KTH Computer Science and Communication

DT2119: Speech and Speaker Recognition
Course Analysis VT2019

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 VT2019 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 new grading criteria were made available to the students at the beginning of the course and were used in the evaluation
- following a comment from a previous course analysis, I clarified part of Lab 2, making the results more general and applicable to Lab 3,
- more teaching assistants were employed in order to run the labs more smoothly,
- 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

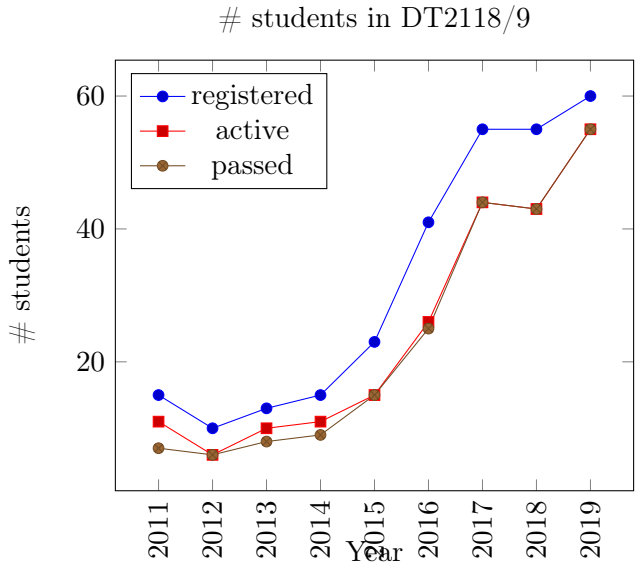
Does the students' workload correspond to the expected level (40 hours/1.5 credits)? If there is a significant deviation from the expected, what can be the reason?

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 60 students applying and registering to the course (source Canvas). Of them, 55 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 number of students has increased quickly during the years and continues to rise although at a much lower rate since 2017. 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 10 students responded to the survey. The overall impression is that the students highly enjoyed the course and found it stimulating (Q1=6.6). They find the course less challenging compared to previous years (Q4=5.4). 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=6.0) and the students thought that the assessment was fair and honest (Q16=6.2). In VT2018 question Q13: "I understood what I was expected to learn in order to obtain a certain grade", received the lowest score (4.4). **In order to improve on this, clear grading criteria were introduced and used in VT2119 and the same question received the score of 6.0, indicating that the improvement had good effects.** The lowest score this year is 4.8 on Q5: "I felt togetherness with others on the course". Although relatively low compared to other scores, this is a positive response nevertheless.

The system identified several subgroups. Because of the low total number of responses, these results are rather questionable statistically. However, I will describe them here. The first distinction is by gender. Here the group of female students gives on average lower scores than the male students. In VT2018 the exact opposite result was observed, leading me to think that these results are more dependent on individuals that happen to follow the course each year rather than some gender issue. However, if this result will return in the future, a more detailed investigation should be performed. The second distinction is between international master students and international exchange students. The first seem to give lower scores than the second. At the moment of writing the report, it is unclear to me what this distinction signifies, and the difference in responses is not great for most 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. 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 moved from KTH Course Web to Canvas, the score on questions related to feedback had decreased. The availability of the teacher to answer question through the forum was one of the most appreciated feature of the course. I have been trying to understand, if the effect was due to Canvas not being as user friendly as in Course Web, or by the fact 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). **In order to improve the situation, in VT2019 I have employed more TAs, not only to evaluate the results of the labs, but also to provide help sessions for the students during the labs. The fact that the scores related to feedback have improved again, implies that this had a positive effect on the course.**

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.

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 students who take the Deep Learning course in parallel with this course, have a clear advantage both of Lab 3 and for the project. A more detailed treatment of deep learning should be included in the course in order to bring all students at the same level.
- 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.
- Following the grading criteria, there was a tendency of assigning high grades to most students. The grading criteria may be revised in order to make the course more challenging.
- 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.
- I will record some of the lectures in order to make it possible for me to run the course from abroad. In place of the lecture slots, I will organise some interacting sessions through the net, to allow the students to ask questions.

