



KTH Computer Science
and Communication

DT2118: Speech and Speaker Recognition Course Analysis VT2016

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 VT2016 the course consisted of 11 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 were the following:

- the new Deep Learning methods received more space in the lectures to account for the latest evolution of the field
- as a consequence, the teaching material was rearranged and a new lecture was introduced
- a new third lab was introduced that explores the use of Deep Learning methods in speech recognition. This was done both to update the course activities to the bleeding edge methodology in ASR, but also to answer some criticism about the old third lab received in the previous course evaluation. Because this was the first time the lab was introduced, students could choose to perform the old third lab instead.
- as a follow up of some of the comments received in the previous course round, I involved the Parallel Data Center (PDC) to provide their services to the course participants. This was both to provide computational resources for the new Deep Learning lab, but also for the final projects. To help the students get acquainted with PDC facilities, a one hour introduction to PDC was added to the lectures. Also, the instructions for the third lab included detailed information on how to use the PDC resources and worked as an introduction for the final project as well.
- the review of project drafts has been improved: the submission process is similar to a conference paper submission where groups get feedback from other students before they submit the final version of their report. This has given me the opportunity to specify which criteria are important for the evaluation of the report in the form of a review questionnaire. The advantage is that students know, not only how to review other students' work, but also how to formulate their own in the best way.

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 3-5 hours/week for some students to 12-14 hours/week for others. On average, the work load is a bit low compared to the 40 hours/1.5 credits: The course is worth 7.5 credits which correspond to 200 hours study. It lasts for 11 weeks, which means the hours should be divided into about 18 hours/week, whereas most students reported less than 14 hours per week. However, students reported to have spent more time on the project, which might indicate they did not include this learning activity in their answer. All the textual comments received indicate that the work load was well balanced.

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 41 students applying and registering to the course (source Rapp). Of them, 26 were active during the course and all but one of 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?

Only 8 students responded to the survey. The overall impression is that the students highly enjoyed the course and found it stimulating (Q1=6.4). They find the course challenging but also rewarding (Q4=5.9). They especially enjoyed the availability of the teacher, mainly through the forum on KTH Social (Q22=6.9). They find the activities aligned (Q12=5.6, Q13=6.4), and the organization seems to work well (Q7=5.5, Q8=6.4). The lowest score is 5.1 on Q17 that is related to having a sufficient background. Although this is still a high score, it might depend of some students not being comfortable with topics in signal processing that are taken up during the course.

The only subgroups identified by the survey system are women vs men and international vs Swedish students. In both cases there is no clear differences between the answers given by the subgroups.

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?

There is a majority of very positive answers to open questions which is very encouraging. The lab material was in general considered very positively, and students were extremely happy about the possibility to access the computational resources at PDC. Some even reported that the procedures they learned in this course helped them even in other courses that require similar computational models.

Most of the suggestions for improvement are concerned with increasing the time spent reviewing concepts from signal processing. This is a known issue because signal processing was completely dropped from programmes in Computer Science. The optimal solution in my view, is to reintroduce at least one course in signal processing or signal theory in the curriculum. However, because I do not have control over these more macroscopic decisions, within this course I plan to increase the time spent on signal processing, and, perhaps, create some review material that could be used by Computer Science students. An alternative would be to pair CS students with Engineering Physics and Electrical Engineering students that are already familiar with the topic.

PRIORITY COURSE DEVELOPMENT

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

The course final grade will be changed from Pass/Fail to A-F (and the course code is changed to DT2119). The grade will be based on the project presentation and report, whereas the labs will still be Pass/Fail. I will define grading criteria and make them available to the students at the beginning of the course. Otherwise the teaching and learning activities will be similar to previous years, with the following improvements.

The third lab still needs some development to focus as much as possible on the learning outcomes, and reduce the time spent on solving practical issues. I plan to meet with the PDC personnel to get feedback on the previous run.

I also plan to change the evaluation of the labs from a written report to an oral presentation, involving teaching assistants. This because I want the students to show what they have learned rather than just showing they went through all the steps in the lab.

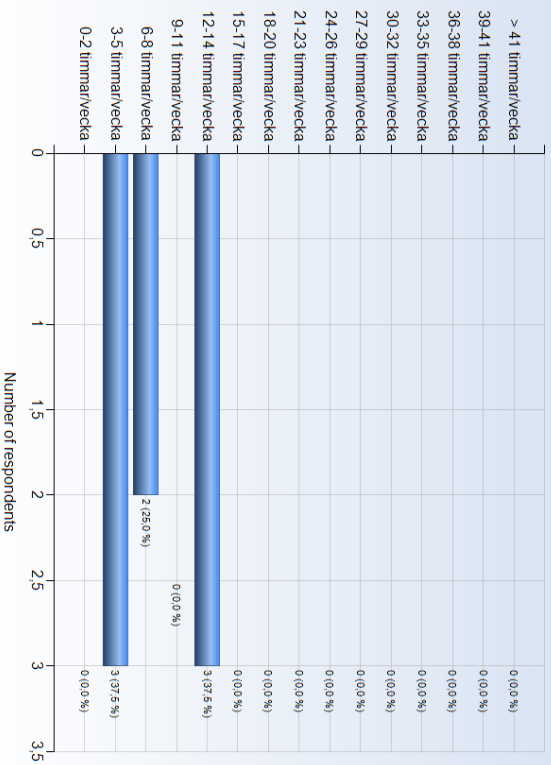
Finally I plan to increase the material on signal processing for those students that do not have enough background on the subject.

DT2118 - 2016-05-30

Antal respondenter: 30
 Antal svar: 8
 Svarfrekvens: 26,67 %

ESTIMATED WORKLOAD

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



Comments

Comments (I worked: 3-5 timmar/vecka)

With my group, we have spent a lot of time on the project. I prefer this type of learning than only class and examination.

Comments (I worked: 12-14 timmar/vecka)

I think the course workload was well-balanced.

