course participants? (I worked: 13-15 timmar/vecka)
Spend time doing the labs properly, it really helps for the overall understanding of the course content.

What advice would you like to give to future course participants? (I worked: 16-18 timmar/vecka)
Don't be afraid to ask on KTH social
Its a nice course, they should be regular with the assignments.
Be careful to the deadlines concerning the project and begin to work as early as possible on it.

Is there anything else you would like to add?

Is there anything else you would like to add? (I worked: 7-9 timmar/vecka)
Good support and will to help from the teacher

Is there anything else you would like to add? (I worked: 13-15 timmar/vecka)
I was unsure of how well the poster session type of project presentation would work, but I think it was a good way of doing it, adding some interaction and discussion.

Is there anything else you would like to add? (I worked: 16-18 timmar/vecka)
I really liked this course, one of the best I have had so far
no

SPECIFIC QUESTIONS

Arbetsinsatsen var jämnfördelad under kurstiden

Arbetsinsatsen var jämnfördelad under kurstiden
yes
Yes
Yes.
no, I worked a lot for the project, and for the labs but I didn't feel the need to work during class, listening was enough. Some exercises during class may help to apply the knowledge, and spread the workload.
Yes!!
Yes it was, except towards the end, when we had the project and some exams from other courses, I could not give the project as much time as I would have liked to.
Yes
Yes
yes

Laborationerna hjälpte mig förstå de teoretiska aspekterna

Laborationerna hjälpte mig förstå de teoretiska aspekterna
yes
Lab 1 and lab 2 did
Yes, I found the labs very useful for understanding the concepts.
yes
Absolutely!
Yes they were great and nicely structured.
Definitely.
Yes
yes

Forumet på KTH Social var aktivt och användbart

Forumet på KTH Social var aktivt och användbart
Yes
Yes. Problems/questions were handled quickly which was very nice to see. Also, there was an active discussion with each lab which in many cases added to my understanding of the topics.
Really active and very useful, more than in any other class I have taken
There were posts almost daily and the professor always responded quickly!!
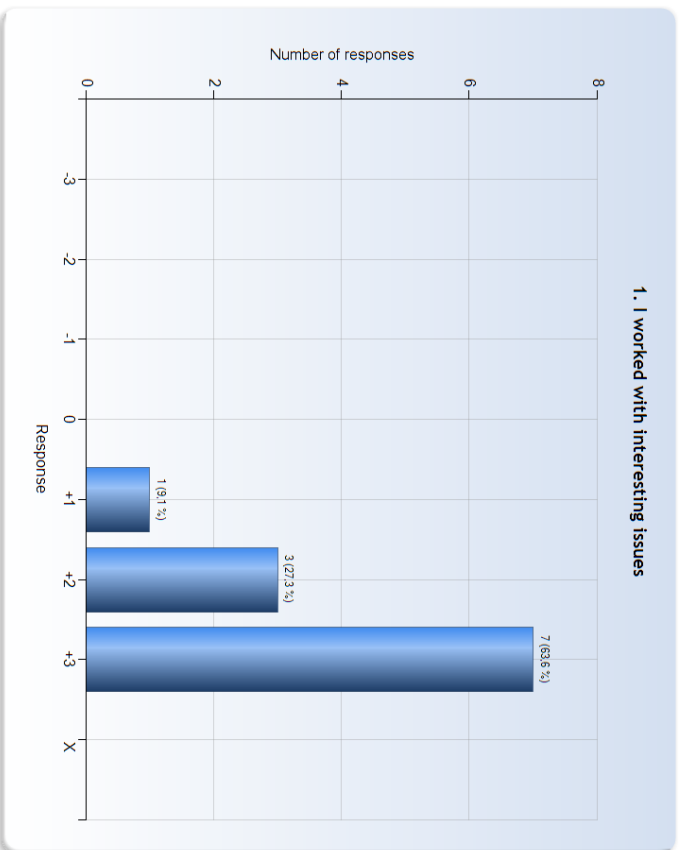Yes it was.
It was surprisingly very active.
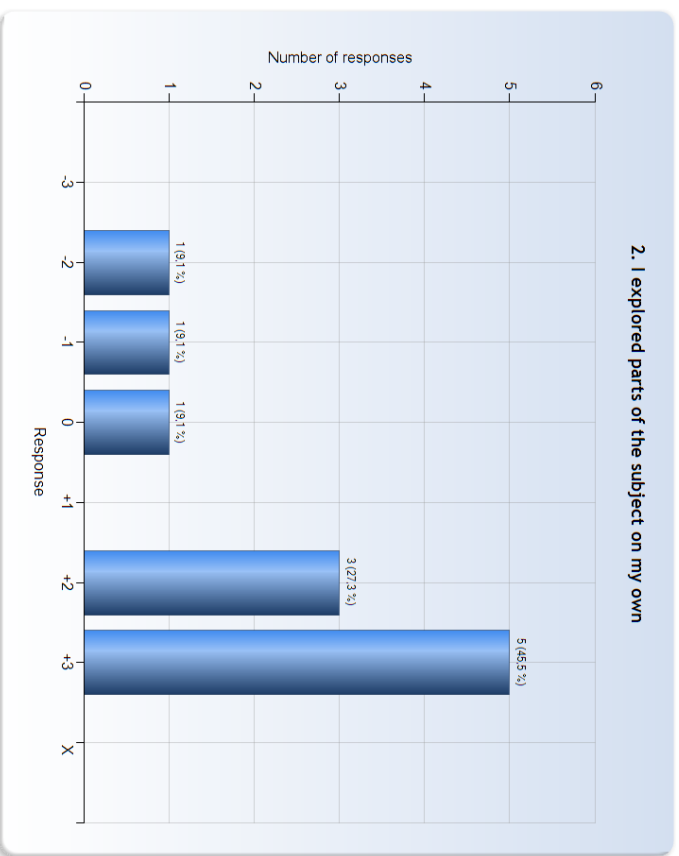Very much, Yes
yes