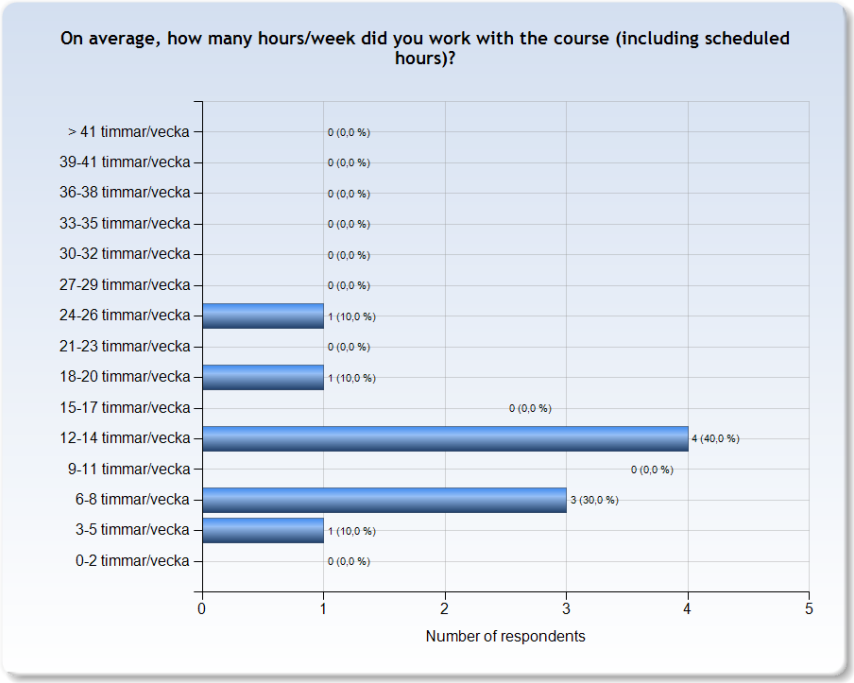
RESULT OF THE STUDENT SURVEY

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

DT2119 - 2019-06-05

Antal respondenter: 60
Antal svar: 10
Svarsfrekvens: 16,67 %

ESTIMATED WORKLOAD



Comments

Comments (I worked: 6-8 timmar/vecka)
In all, the course is very good, as it provides a wide view of speech recognition. Besides, it also requires students to do basic laboratories in the course lab, and also extends with a course project.

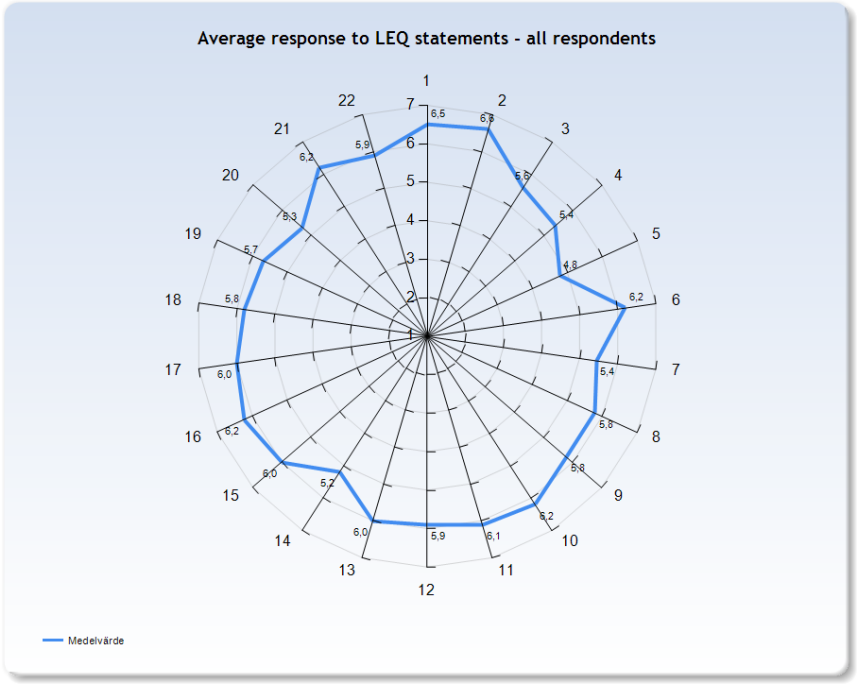
Comments (I worked: 12-14 timmar/vecka)
The average work hour is suitable for me.

