KTH Computer Science and Communication

DT2119: Speech and Speaker Recognition
Course Analysis VT2018

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 VT2018 the course consisted of 12 lectures, 3 computer labs each evaluated with an oral presentation and a final project evaluated with a written report, peer review and a poster session. Special care was put into aligning the learning outcomes with the teaching, learning activities and assessment. This is a course that, besides the specific topic, intends to teach the basic research paradigm, based on performing scientific studies, peer review, and public presentations.

The main differences with previous years were the following:

- the third lab on deep learning was completely rewritten and now is based on Python and TensorFlow. This improves the pedagogical value of the lab because it lets students implement most of the methods used,
- improvement were made to lab 1 and 2 to address some of the feedback received in VT2017,
- grading criteria were improved,
- some improvements were made to the software available at Parallel Data Centre machines to simplify use for the students
- credit to the Google Cloud Platform was obtained under an academic licence and the service was made available to the students

THE STUDENT'S WORKLOAD

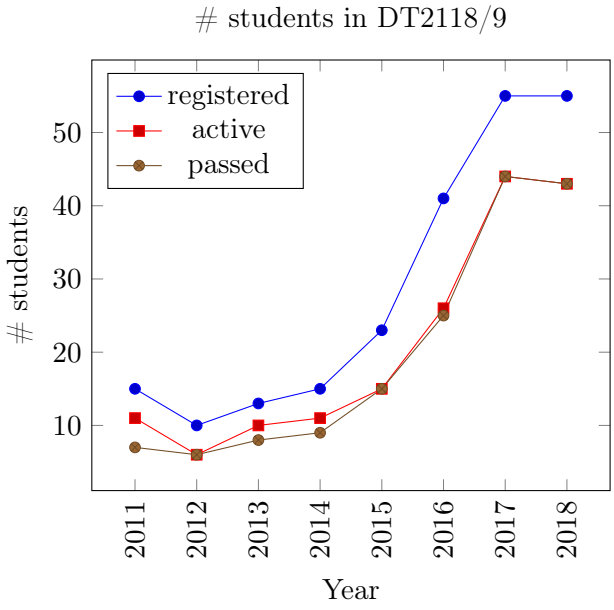
Does the students' workload correspond to the expected level (40 hours/1.5 credits)? If there is a significant deviation from the expected, what can be the reason?

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, Besides one student who reported 33–35 hours/week load, most students range from 3–5 to 18–20 hours/week. On average, the work load is 12.5–14.5 hours/week which is low compared to the 20 hours/week required for this kind of courses. There is still room to include more teaching and learning activities, for example a fourth lab.

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 55 students applying and registering to the course (source Canvas). Of them, 43 were active during the course and passed at the end. Below you can see the evolution in time for the course (until 2016 the course code was DT2118). The increase in number of students seem to have stopped in 2018. This may be due to the course reaching its limit, also considering the ever increasing course offering on Machine Learning topics at KTH.



The milestones during the years are:

VT2015: the matlab exercises and computer lab based on the HTK software package were substituted for three python based labs on Feature Extraction, HMMs and Continuous Speech Recognition in order to improve the alignment between the learning outcomes, the teaching/learning activities and the assessment. However, Lab 3 was still based on the HTK software package.

VT2016: An alternative version of Lab 3 was introduced to include the Deep Learning models that became state-of-the art in speech recognition. However, this lab was still based on pre-made software packages and offered limited learning opportunities for the students

VT2017: An introduction to signal processing was added to the course to help student lacking that background (mainly computer science students).

VT2018: Lab 3 was completely redesigned in Python/TensorFlow to allow the students to implement most of the methods, giving them a better opportunity to learn.

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 13 students responded to the survey. The overall impression is that the students highly enjoyed the course and found it stimulating (Q1=5.6). They find the course less challenging compared to previous years (Q4=4.8). This probably is due to the different distribution of students that joined the course this year that are mainly from the machine learning master. It is, therefore possible, to design more challenging tasks in the course. Similarly the background of participants seems to be adequate (Q17=5.8) and the students thought that the assessment was fair and honest (Q16=5.6). The lowest score (4.4) was for Q13: "I understood what I was expected to learn in order to obtain a certain grade", which indicates that the grading criteria can still be improved. It is to note that 4.4 is not a low score.

The system identified several subgroups. The distinction between men and women is rather interesting and shows that women are much more positive than man in their feedback. The questions with the larges difference were Q1 (interest), Q6 ("The atmosphere on the course was open and inclusive"), Q7–Q8 (clear goals and organisation), Q9–Q11 (understanding of subject matter), Q12: "The course activities helped me to achieve the intended learning outcomes efficiently", Q21 (collaboration) and Q22 (support). This is very encouraging. The distinction between international master students and total, does not show interesting differences.

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. Compared to previous years, the students who apply to this course seem to have a more fitting background resulting in lower work loads and lower perception of the course being challenging. This means that the assignments can be extended both in terms of coverage of the course topics and in terms of difficulty. Also, in the past years, when the course was run on KTH Course Web, one of the most appreciated feature was the availability of the teacher to answer question through the forum. Now, since Canvas has been introduced, the score on questions related to feedback have decreased. I intend to investigate if this is due to the forum functionality in Canvas that is not as user friendly as in Course Web, or if I have been less present due to other engagements (the Machine Learning Master Admission process takes a significant amount of my time during the course). However, the open questions on Canvas and feedback from the teacher were extremely positive, making me think that the lower numerical scores are simply due to the different scoring traditions of international students.

Throughout the years I have been meaning to find the resources to organise meetings with the students during the project to check progress and provide some form of supervision. Perhaps I can achieve this by recruiting some teaching assistants with a good background in the subject.

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 way the course was organised on Canvas. Many had difficulties using the computational resources at PDC, and were glad that the alternative of Google Cloud Platform was made available in the course. Some improvements are required for lab 3, and the students would like to have TA sessions during the labs and project to get assistance.

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 has reached maturity. However there is still room for improvements:

- The instructions of lab 3 should be revised.
- Also, writing lab 3, I realised that the instructions of some aspects of lab 2 could be made more general so to fit both labs and simplify the work for the students.
- I will consider adding a fourth lab on continuous speech recognition. This is an important aspect in the course and it would be good if the students dedicated some extra time on it. The problem so far has been making sure that the students have enough time to carry out four labs without affecting the results of the project. However, the reported work load indicates that there is room for adding more tasks in the course.
- The grading criteria need to be improved as some students reported they were not sure what they were expected to do to obtain a certain grade.
- I will try to define more Canvas quizzes to cover those topics that are not covered by labs and project. This has also been requested by the students.

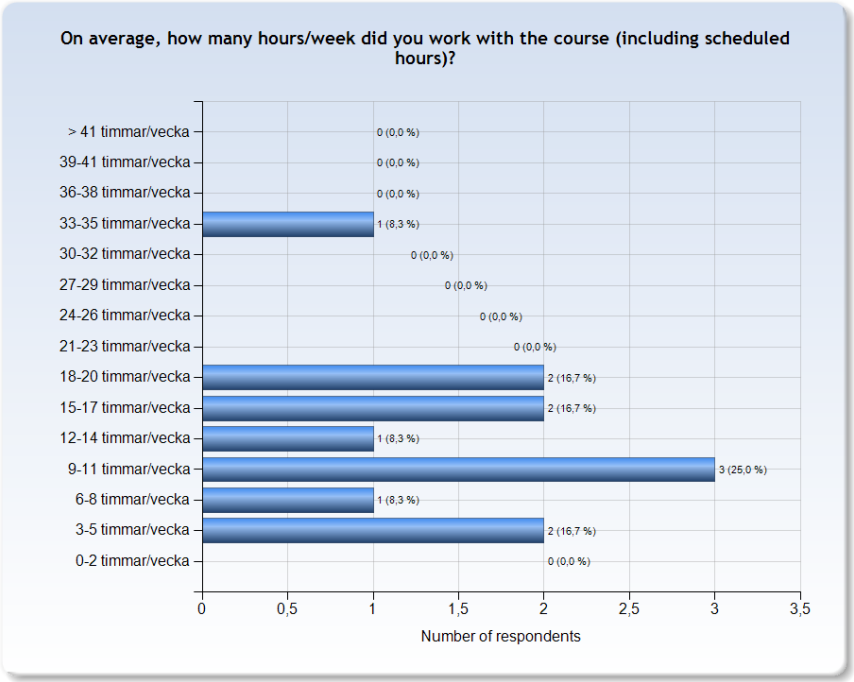
RESULT OF THE STUDENT SURVEY

In the next pages I report the result of the student survey.