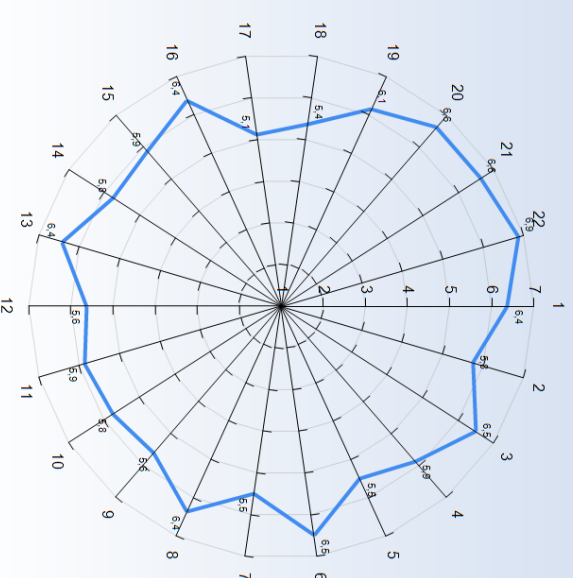
LEARNING EXPERIENCE

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



KTH Learning Experience Questionnaire v3.1.1

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 could 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 other course participants (d)
6. The atmosphere in the course was open and inclusive (d)

Comprehensibility - cognitive level

Clear goals and organization

7. The learning objectives helped me understand what I was expected to achieve (e)
8. I understood how the course was organized and what I was expected to do (e)

Understanding of subject matter

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

Constructive alignment

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

Feedback and security

14. I regularly received feedback that helped me see my progress (j)
15. I could practice and receive feedback without any grading being done (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 choices

19. I could learn in a way that suited me (m)
20. I had opportunities to choose what I was going to do (m)

Collaboration

21. I could learn by collaborating and discussing with others (n)

Support

22. I could 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, act or feel) when:

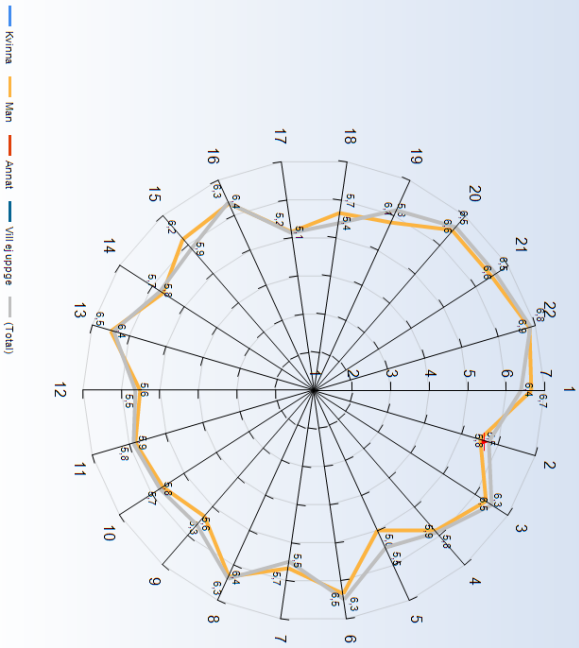
- a) We are trying to answer questions, solve problems or acquire skills that we find interesting, intriguing or important
- b) We can speculate, try out ideas (intellectually or practically) and learn from experience, even before we know much about the subject
- c) We are able to do so in a challenging yet supportive environment
- d) We feel that we are part of a community and believe that other people have faith in our ability to learn
- e) We understand the meaning of the learning objectives, how the environment is organized and what is expected of us
- f) We have sufficient background knowledge to manage the present learning situation
- g) We can learn inductively by moving from specific examples and experiences to general principles, rather than the other way around
- h) We are challenged to develop a proper understanding of key concepts and successively create a coherent whole of the content
- i) We believe that the work we are expected to do will help us to reach the learning objectives
- j) We can try, fail, and receive feedback in advance of and separate from any summative judgment of our efforts
- k) We believe that our work will be considered fairly and honestly
- l) We have sufficient time to learn and devote the time necessary to do so

- m) We believe that we are in control of our own learning, not manipulated
- n) We can work collaboratively with other learners struggling with the same problems

Literature

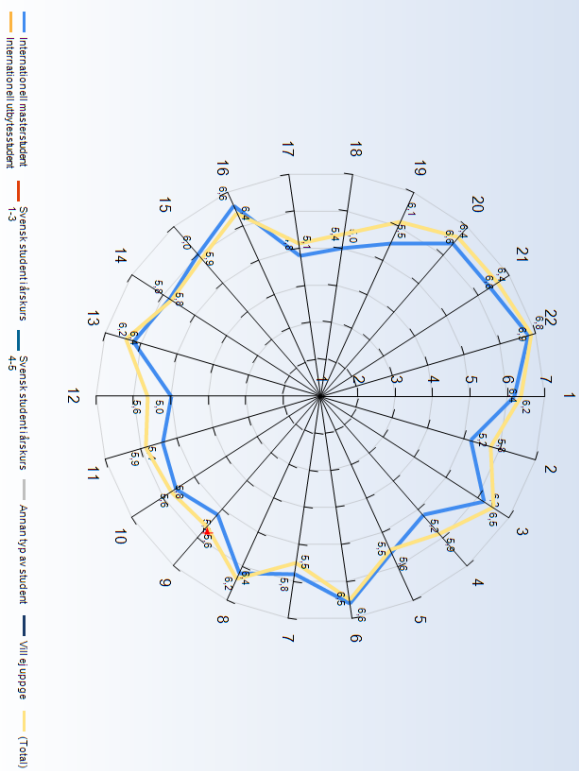
- Bain, K. (2004). *What the Best College Teachers Do*, Chapter 5, pp. 98-134. Cambridge: Harvard University Press.
- Biggs, J. & Tang, C. (2011). *Teaching for Quality Learning at University*, Chapter 6, pp. 95-110. Maidenhead: McGraw Hill.
- Elmgren, M. & Henriksson, A-S. (2014). *Academic Teaching*, 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

Average response to LEQ statements - per type of student



Comments

Comments (I am international master student)
 Actually: international double degree student



GENERAL QUESTIONS

What was the best aspect of the course?

What was the best aspect of the course? (Worked: 3-5 timmar/vecka)

The labs were the best aspect. I also enjoyed the seminar. The project and an access to pdc. The labs were good as well.

It was just hard to do both lab 3 a and b in the due time. Nice opening to deep learning applied to a specific field.

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

Great and stimulating atmosphere among the students.

I was very happy about the fast feedback on the lab reports. I could see that I was on the right track on the first lab before handing in the second one.