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 v3.1.4

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.

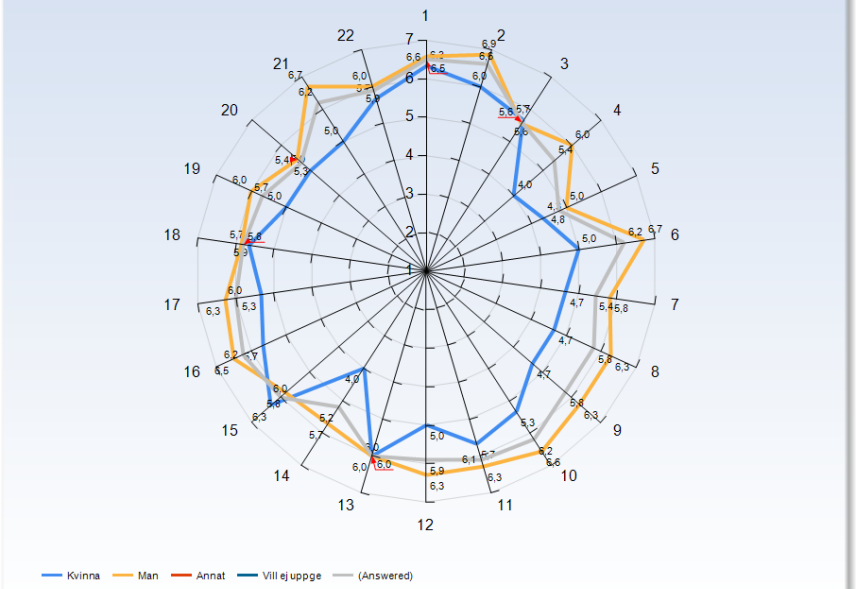
Biggs J. & Tang, C. (2011). *Teaching for Quality Learning at University*, Chapter 6, pp. 95-110. Maidenhead: McGraw Hill.

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.

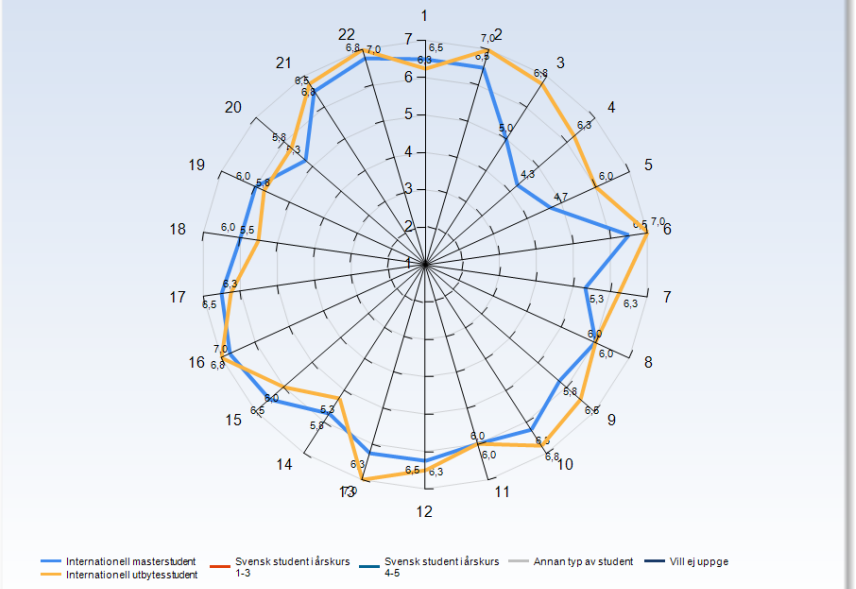
Ramsden, P. (2003). *Learning to Teach in Higher Education*, Chapter 6, pp. 84-105. New York: RoutledgeFalmer.