DT2119 - 2018-06-06

Antal respondenter: 46
Antal svar: 13
Svarsfrekvens: 28,26 %

ESTIMATED WORKLOAD



Comments

Comments (I worked: 9-11 timmar/vecka)
I can't really remember the hours/week but it felt like a good work load/credits ratio.

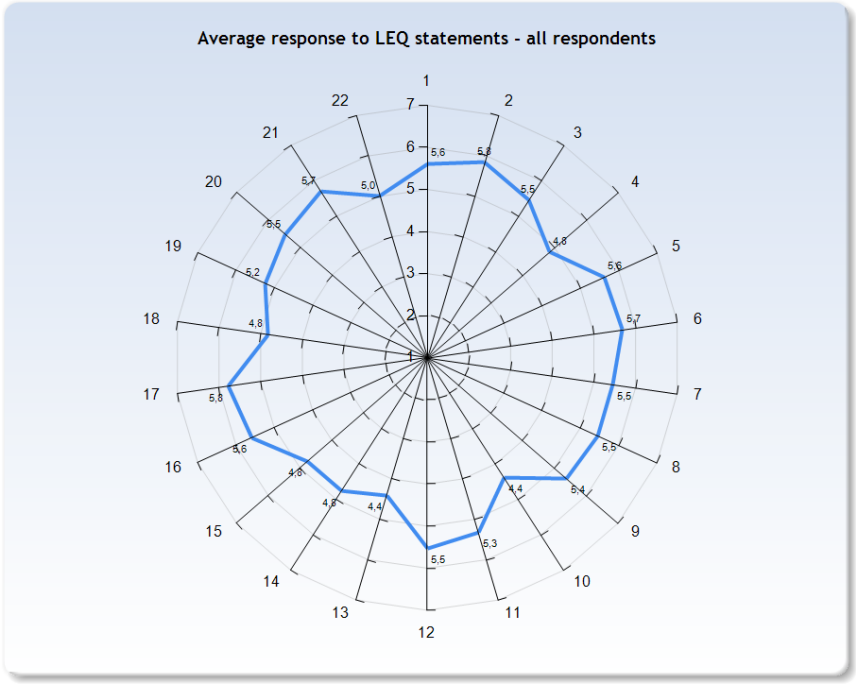
Comments (I worked: 33-35 timmar/vecka)
There was no way near enough time to read the reading material associated with the lectures. (But maybe this was not the idea)

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.



KTH Learning Experience Questionnaire v3.1.3

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. 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 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 choices

19. I was able to learn in a way that suited me (m)
20. I had opportunities to choose what to do (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, 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 intended learning outcomes, 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 intended learning outcomes

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.

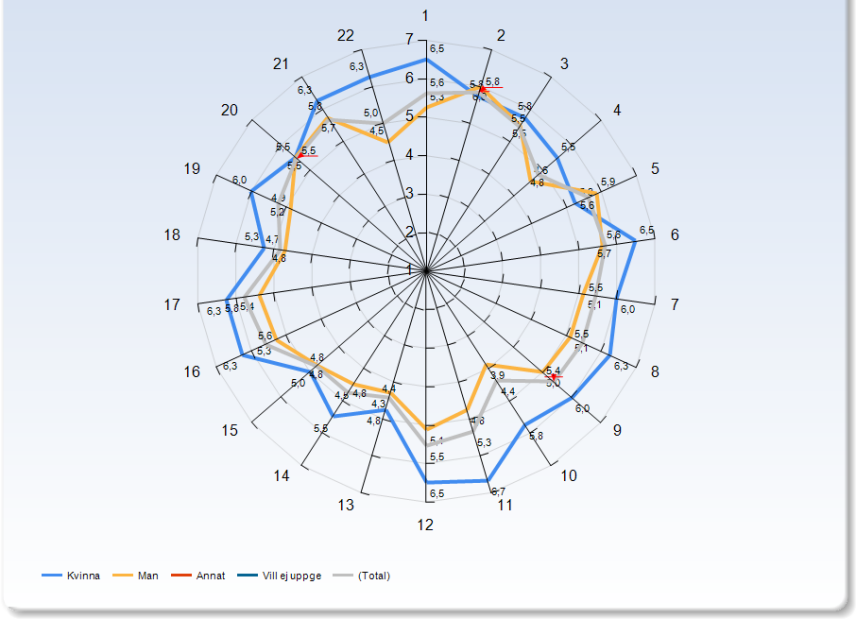
Biggs J. & Tang, C. (2011). *Teaching for Quality Learning at University*, Chapter 6, pp. 95-110. Maidenhead: McGraw Hill.

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.

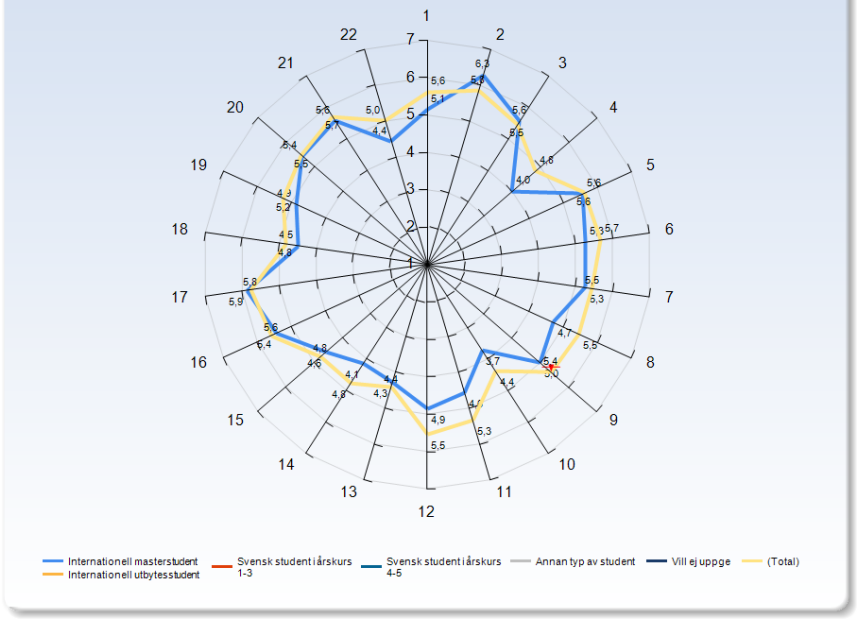
Ramsden, P. (2003). *Learning to Teach in Higher Education*, Chapter 6, pp. 84-105. New York: RoutledgeFalmer.

Average response to LEQ statements - per gender



Comments

Average response to LEQ statements - per type of student



Comments

Comments (I am: Svensk student i årskurs 1-3)
Thanks for an interesting course! :)

GENERAL QUESTIONS

What was the best aspect of the course?

What was the best aspect of the course? (I worked: 3-5 timmar/vecka)
The labs
The labs and the final project

What was the best aspect of the course? (I worked: 9-11 timmar/vecka)
Very relevant and well written assignments throughout the course.
The project, allowing for us to do something we are interested in within the field.
Good labs. Clear lab instructions on the first two labs.

What was the best aspect of the course? (I worked: 15-17 timmar/vecka)
The freedom to choose almost any speech related subject for the final project
Föreläsningarna, att det var mycket arbete i grupp, att projektet var så fritt och redovisningsformatet med posters.

What was the best aspect of the course? (I worked: 18-20 timmar/vecka)
the project
Coming into contact with speech preprocessing

What was the best aspect of the course? (I worked: 33-35 timmar/vecka)
That it covered a lot of topics

What would you suggest to improve?