RESPONSE DATA

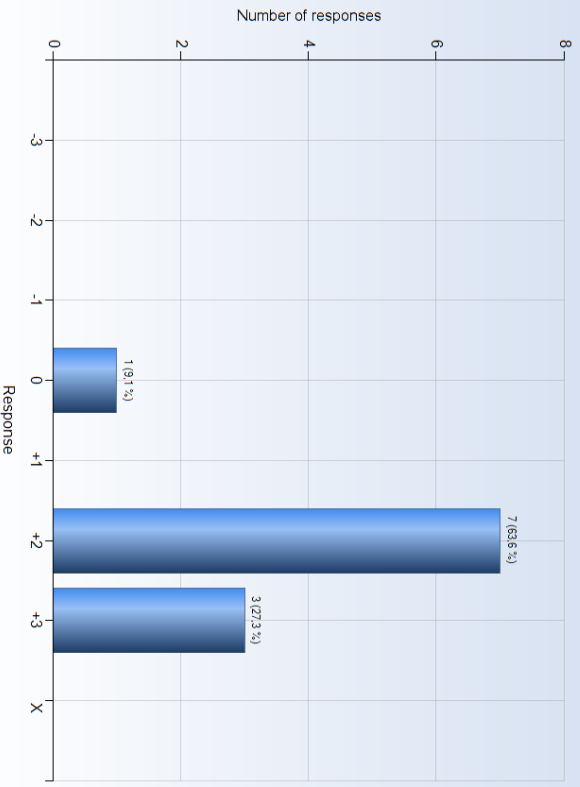The diagrams below show the detailed response to the LEQ statements. The response scale is defined by:

-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

Comments

2. I explored parts of the subject on my own

Comments

3. I could learn by trying out my own ideas

Number of responses

Response

0   1 (9.1 %)

+2   7 (63.6 %)

+3   3 (27.3 %)

Comments

4. The course was challenging in a stimulating way

Number of responses

Response

+1   3 (27.3 %)

+2   5 (45.5 %)

+3   3 (27.3 %)
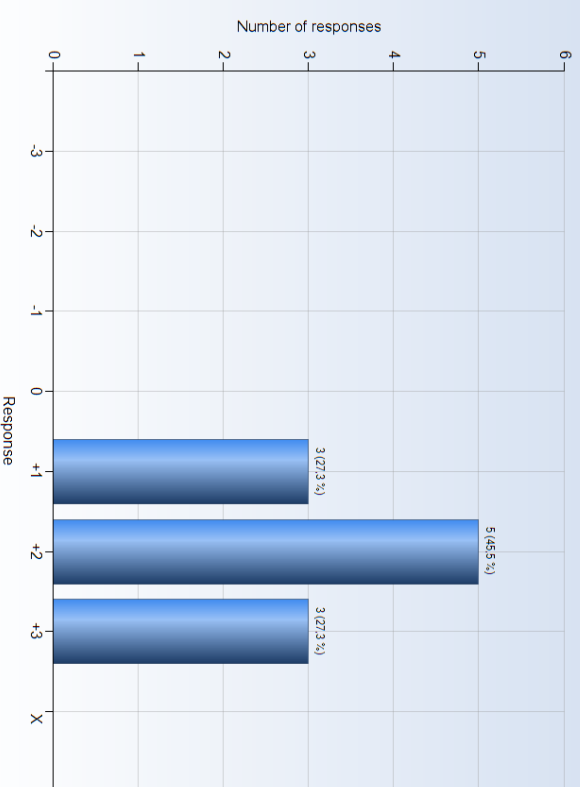
Comments

5. I felt togetherness with other course participants

Number of responses

Response

Comments

Comments (My response was: -3)

The only interaction was on KTH social, but we were asking questions to the teacher, not interacting with each other. Some lab sessions should be schedule