Average response to LEQ statements - per gender



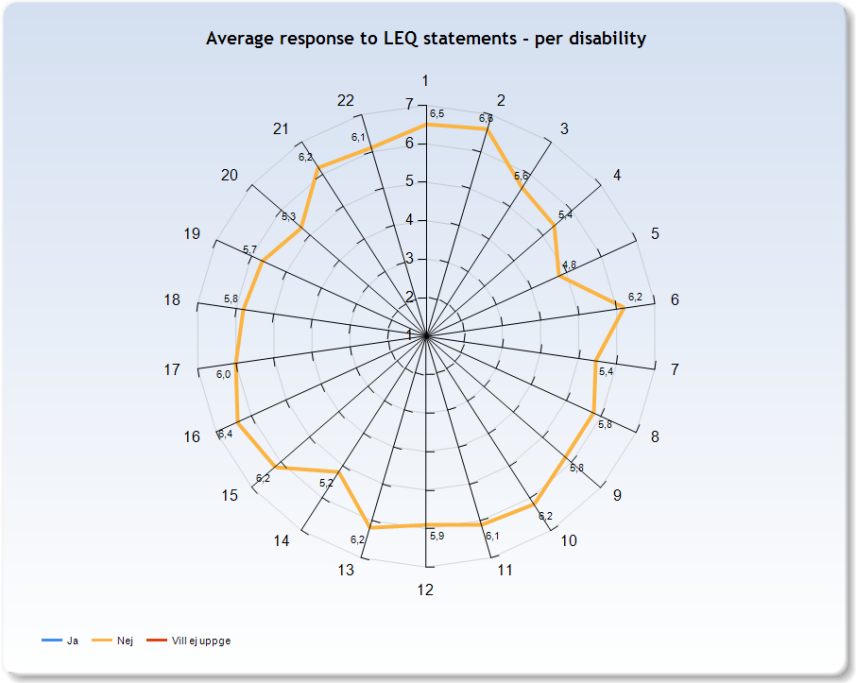
Comments

Average response to LEQ statements - per type of student



Comments

Comments (I am: Internationell utbytesstudent)
Very good expansion of my studies.



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)
Lab and project

What was the best aspect of the course? (I worked: 12-14 timmar/vecka)
The labs were interesting and fun, although i would reccomend them to be individual.
The feature extraction part
It had a very clear structure and the
The project part of this course is pretty nice. It is almost free when choosing the project topic.

What was the best aspect of the course? (I worked: 18-20 timmar/vecka)
Labs

What would you suggest to improve?

What would you suggest to improve? (I worked: 6-8 timmar/vecka)
In my opinion, there should be a little more focus on the theoretical aspects, which could be enforced by little tests or the like.
Maybe the number of labs can be improved

What would you suggest to improve? (I worked: 12-14 timmar/vecka)
Some of the lectures were a bit tedious, I suggest to make them more related to the labs.
I would like the assignments/labs to be graded and without ready-made code.
I think lab 3 is too time consuming. A small tutorial on how to create the architecture of DNNs and train models would be nice. I felt that most of the other students had a lot of experience with it but to me it was quite new.
The schedule of the lab assignments seems a little bit messy.

What would you suggest to improve? (I worked: 18-20 timmar/vecka)
Project. Project examples. Project supervision

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)
Begin the project early!

What advice would you like to give to future participants? (I worked: 12-14 timmar/vecka)
Start on time the project.
If you never worked with DNNs find a group partner that has some experience.
Spend more time on lab and start your project early.

What advice would you like to give to future participants? (I worked: 18-20 timmar/vecka)
Choose project group visely

Is there anything else you would like to add?

Is there anything else you would like to add? (I worked: 6-8 timmar/vecka)
Nothing else

SPECIFIC QUESTIONS

Arbetsinsatsen var jämfördelad under kurstiden

Arbetsinsatsen var jämfördelad under kurstiden
Yes
Yes.
Towards the end of the course the work load increased due to the project.
Yes
Very unbalanced towards the end due to lab 3.
Yeah
Totally agree.

Laborationerna hjälpte mig förstå de teoretiska aspekterna

Laborationerna hjälpte mig förstå de teoretiska aspekterna
Yes
Yes.
I think this is partially true. Often, it wasn't necessary to understand the full theoretical reasoning in order to implement and pass the labs.
Yes
True
Yeah
Of course, I learn a lot during lab sessions.