What would you suggest to improve? (I worked: 3-5 timmar/vecka)
Maybe propose subjects for projects
It suppose to have course quiz

What would you suggest to improve? (I worked: 9-11 timmar/vecka)
Maybe emphasize a bit on speech characteristics when models are presented.
More guidance during the project
The lab instructions on the third lab.

What would you suggest to improve? (I worked: 15-17 timmar/vecka)
Improve the assignment descriptions. Some people including me lost a lot of time trying to understand what the description text wants us to do and how. There were cases where the description was apparently not very carefully written and these things were fixed only after someone poses question on the discussions.
- Det hade varit trevligt att ha alla quizzar. - Labb 3 tog väldigt mycket tid och inkräktade därmed på projektet. Mycket av det berodde på att mängden data var såpass stor så våra datorer hade problem med att hantera den.

What would you suggest to improve? (I worked: 18-20 timmar/vecka)
better defined assignments without bugs in the skeletons
The signal processing lecture was not sufficient to understand the reasons behind the different manipulations of the speech signal. Less focus on recreation of historic techniques, more critical analysis of them (what are their drawbacks, and where do they come from), and more contact with modern techniques and how they try to solve some of the drawbacks.

What would you suggest to improve? (I worked: 33-35 timmar/vecka)
Add prerequisite courses
Add TA help sessions for the labs and the project

What advice would you like to give to future participants?

What advice would you like to give to future participants? (I worked: 3-5 timmar/vecka)
pay more attention to the final project

What advice would you like to give to future participants? (I worked: 9-11 timmar/vecka)
Try to start the project as early as possible.
Learn about sound theory to better understand the labs

What advice would you like to give to future participants? (I worked: 15-17 timmar/vecka)
Hitta en labb-/projektpartner du trivs med för ni kommer att tillbringa mycket tid ihop.

What advice would you like to give to future participants? (I worked: 18-20 timmar/vecka)
start the lab ASAP as you will find a lot of bugs
Get quite familiar with the preprocessing pipeline

Is there anything else you would like to add?

Is there anything else you would like to add? (I worked: 3-5 timmar/vecka)
no

Is there anything else you would like to add? (I worked: 9-11 timmar/vecka)
No

Is there anything else you would like to add? (I worked: 15-17 timmar/vecka)
Jag använde inte kurslitteraturen alls men hade viss nytta av Jurafsky & Martins Speech and language processing.

Is there anything else you would like to add? (I worked: 18-20 timmar/vecka)
please pay attention to the lab specs
Modern ASR still seems like it's just an interface above a really bad UX design, and the course did not help change that view. It may not have been in the course's aims though. In any case, I do not feel I have any greater appreciation for the technology and its applications, it still seems like a terrible way to interact with computers

SPECIFIC QUESTIONS

Arbetsinsatsen var jämnfördelad under kurstiden

Arbetsinsatsen var jämnfördelad under kurstiden
Yes
No, there was too much work in a short period of time for Lab2 and Lab3 (given that we were doing the project at the same time). On the other hand there was too much time given for Lab1. However, I assume the labs 2 and 3 would take far less time to implement if we had better instructions in the assignment description.
Yes that is something I like about the course !
Yes, it was evenly distributed and felt fair
Yes, maybe except for the last project
Yes
Yes, a part from lab3 being to heavy
yes
yes
Det mesta av arbetet lades på labb 3 och projektet som båda var på slutet.

Laborationerna hjälpte mig förstå de teoretiska aspekterna

Laborationerna hjälpte mig förstå de teoretiska aspekterna
Significantly
Yes but I learned a lot of stuff during the actual presentation from the TAs. I believe all that stuff should be included in the description or at least hints should be given so that we do not squander our time.
Yes definitely but it was sometime hard to meet the deadlines with my 2-3 other courses
Yes
Yes
Yes
to an extend. They were not always clear on what their aim was, or what particular part of the whole recognition process we were dealing with in a concrete and focused way. Lab 3 was particularly badly formed, with the task being unclear both in its nature and in its necessity, since we already were doing the same thing with HMMs. It was a good discussion on the pros and cons of each method at least
yes
Ja

Informationsflödet i Canvas var tidsenlig och användbar

Informationsflödet i Canvas var tidsenlig och användbar
Yes
Yes
Yes
To some extend yes
Very helpful
Yes
Yes
Yes, the teacher did a very good job with canvas. He even added a deadline for us to apply for pdc accounts so we wouldn't forget
yes
yes
Ja, Canvas funkade överlag väldigt bra

Beräkningsresurserna var adekvat (PDC/GCP/AWS)

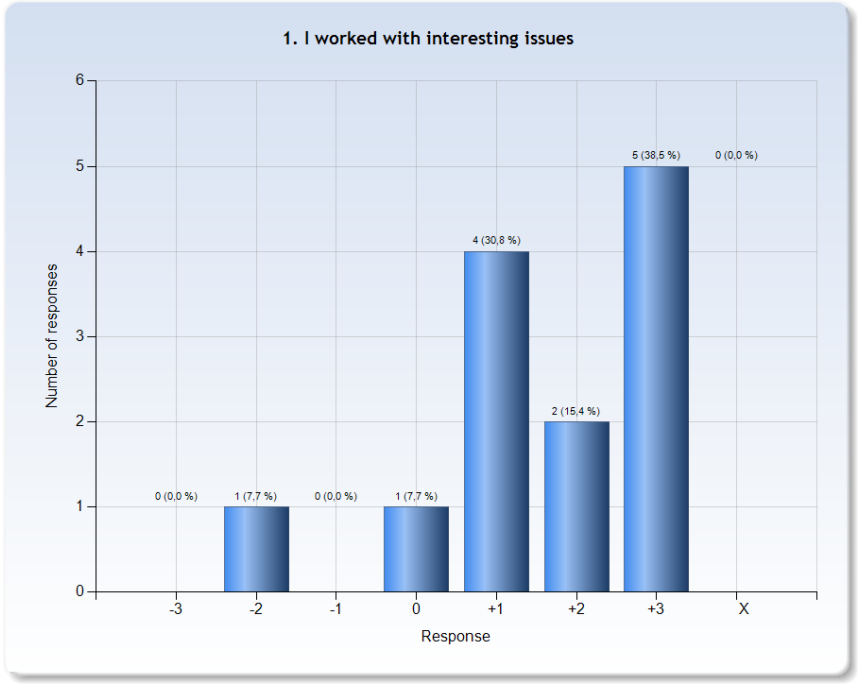
Beräkningsresurserna var adekvat (PDC/GCP/AWS)
PDC was unusable in the end, AWS was very helpful and easy to use. Ps : I used AWS too much and consumed more than my free credit. The billing dashboard is not clear, and seems to take time to refresh.
We did not run into any issues but I was afraid that running certain stuff on GCP would make us run out of credits.
Yes but kind of hard to use sometimes.
Yeah, I like that you added google clouds. They are so easy to use
They were a bit complicated
PDC was very hard to use and we spent many hours trying to get it to work. Once it was working it was extremely hard to get a time slot for running our jobs. The google cloud platform which we used instead, was however very convenient and user friendly!
GCP was. We were unable to use PDC after correctly setting everything up
GCP
Föreläsningen om PDC kändes inte alls anpassad efter oss och vad vi behövde veta och klargjorde inte särskilt mycket. Vi använde istället Google Cloud och det fungerade utmärkt, lätt att komma igång och kvoten räckte mer än väl. Vi hade dock behövt mer minne än förslaget i instruktionerna, men det visste vi ju nte när vi skapade vår VM och det gjorde att vi fick hoppa över vissa körningar.