## 6. The atmosphere in the course was open and inclusive

Number of responses
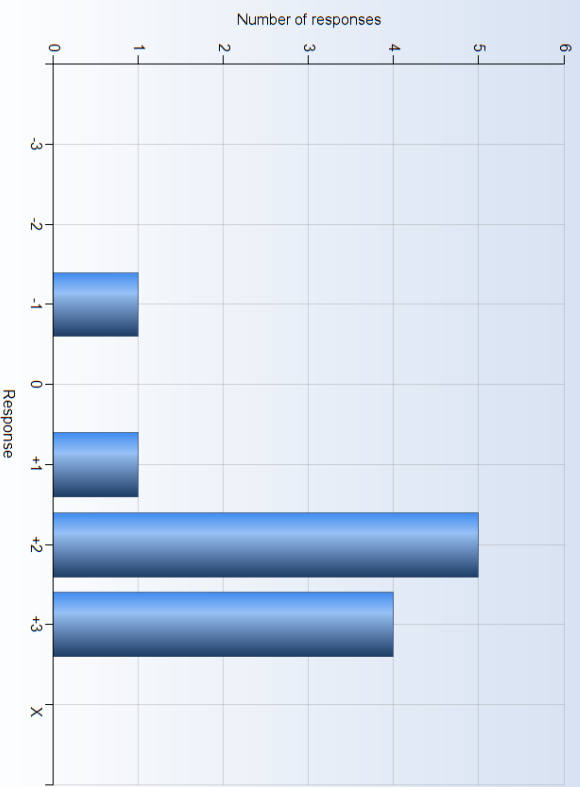
Response

Comments

Comments (My response was: -1)

I haven't talk to anyone except my lab partner

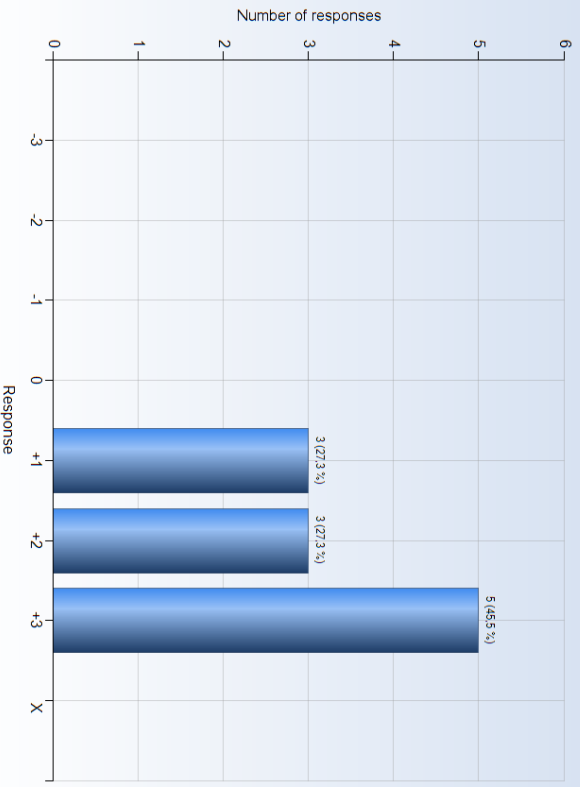**7. The learning objectives helped me understand what I was expected to achieve**

Number of responses

Response	
0	1 (9.1 %)
+1	1 (9.1 %)
+2	4 (36.4 %)
+3	5 (45.5 %)
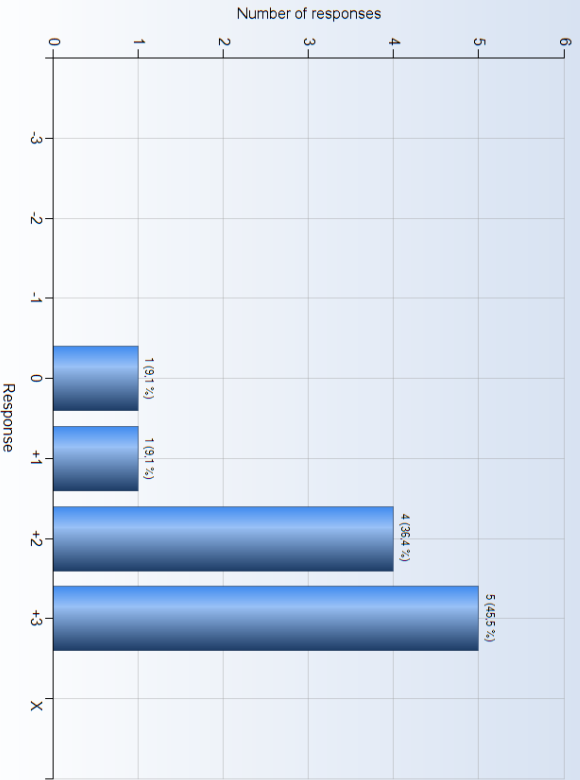
Comments