Informtationsflödet i Canvas var tidsenlig och användbar

Informtationsflödet i Canvas var tidsenlig och användbar
Kind of
Yes.
Yes
I was waiting a few days for an answer to a specific problem. Maybe the discussion board should be checked more frequenty.
Yeah
Yes

Beräkningsresurserna var adekvat (PDC/GCP/AWS)

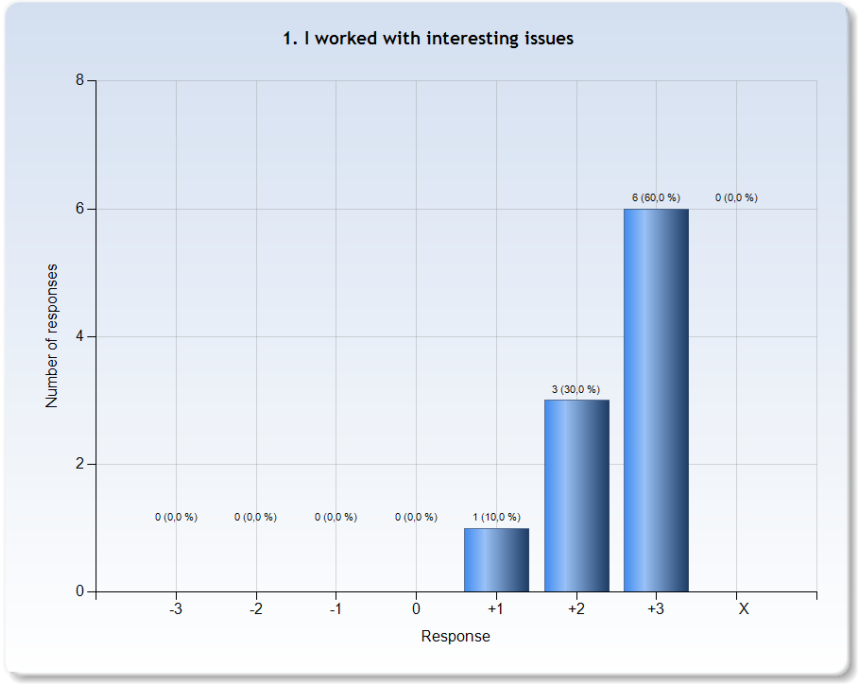
Beräkningsresurserna var adekvat (PDC/GCP/AWS)
Don't know
Yes.
We used the Google credits for our project which were sufficient.
Yes
Yes but how to use these could maybe be explained in little more detail and not so much how to register for them.
Yeah
I only used GCP. And there are some minor mistakes in the GCP guide.

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



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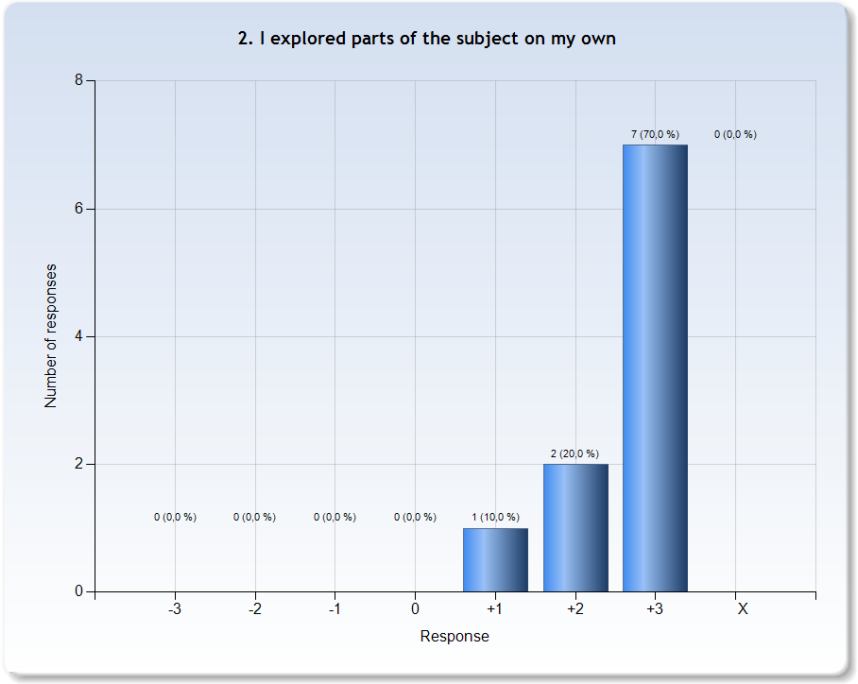