RESPONSE DATA

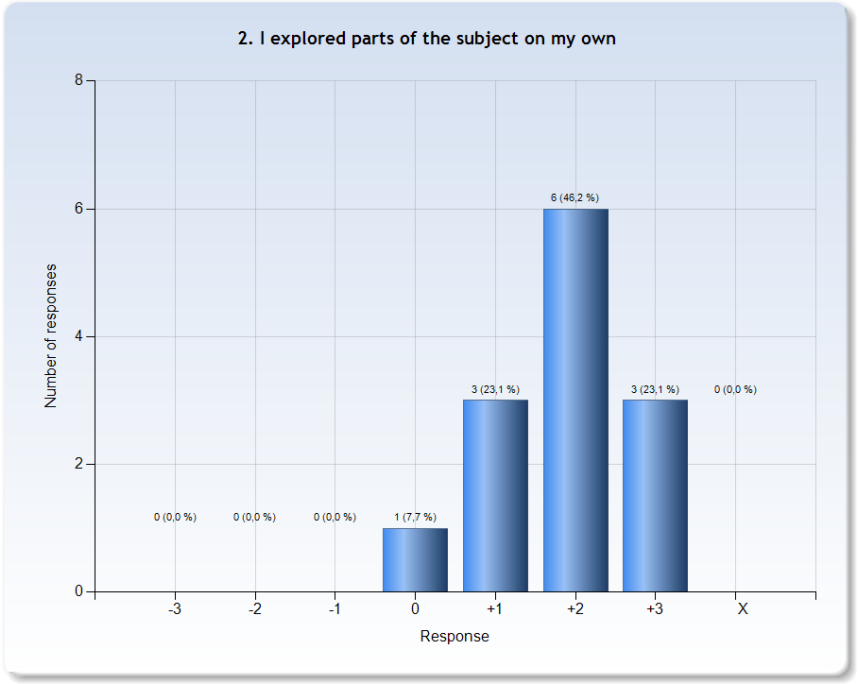
The diagrams below show the detailed response to the LEQ statements. The response scale is defined by:

-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



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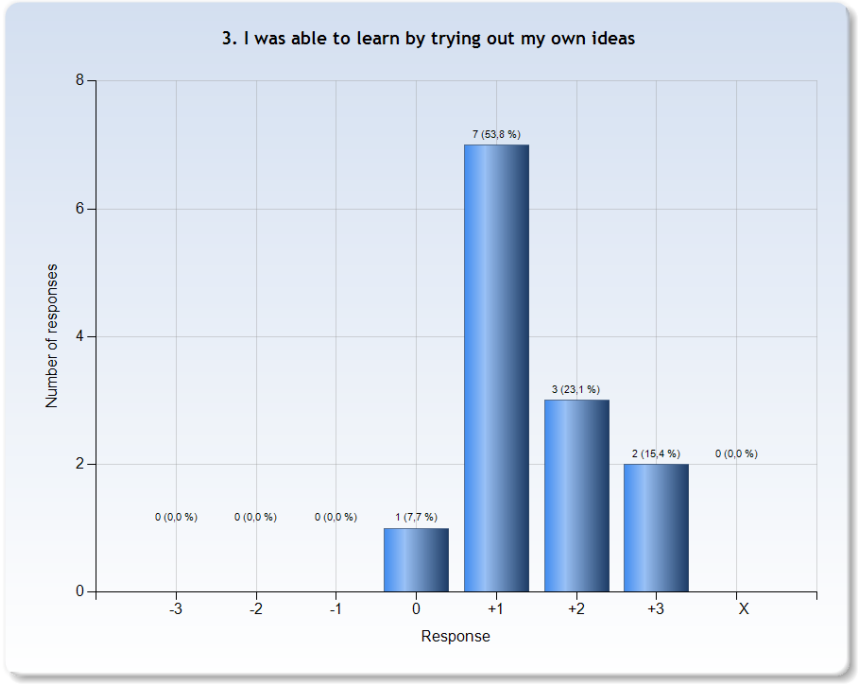

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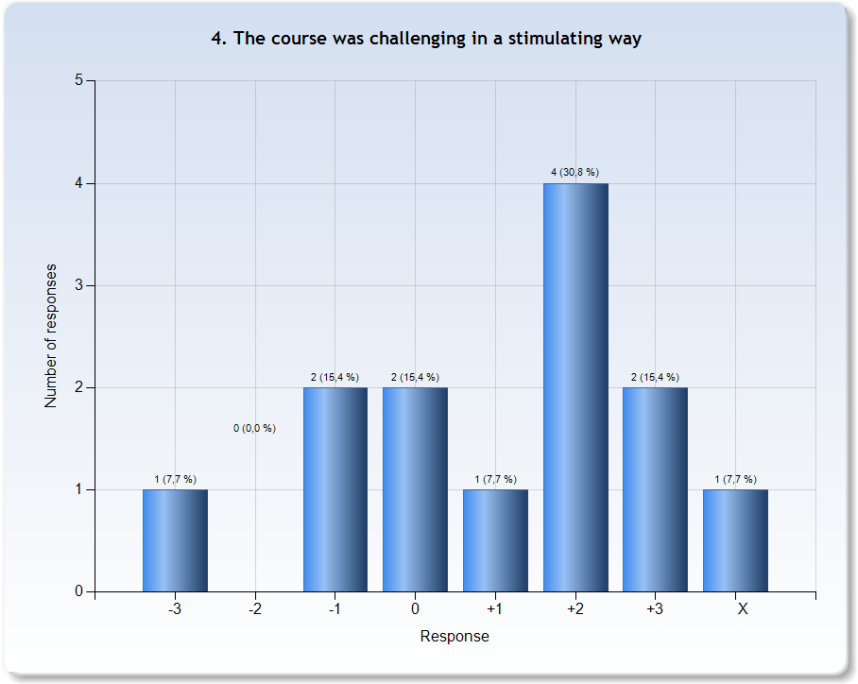
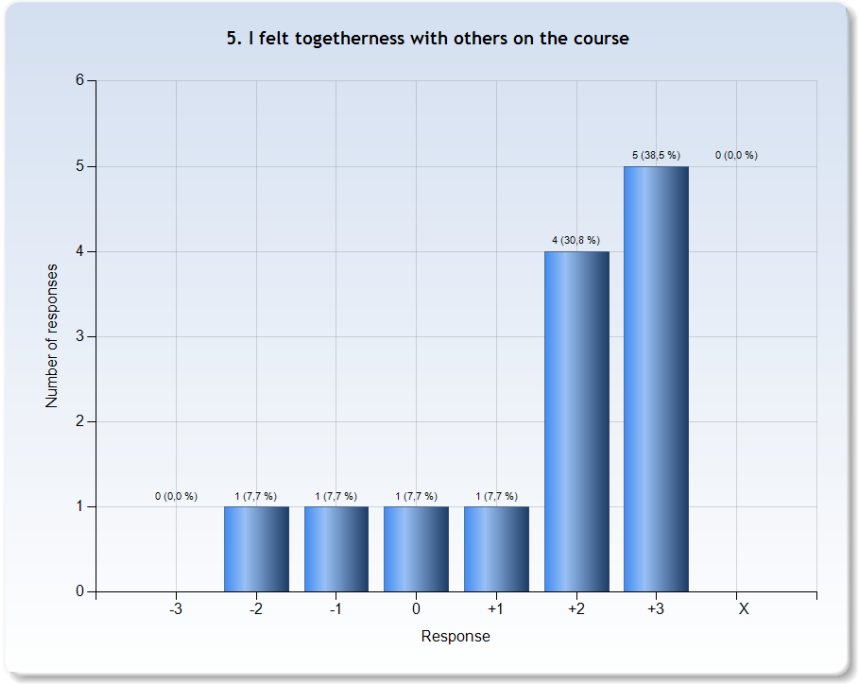


Comments

Comments (My response was: +2)