8. I understood how the course was organized and what I was expected to do

Number of responses

Response	
-1	1 (9.1 %)
+1	1 (9.1 %)
+2	2 (18.2 %)
+3	7 (63.6 %)
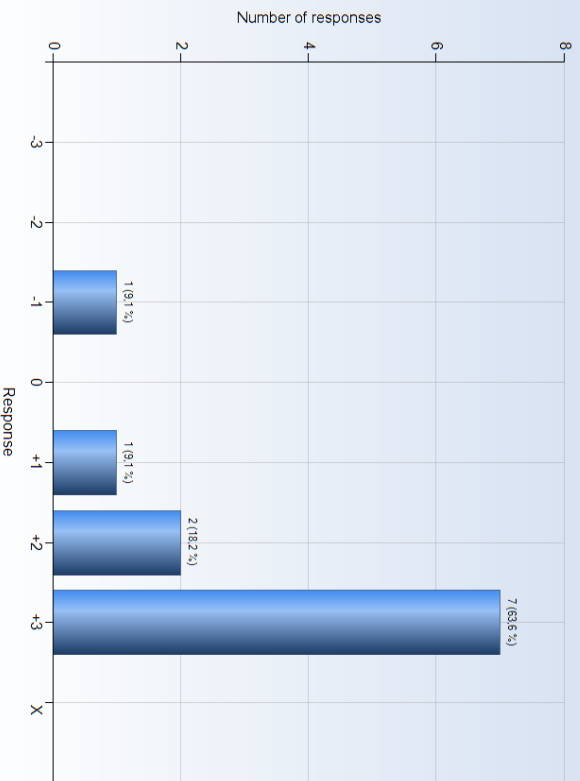
Comments

9. I understood what the teachers were talking about

Number of responses

Response	
+1	3 (27.3 %)
+2	3 (27.3 %)
+3	5 (45.5 %)

Comments

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

Number of responses

Response	
-1	1 (9.1 %)
0	2 (18.2 %)
+1	2 (18.2 %)
+2	3 (27.3 %)
+3	3 (27.3 %)
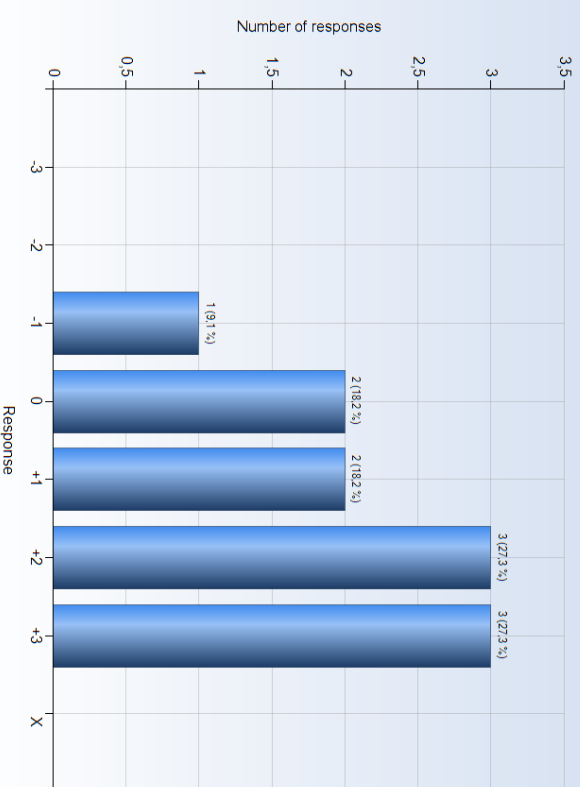
Comments