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

The subject matter is very interesting, personally I love language and speech as it is something that clearly separates humans from machines (well, for the time being...), and makes it clear what how "machine learning" fares compared to human learning (i.e. not well at all).

I especially liked that it was a pass/fail course as it alleviated a lot of performance-related stresses that otherwise might arise, which let me concentrate better on the subject matter.

Learning many diverse techniques about signal processing & speech recognition (Teacher.)

What would you suggest to improve?

What would you suggest to improve? (Worked: 3-5 timmar/vecka)

more time for the project?

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

Present the course material in a more reduced and focused way.

The part about signal processing was very confusing to me. Unfortunately, I missed the first lecture on it, so I read both chapters 5 and 6 in the book to get a better understanding. But I had a really hard time even understanding the book and I took two days to get through them. Some more condensed and perhaps slightly simplified reading material would have been nice.

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

It was great that the last lab allowed exploration of DNNs as this technology is proving very promising for the subject of speech recognition, but as I am sure Giampiero is aware, the lab was a little poorly prepared in the sense that it was too big and the computer resources at PDC were tricky to utilize.

I also found the project report format (NIPS style) ugly and would have preferred being allowed to make a two-column article. It looks better. I promise. It was also unclear what the scope of the project should be in terms of size. One guy did a simple literature survey, others spent weeks on finding good models for recognizing Chinese phonemes.

The lab 3a is not really interesting, and because we were not asked to really code the network, I didn't really get what I did. The project helped me better understand deep learning. I should have done the 3b, but was running out of time.

More about signal processing.
Or optional lectures about signal processing and machine learning for those who don't know anything about this.

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

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

Be sure to have a bit of machine learning background before participating in this course.

If you will be using PDC, make sure to check that you can log in early on, so that doesn't become a roadblock later.

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

I'd advise them to take Advanced Machine Learning before taking this course, as it introduces and examines nearly every concept that is non-specific to speech recognition.

Also the free coffee in the break room.

Don't forget this is a machine learning class: some people didn't really had a ML background while it's important in this course.

?



Is there anything else you would like to add?

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

As a media technology student, this course was very hard for me and I wouldn't make it if I hadn't have a great lab/project partner. I'm not sure if this course is a good pick for media technology students.

Is there anything else you would like to add? (Worked: 12-14 timmar/vecka)

It was a good course, Giampiero is a good teacher and a sympathetic person. The subject matter was truly interesting, and I feel as if though most participants were very engaged in the course, which yielded very interesting project presentations and discussions.

no

SPECIFIC QUESTIONS

Apoetsinsatsen var jättnordelad under kursisten

Apoetsinsatsen var jättnordelad under kursisten.

Yes, but if you have a lot to catching up to do with the theory as I did, the workload becomes to big.

yes, but I feel final project deadline was a bit broad.

Maybe a draft of the skeleton of the project at mid time could be good.

Thus, the teacher can just supervise the organisation of the project and help if something goes wrong.

We have done some mistakes and we have lost a lot of time during the project.

There was definitely a hiatus between the last lab and the start of the project work for us. This proved very useful for studying other courses, however.

Yes, if you start the project early enough.

It was, however, I started a bit late on the third lab, but that's on me.

yes

Laborationerna hjälpte mig förstå de teoretiska aspekterna

Laborationerna hjälpte mig förstå de teoretiska aspekterna.

Yes, they did.

Yes, I learnt a lot during the course including python.

Yes.

It was sometimes hard to connect the content of the lectures to the contents of the lab -- especially the HMM stuff. I feel was a little hand-ways.

Perhaps we could discuss the labs more in-depth in class once they are handed in and reviewed.

Yes, except for lab2a where I just followed the instructions without really knowing what I was doing. I couldn't really dig into it due to lack of time, but I probably should have done lab 3b.

Yes.

yes

Forumet på KTH Social var aktivt och användbart

Forumet på KTH Social var aktivt och användbart

Yes
Yes, but the class created a slack channel that that was very active. The professor's quick response times were appreciated.
Yes
Yes, well, we have an online group for ML master students which was diligently used for helping each other in the lab course.
Yes, and Shapiro was answering quite fast.
Mostly during the final lab.
Yes

Det var användbart att använda PDC beräkningssusenerna

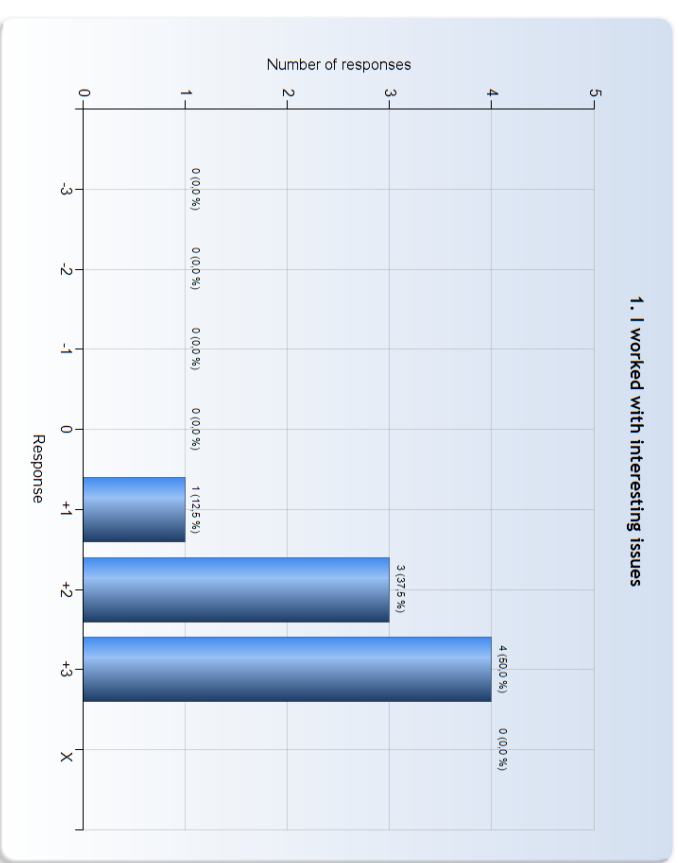
Det var användbart att använda PDC beräkningssusenerna

Yes
Yes very useful. I am now able to use pdc for other courses too!
Yes
Definitely, and having taken a course in parallel computation was a big help too. I think I was one of few who was able to properly utilize PDC.
Yes, especially for the project
Yes, it was very interesting and I think a good experience to have.
Yes