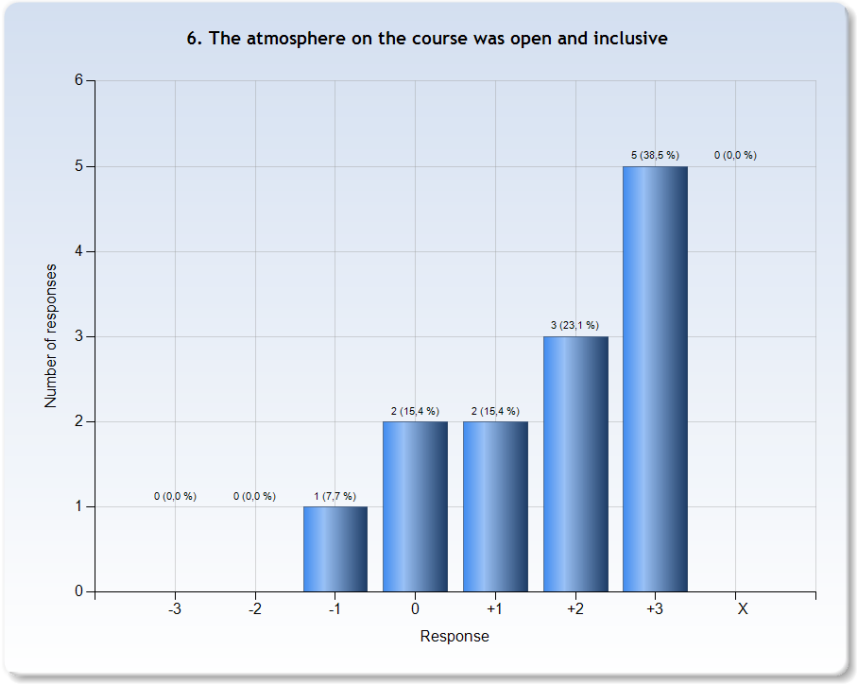
Yes, but sometimes frustrating, especially lab3 since this lab was pretty extensive, stressful and a bit unclear



Comments

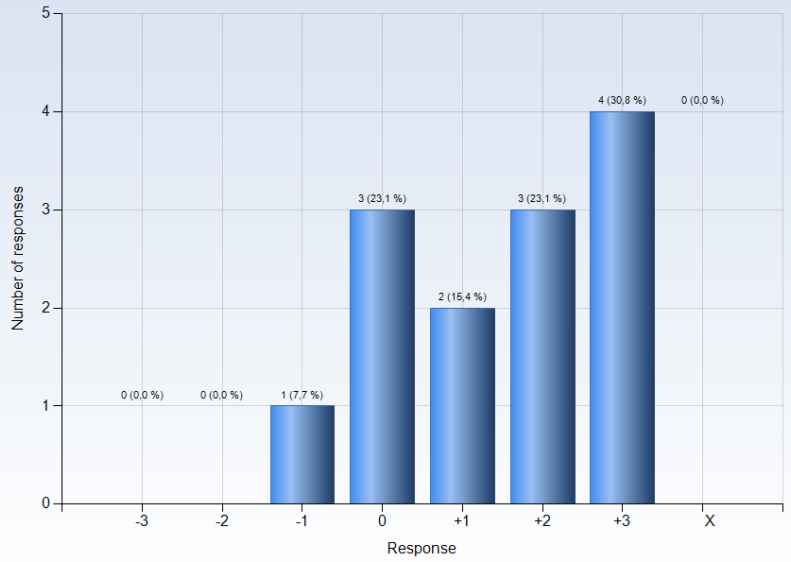
Comments (My response was: +3)

Students where very helpful! And there was a very open and inclusive atmosphere in the class!



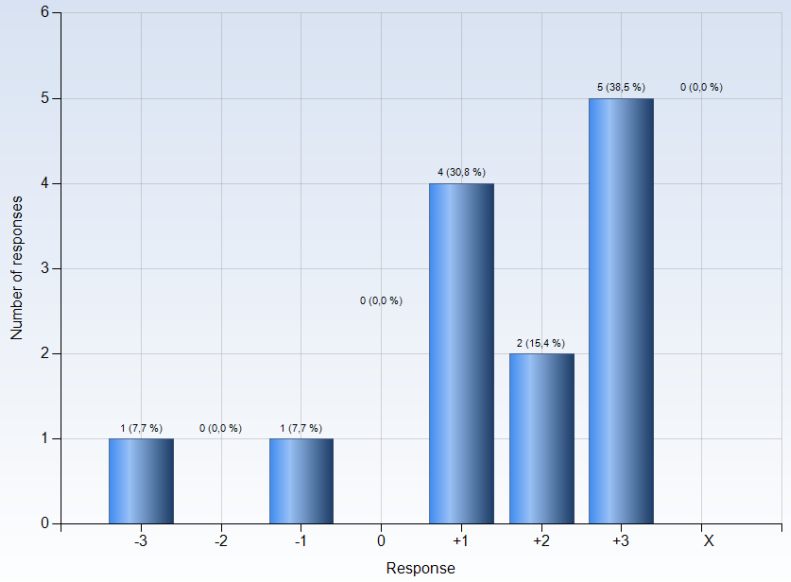
Comments

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



Comments

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



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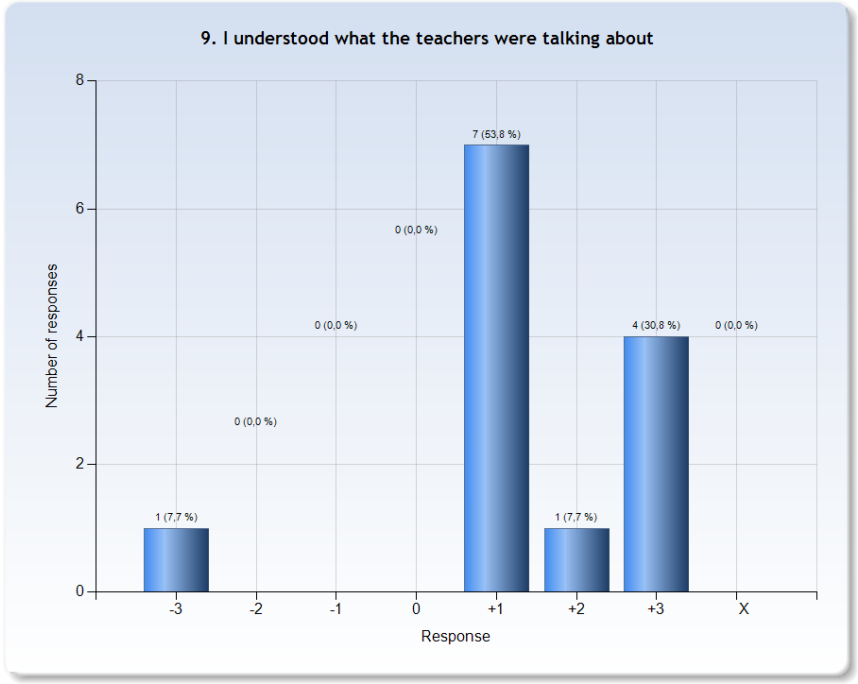
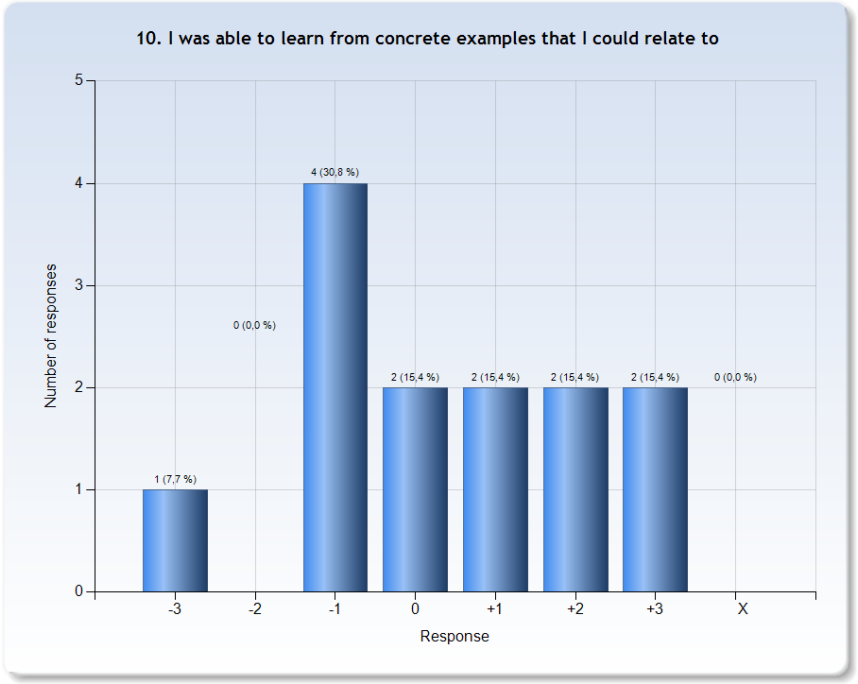