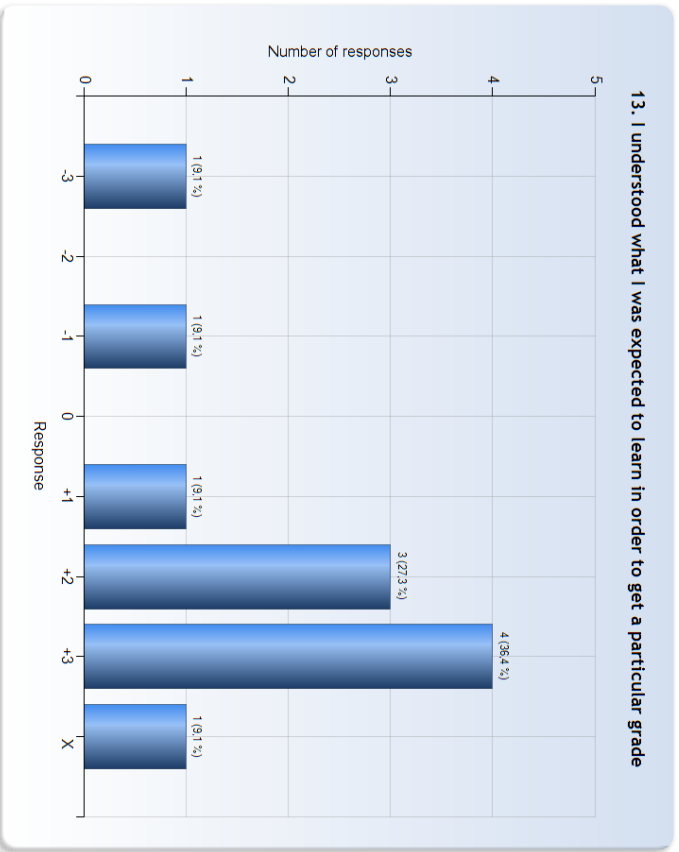## 11. Understanding of key concepts was given high priority
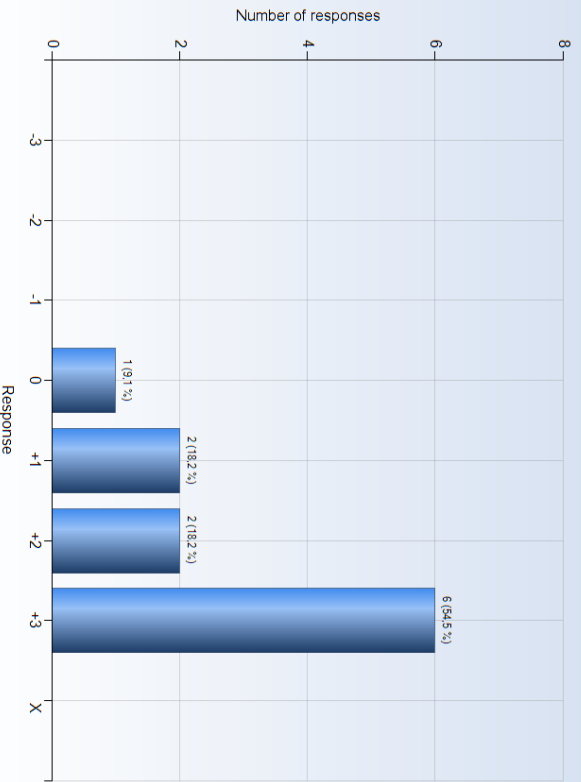
Comments

12. The course activities helped me to reach the learning objectives efficiently
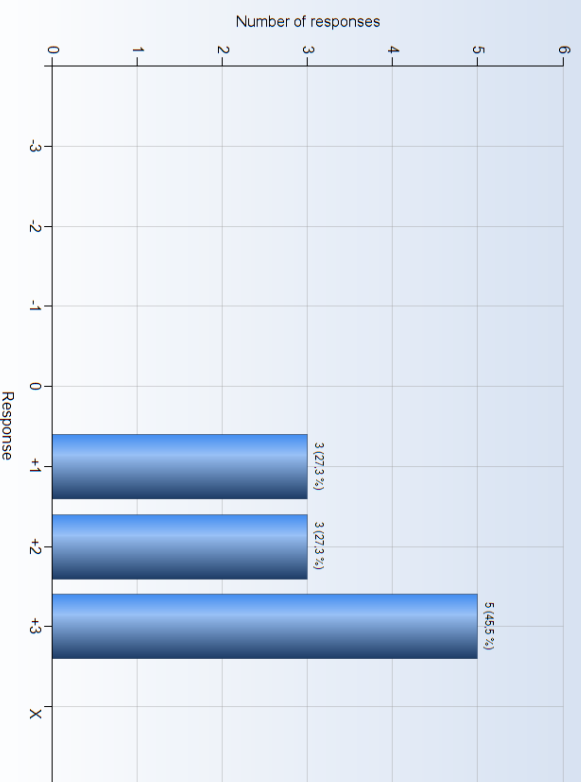
Comments

(My response was: +2)
Lab3 was a little hard to follow what you where doing, since it was mostly writing a command then wait and write the next. You didn't really need to think
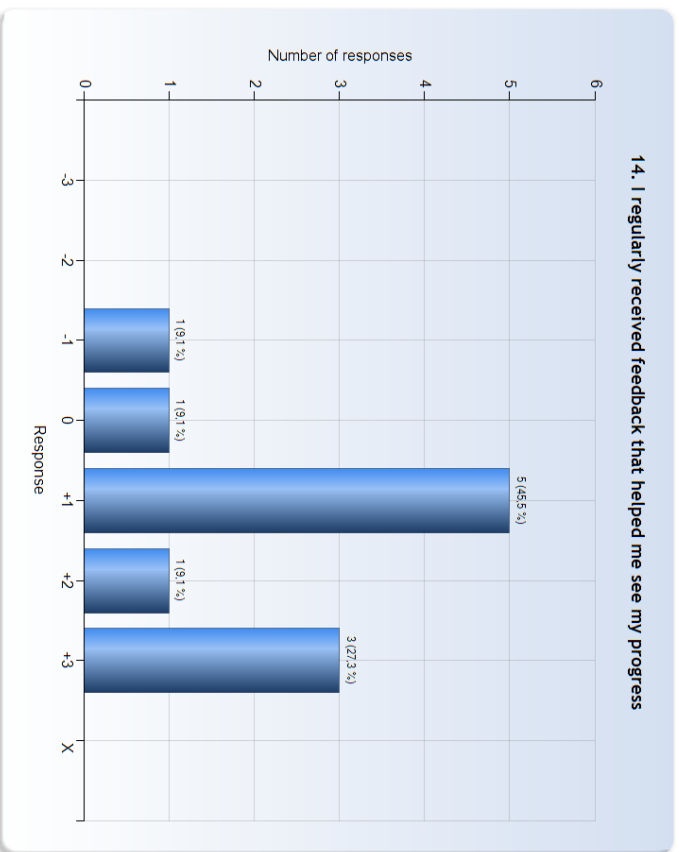
13. I understood what I was expected to learn in order to get a particular grade