RESPONSE DATA

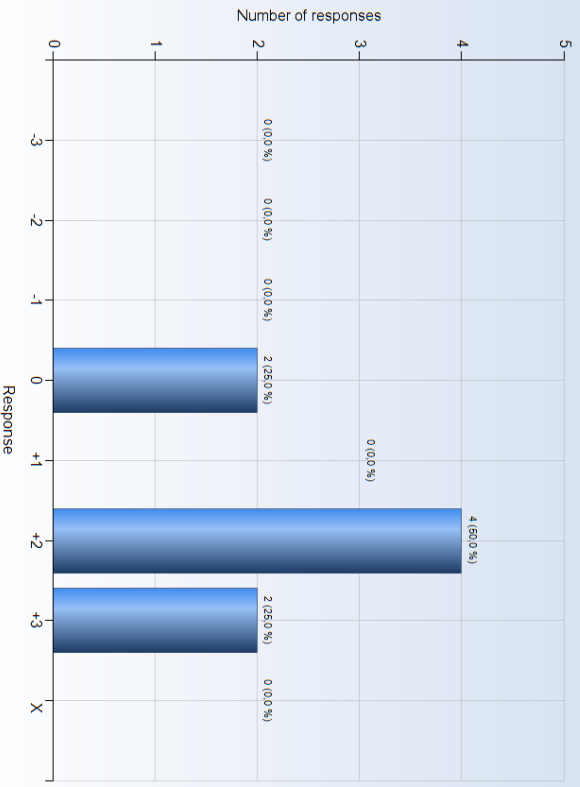
The diagrams below show the detailed response to the LEQ statements. The response scale is defined by:

- 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



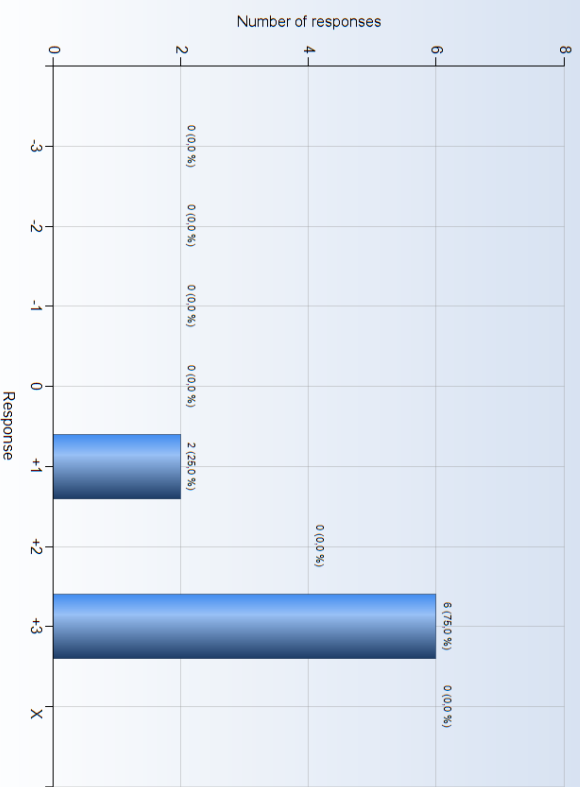
Comments

2. I explored parts of the subject on my own



Comments

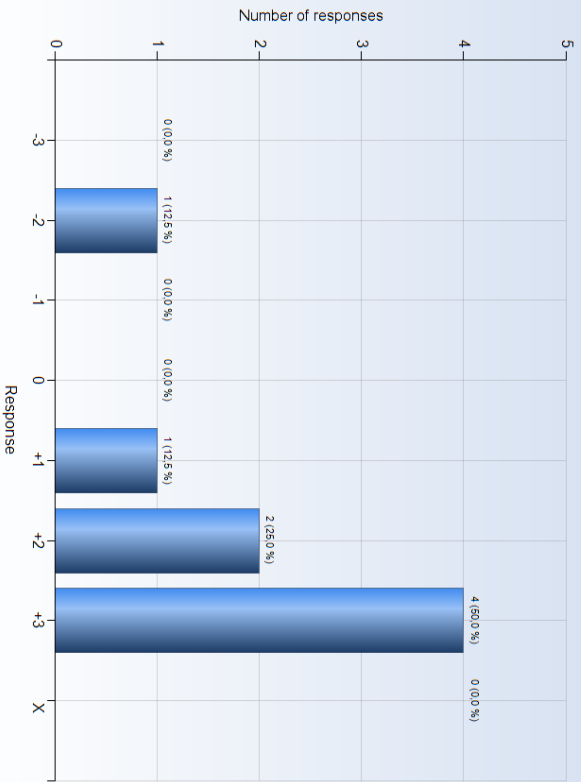
3. I could learn by trying out my own ideas



Comments

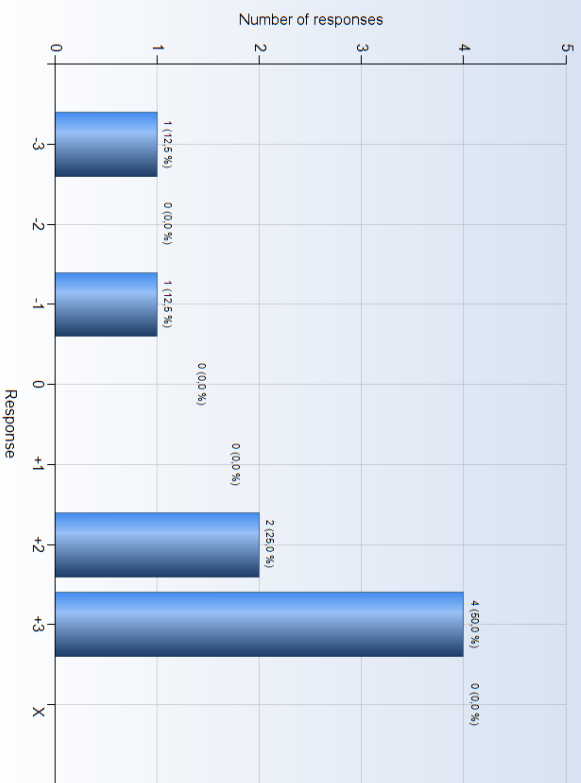
Comments (My response was: +3)
The project was perfect