Comments

Comments (My response was: +1)
Most of the time



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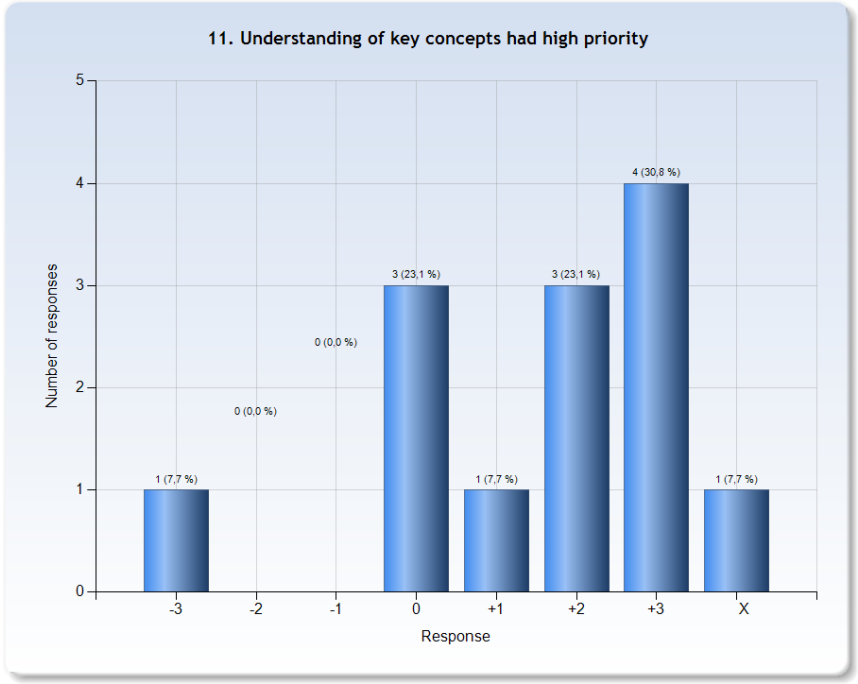
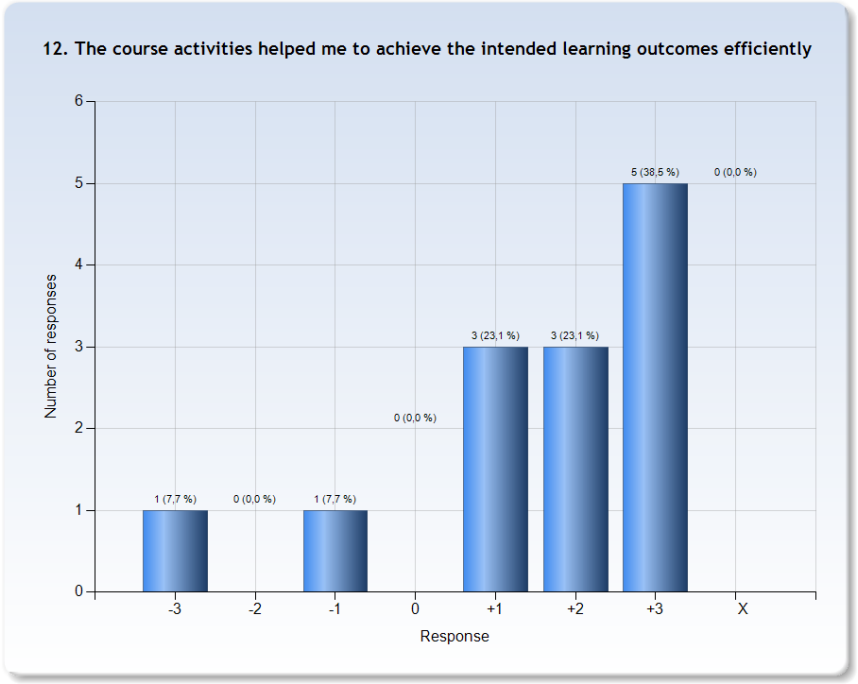


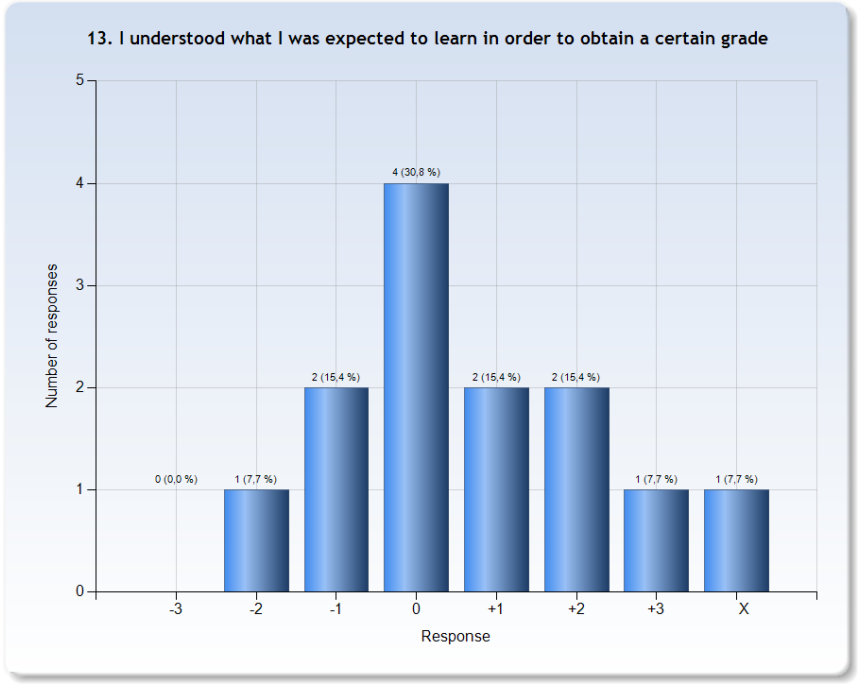
Comments

Comments (My response was: +3)

Very well structured powerpoints and lectures!



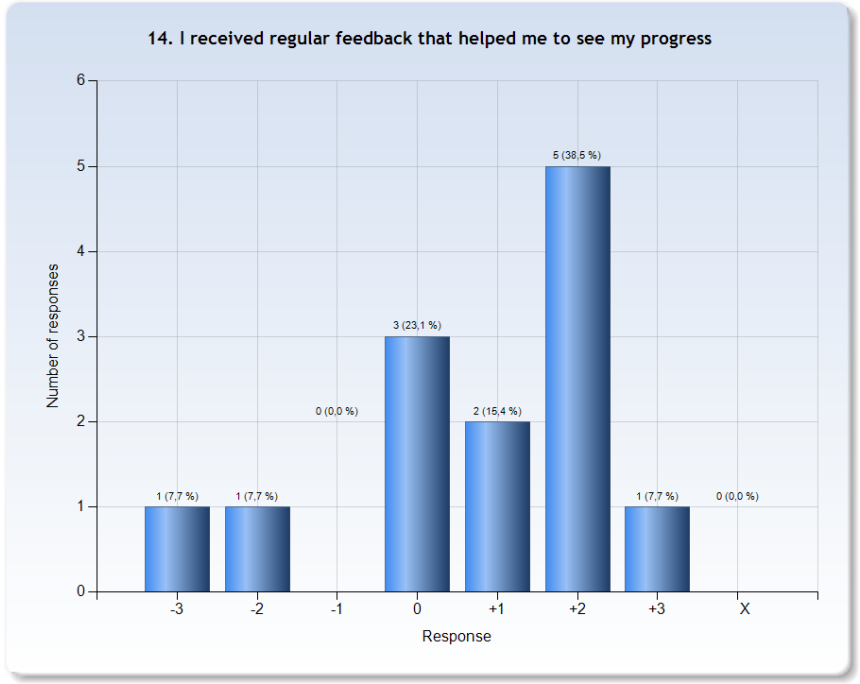
Comments



Comments

Comments (My response was: +1)