Number of responses / Response

- −3: 1 (9.1 %)
- −1: 1 (9.1 %)
- +1: 1 (9.1 %)
- +2: 3 (27.3 %)
- +3: 4 (36.4 %)
- X: 1 (9.1 %)

Comments

Comments (My response was: -3)
I have no idea about what grade I can expect based on my performance

Comments (My response was: -1)
I don't know how this course is graded

Comments (My response was: X)
There was no grading!

14. I regularly received feedback that helped me see my progress

Number of responses / Response

- −1: 1 (9.1 %)
- 0: 1 (9.1 %)
- +1: 5 (45.5 %)
- +2: 1 (9.1 %)
- +3: 3 (27.3 %)

Comments

Comments (My response was: +3)
Giampero didn't hesitate to help at any moment

15. I could practice and receive feedback without any grading being done

Number of responses

Response

- +1: 1 (9.1 %)
- +2: 3 (27.3 %)
- +3: 7 (63.6 %)
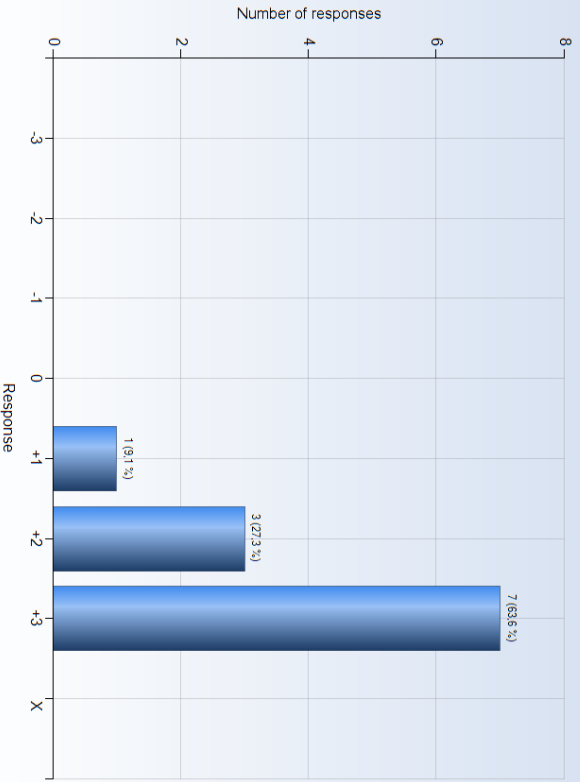
Comments

Comments (My response was: +2)
I asked questions, I don't know if it will influence the grading

16. The assessment on the course was fair and honest
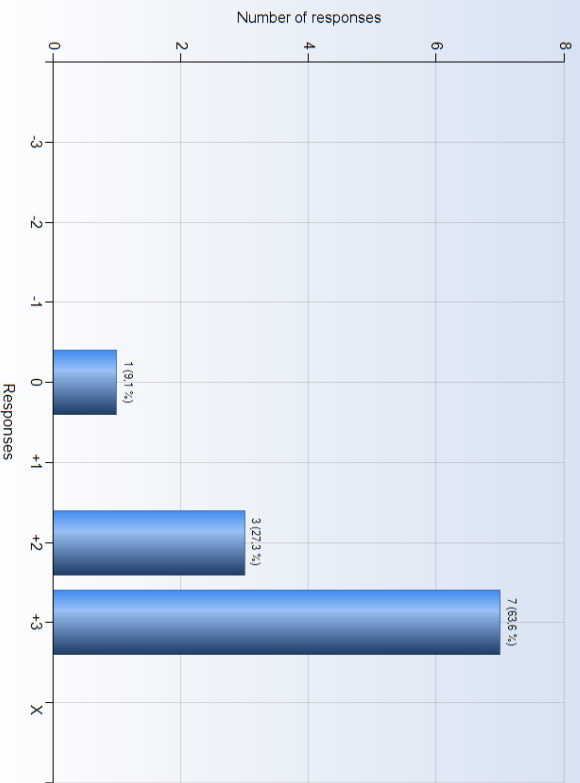
Number of responses

Responses

- 0: 1 (9.1 %)
- +2: 3 (27.3 %)
- +3: 7 (63.6 %)