4. The course was challenging in a stimulating way



Comments

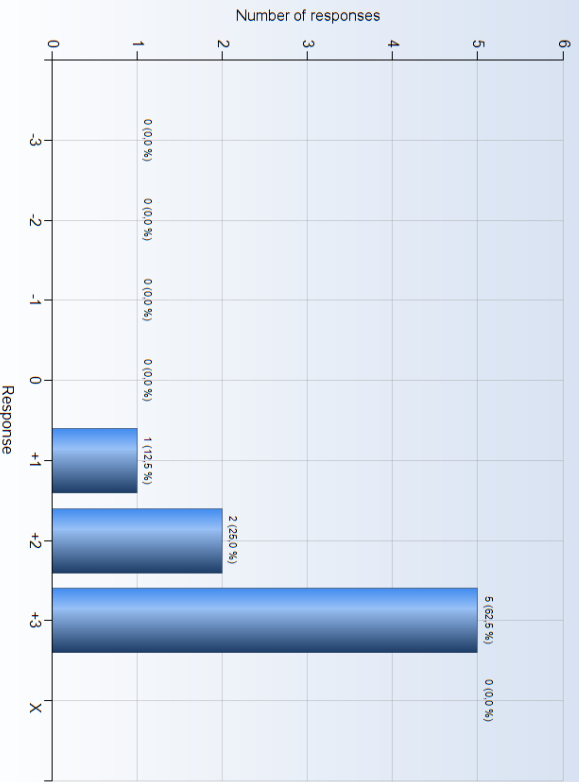
5. I felt togetherness with other course participants



Comments

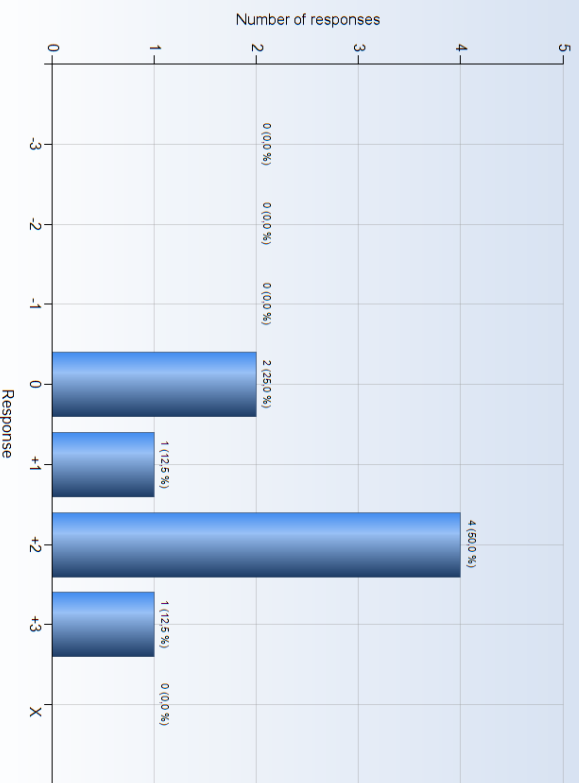
Comments (My response was: +2)
 the final seminar was really good but maybe too late for really sharing a lot with the others

6. The atmosphere in the course was open and inclusive



Comments

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

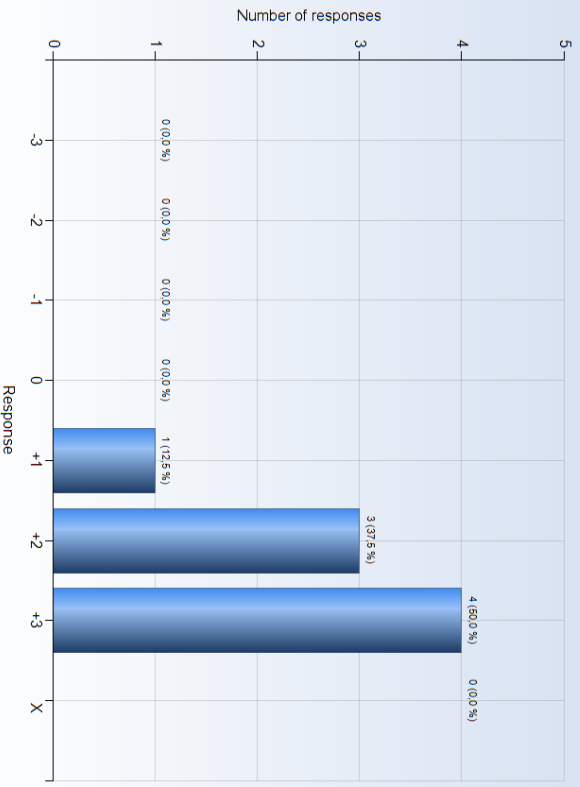


Comments

Comments (My response was: 0)

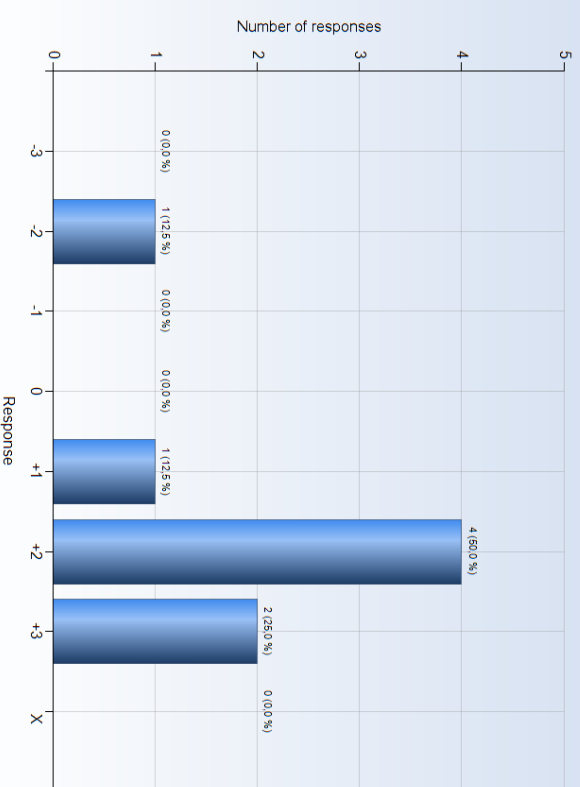
I am unsure what the stated learning objectives were.