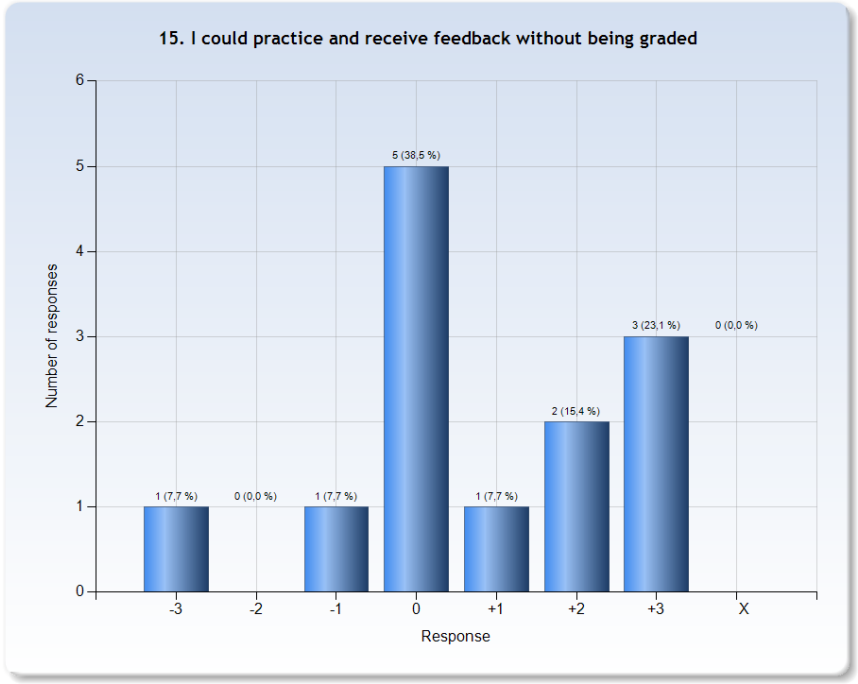
Lite oklart hur projektet kommer att betygsättas.



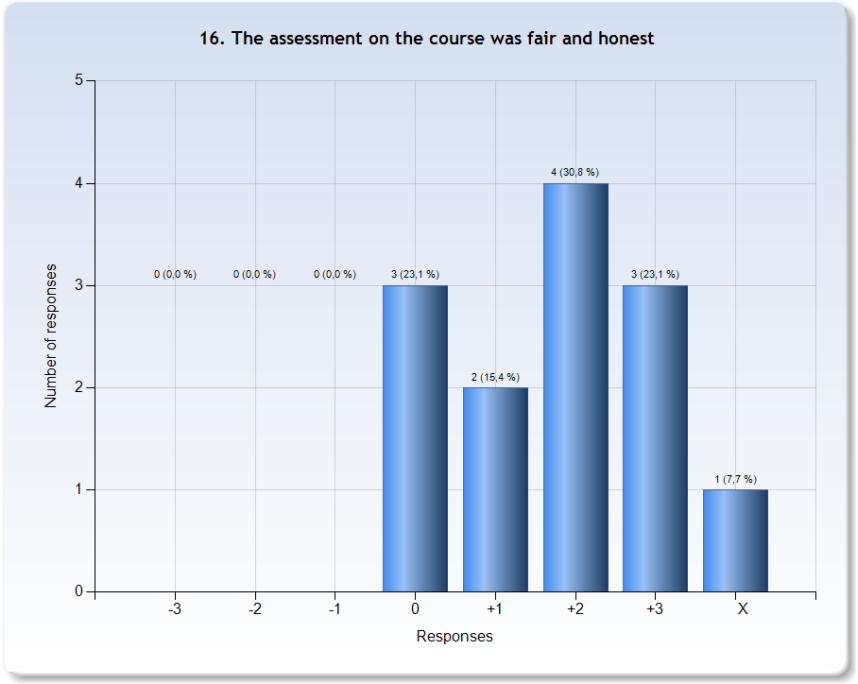
Comments

Comments (My response was: +2)

However, I think it could be good with helpsessions with TAs as we had in the DD2424

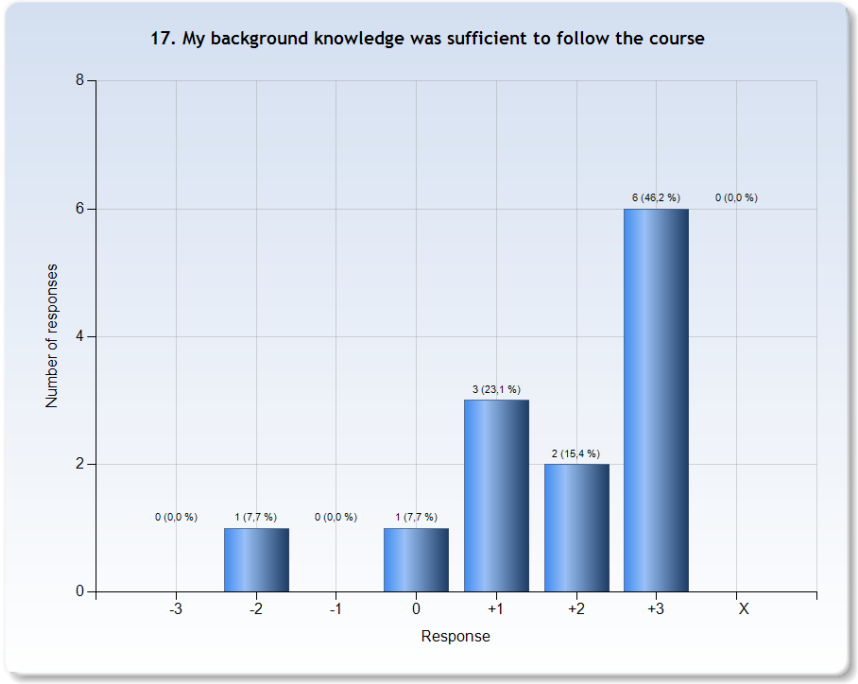


Comments



Comments

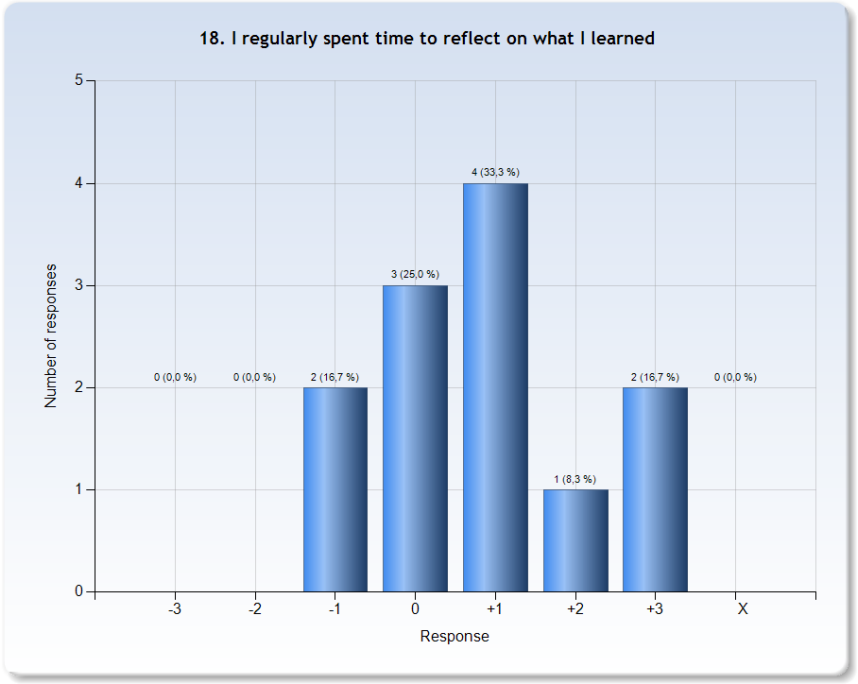
Comments (My response was: X)
No assesment yet, still waiting for project grades