Comments

Comments (My response was: +2)
I asked questions, I don't

17. My background knowledge was sufficient to follow the course

Number of responses

Response

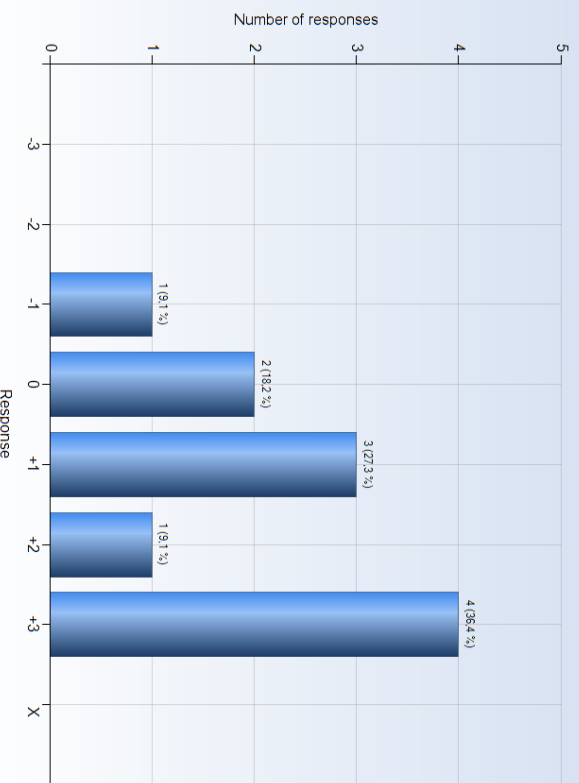1 (9.1 %)
1 (9.1 %)
4 (36.4 %)
5 (45.5 %)
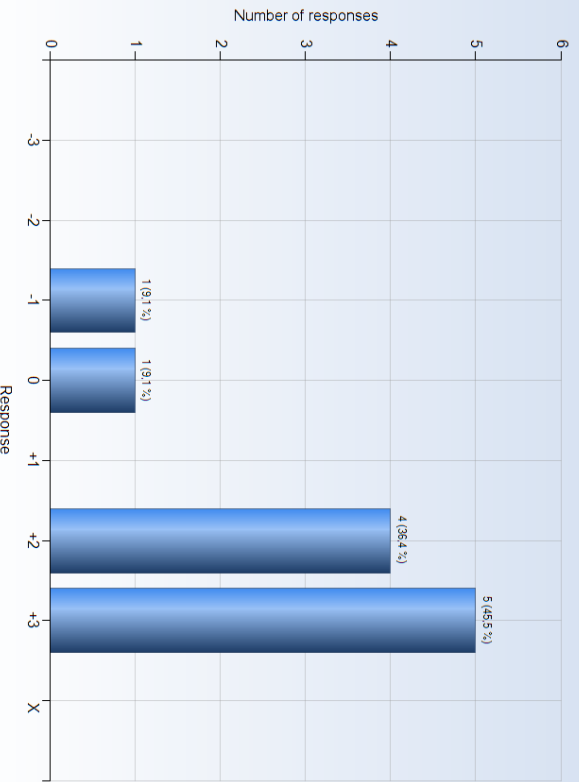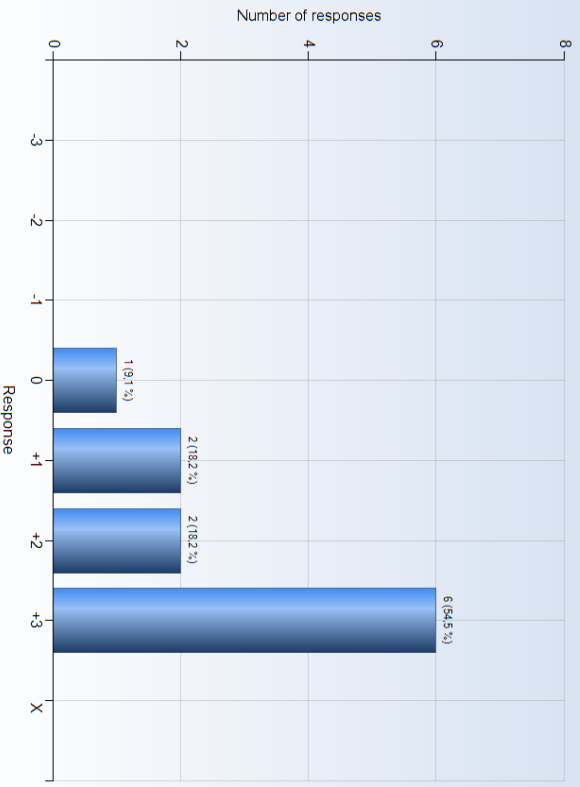
Comments

Comments (My response was: -1)
I was lucky to have partners who understood signals when we were doing the feature extraction part for the project