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



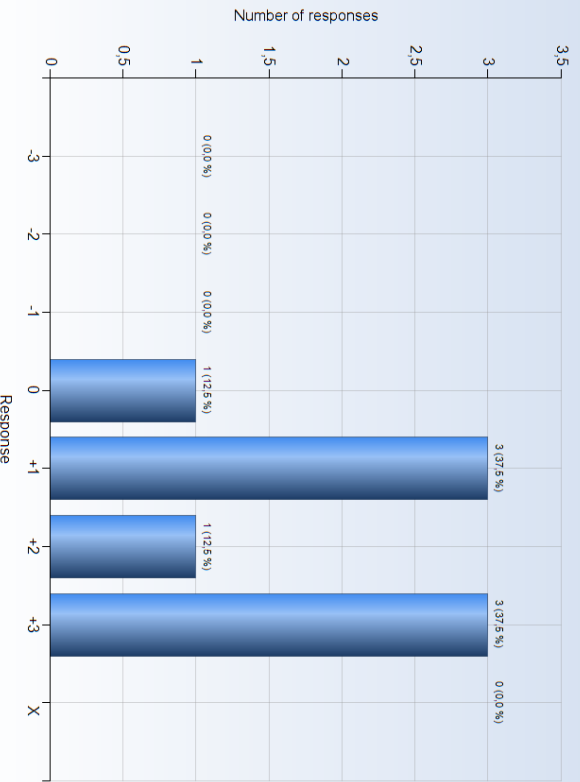
Comments

9. I understood what the teachers were talking about



Comments

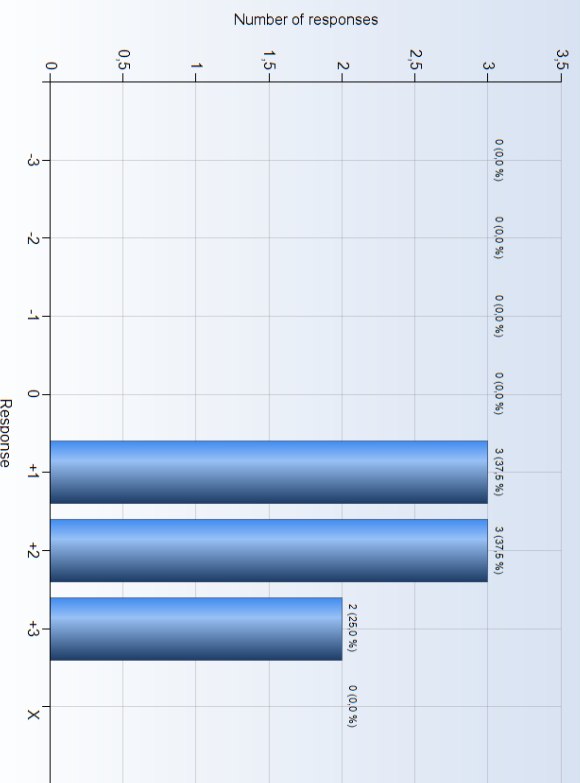
10. I could learn from concrete examples that I was able to relate to



Comments

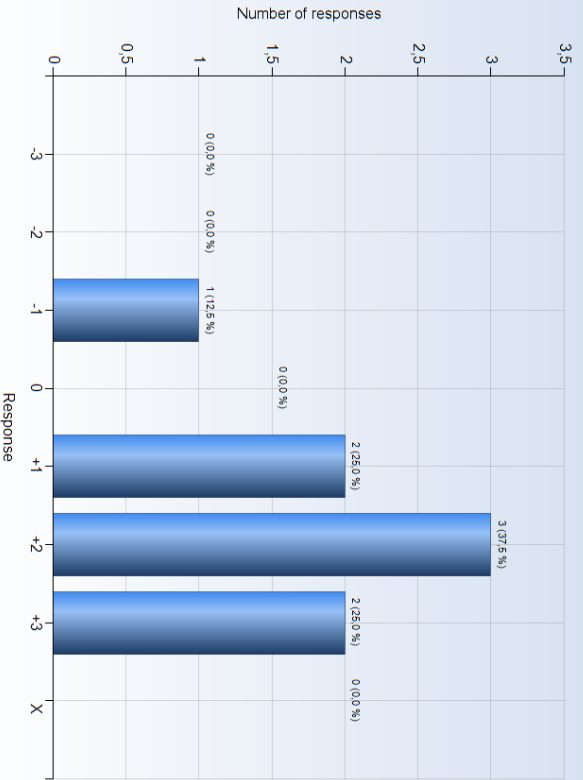
Comments (My response was: +3)
nice tabs :)