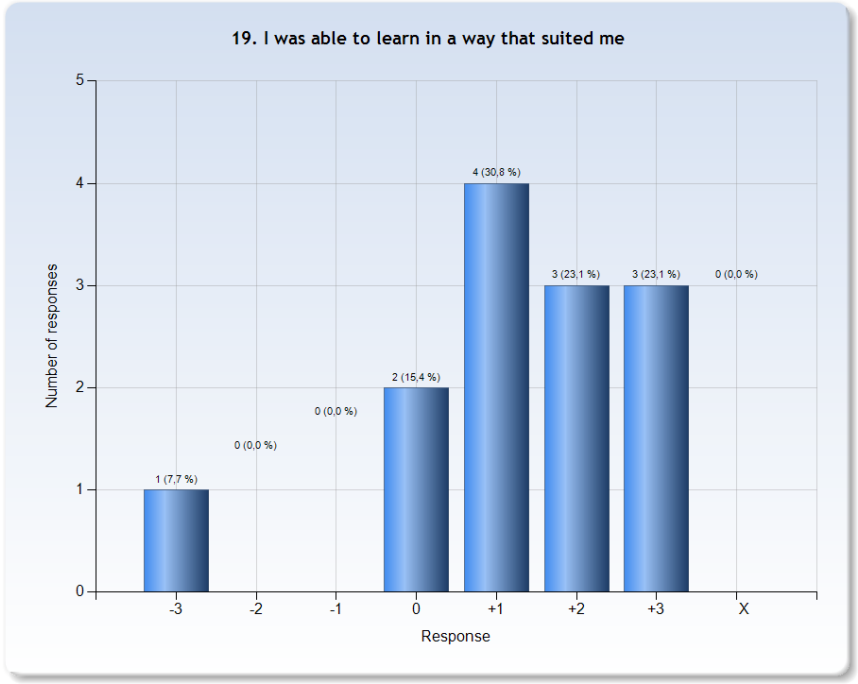
Comments

Comments (My response was: -2)

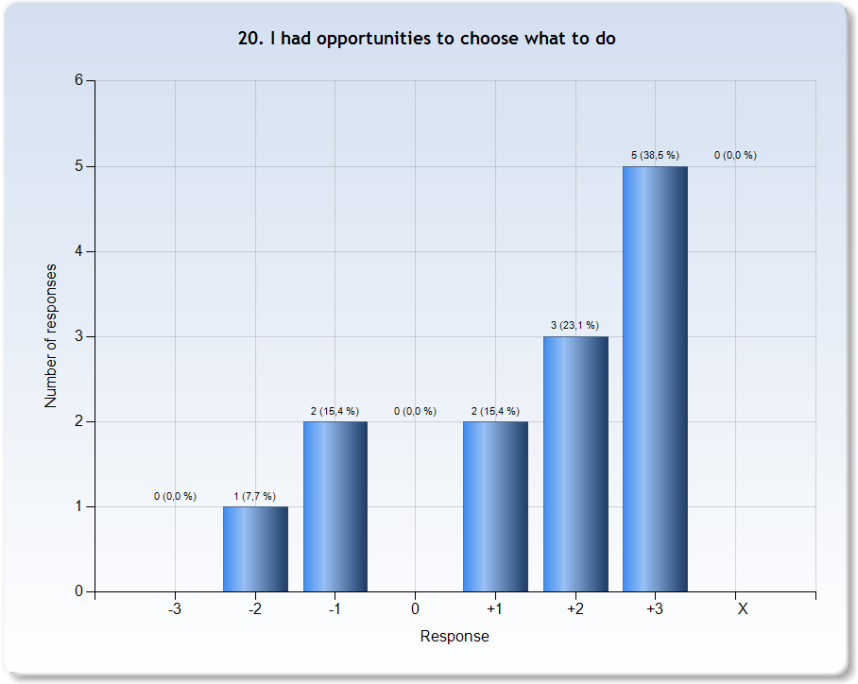
Without any background in machine learning, advanced machine and signal processing it was sometimes very challenging to follow the course. I would recommend adding them as prerequisites or recommended prerequisites on the course page



Comments

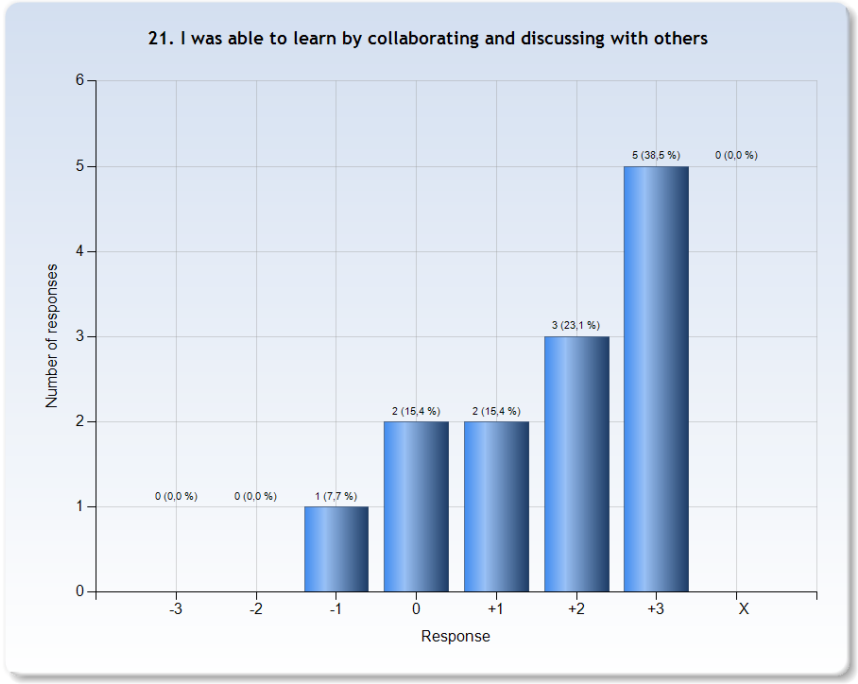


Comments

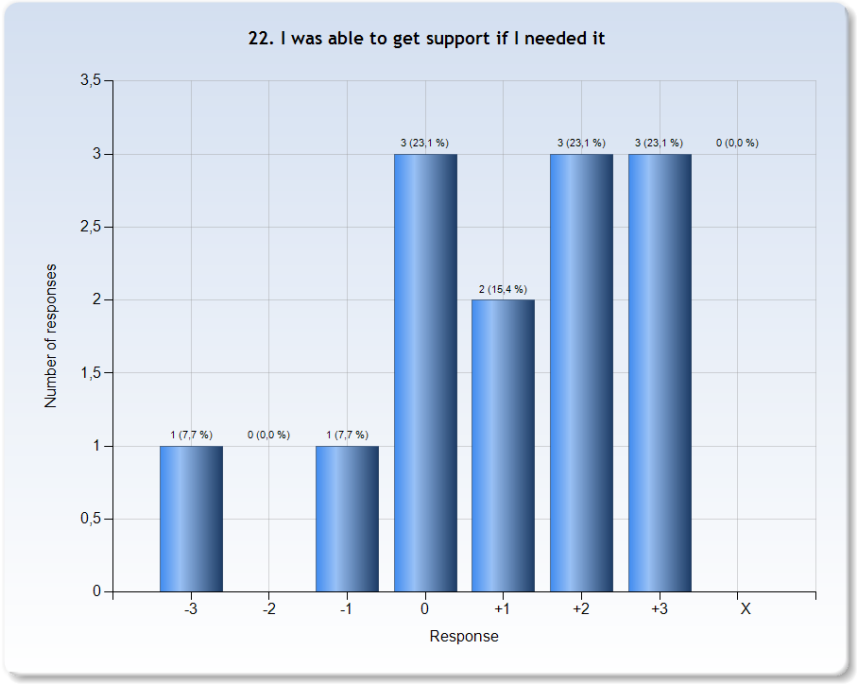


Comments

Comments (My response was: -2)
During the project only



Comments



Comments