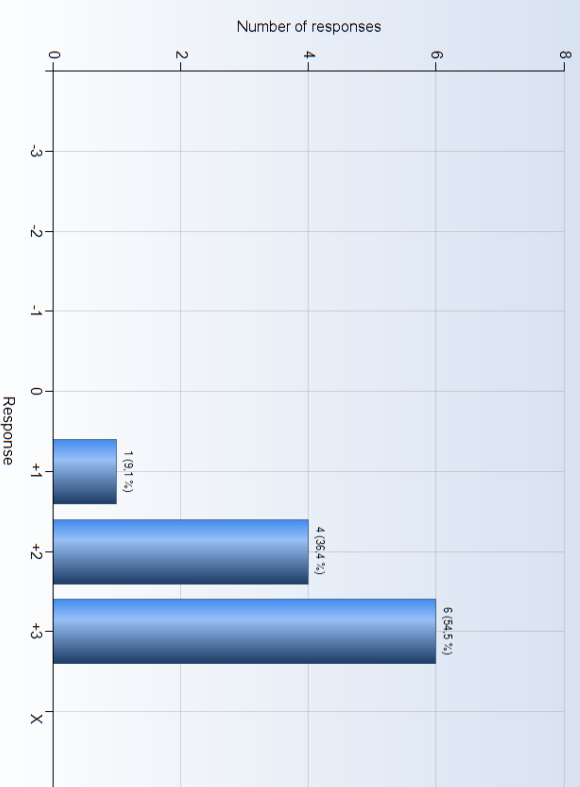## 18. I regularly spent time to reflect on what I learned

Number of responses

Response

1 (9.1 %)
2 (18.2 %)
3 (27.3 %)
1 (9.1 %)
4 (36.4 %)

Comments

19. I could learn in a way that suited me

Number of responses

Response

- 0: 1 (9.1 %)
- +1: 2 (18.2 %)
- +2: 2 (18.2 %)
- +3: 6 (54.5 %)

Comments

20. I had opportunities to choose what I was going to do

Number of responses

Response

- +1: 1 (9.1 %)
- +2: 4 (36.4 %)
- +3: 6 (54.5 %)

Comments

21. I could learn by collaborating and discussing with others

Number of responses

Response

1 (9,1 %)
1 (9,1 %)
3 (27,3 %)
4 (36,4 %)
2 (18,2 %)
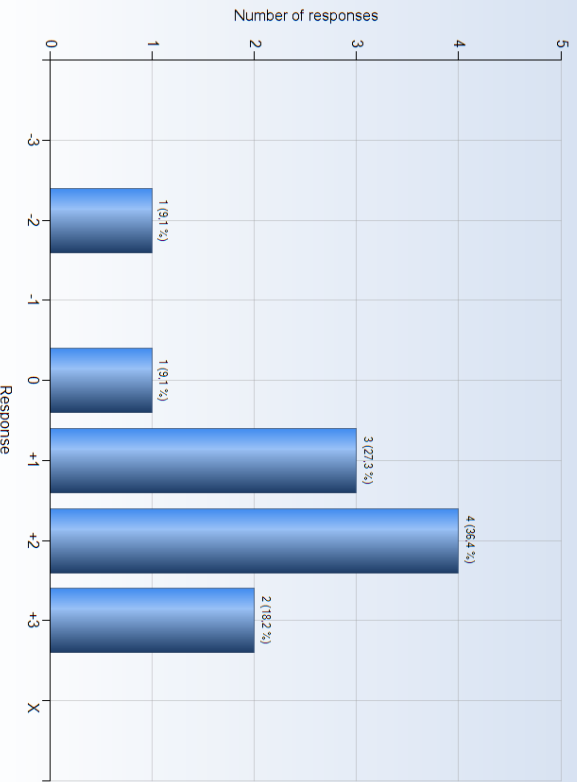
Comments

22. I could get support if I needed it

Number of responses

Response

1 (9,1 %)
2 (18,2 %)
8 (72,7 %)
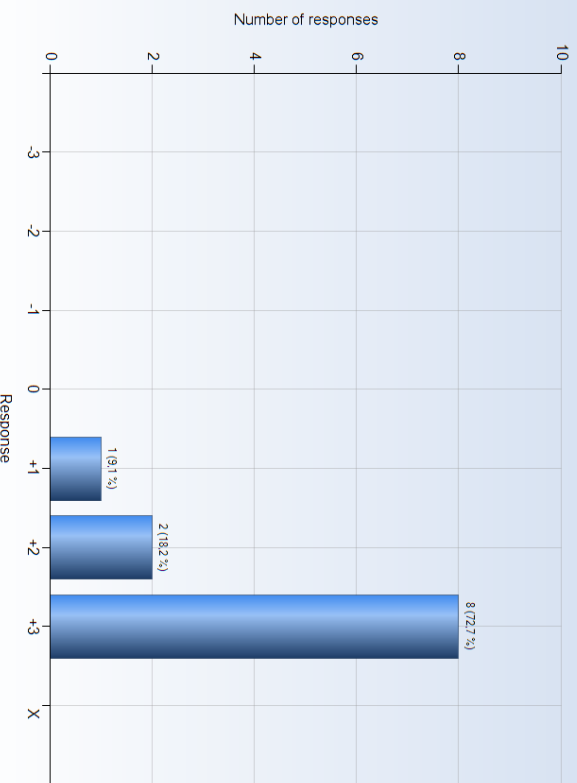
Comments

Comments (My response was: +3)
Teacher was extremely reactive to mails. Which was really helpful