11. Understanding of key concepts was given high priority



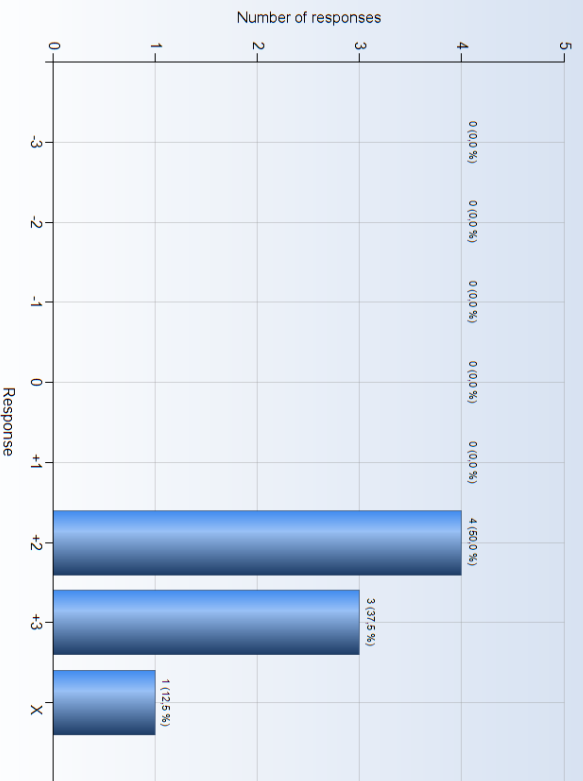
Comments

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



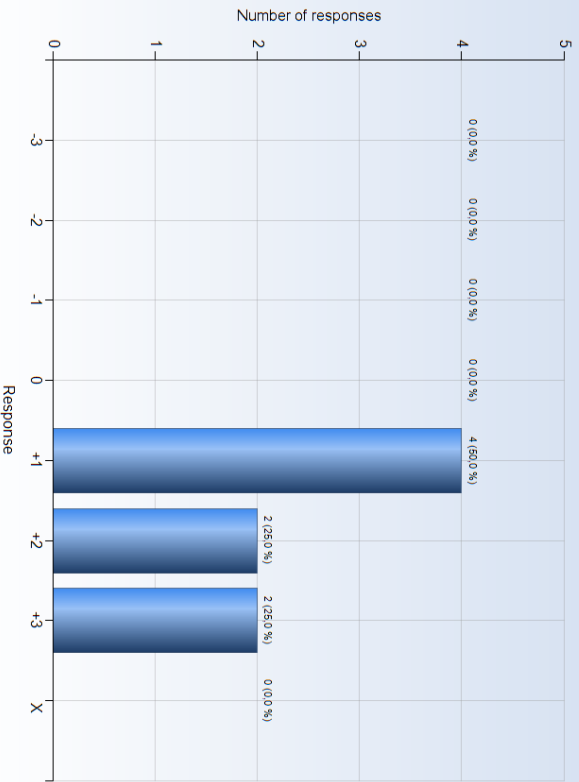
Comments

13. I understood what I was expected to learn in order to get a particular grade



Comments

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

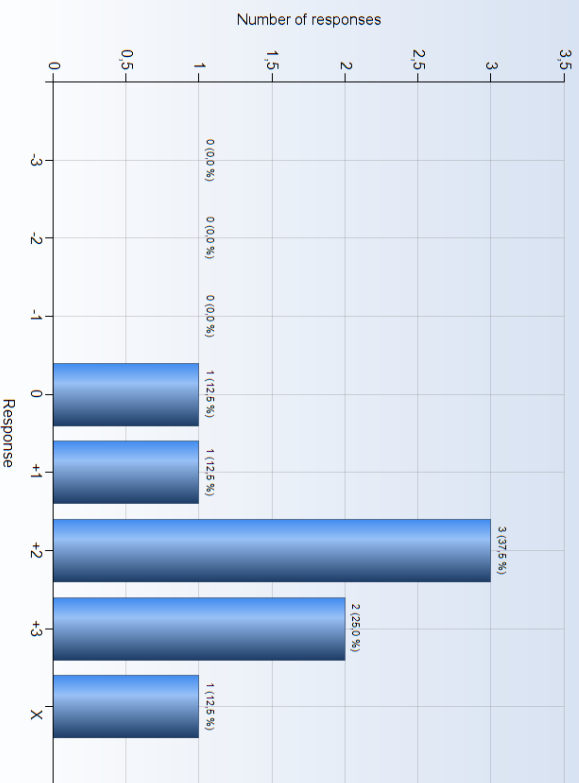


Comments

Comments (My response was: +1)

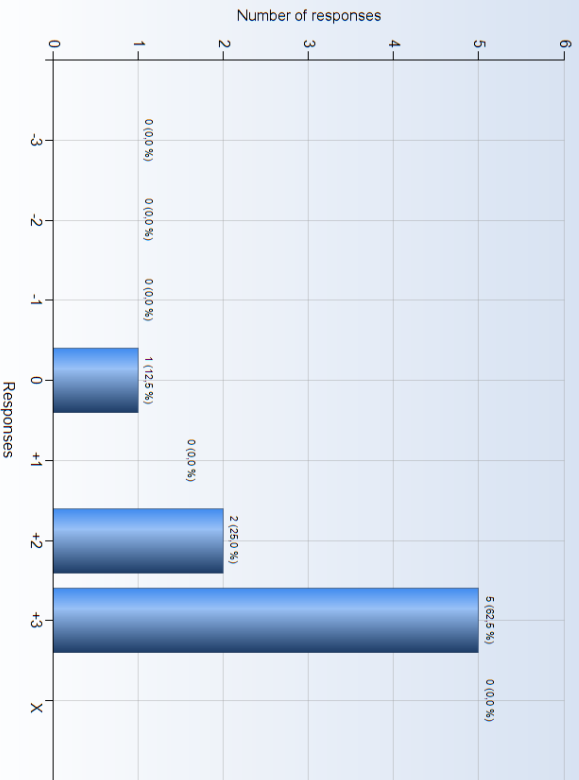
I would have received feedback from the teacher as well about the paper. It's was the first one for me

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



Comments

16. The assessment on the course was fair and honest



Comments

Comments (My response was: 0)
 What assessment?

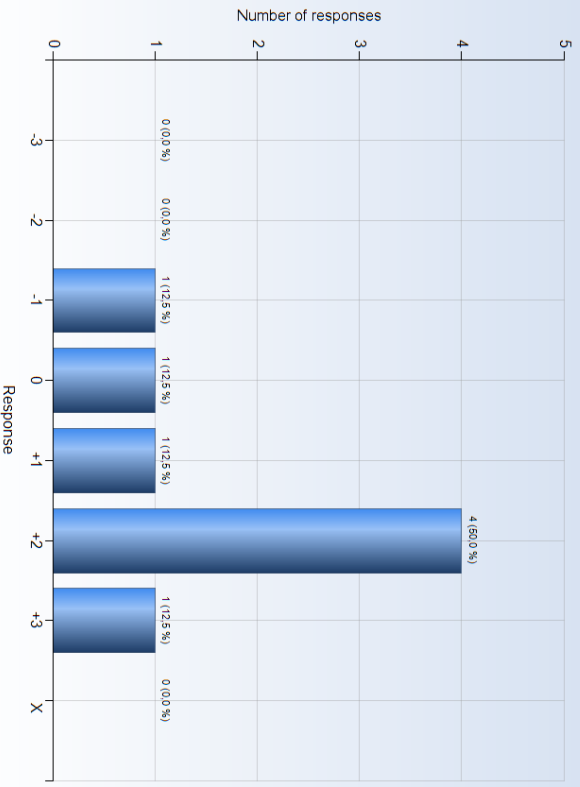
17. My background knowledge was sufficient to follow the course



Comments

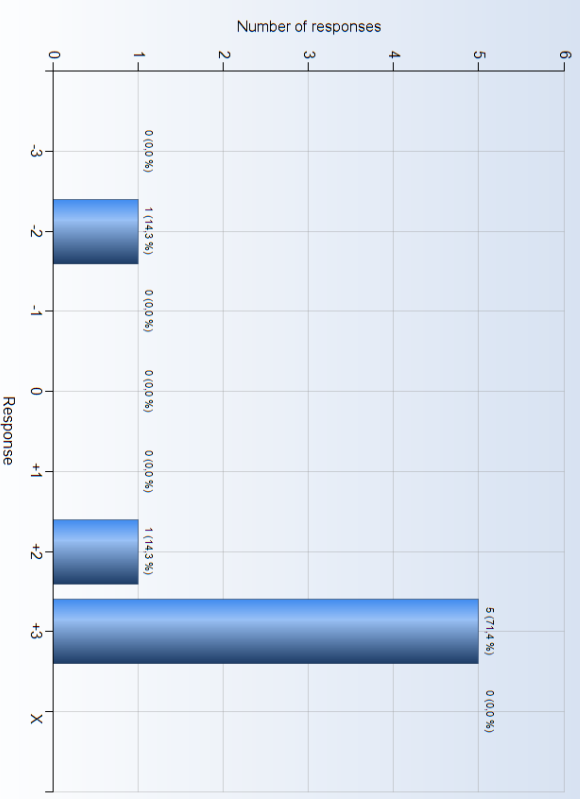
Comments (My response was: +1)
 I got very lost on the signal processing math.

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



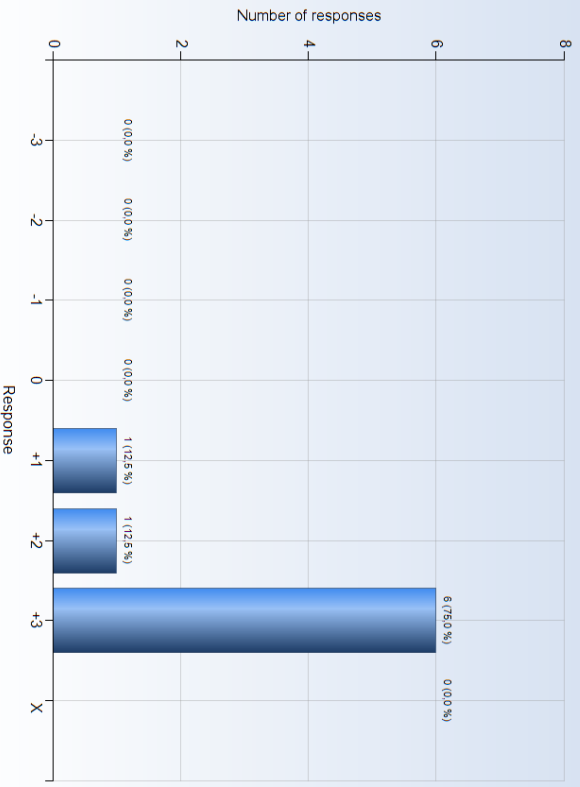
Comments

19. I could learn in a way that suited me



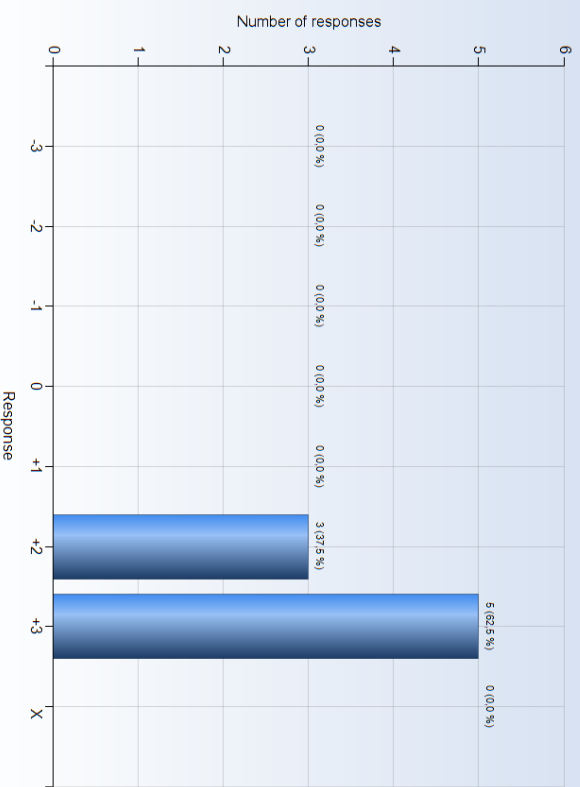
Comments

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



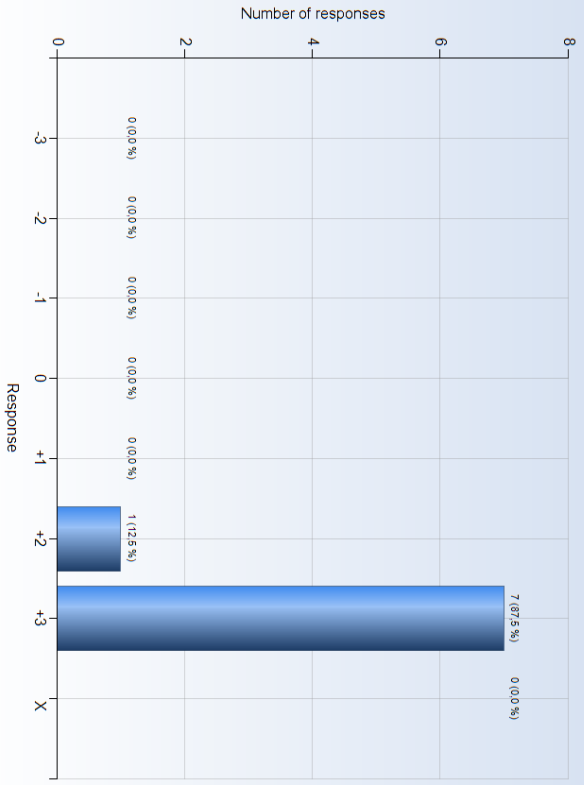
Comments

21. I could learn by collaborating and discussing with others



Comments

22. I could get support if I needed it



Comments