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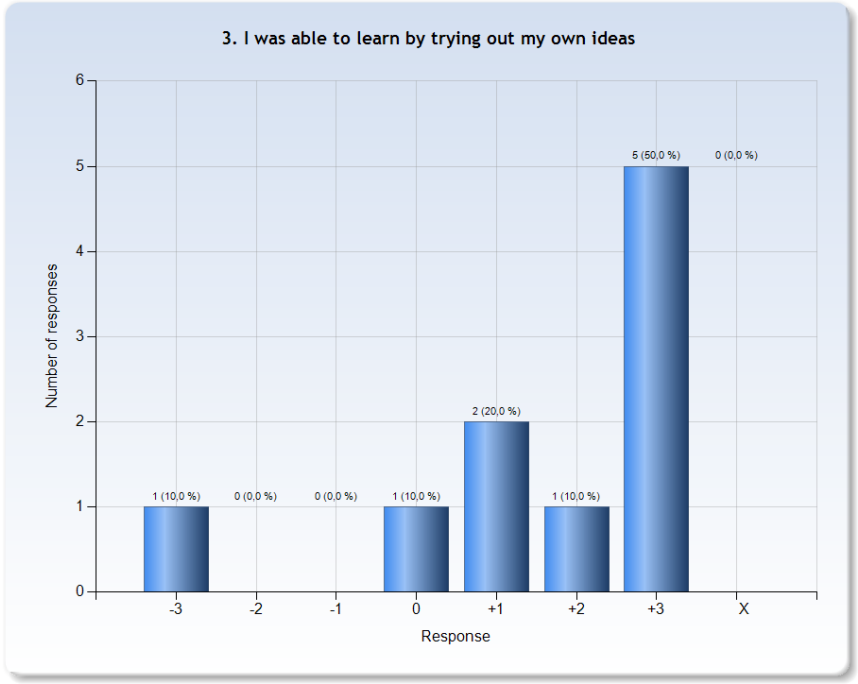

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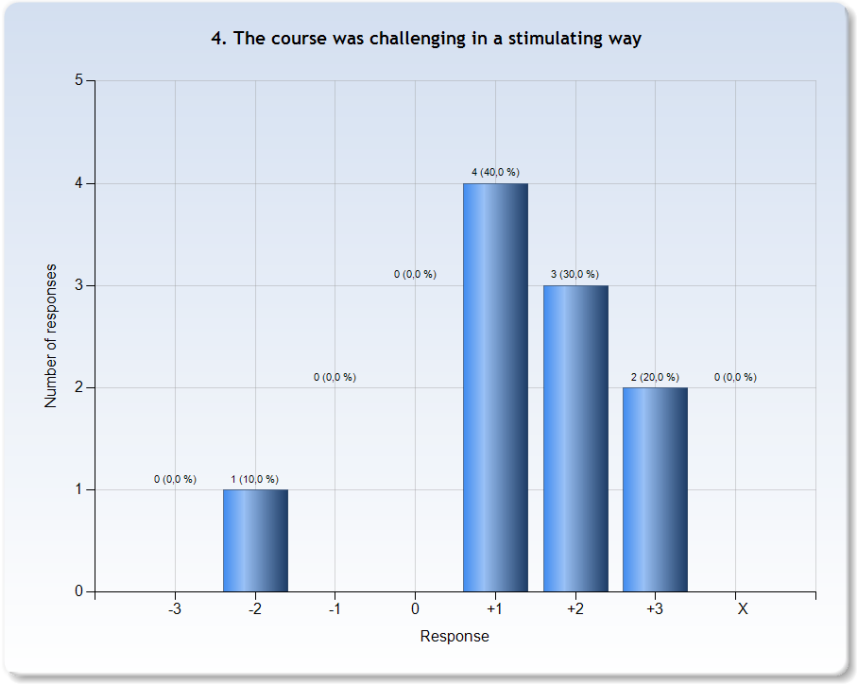
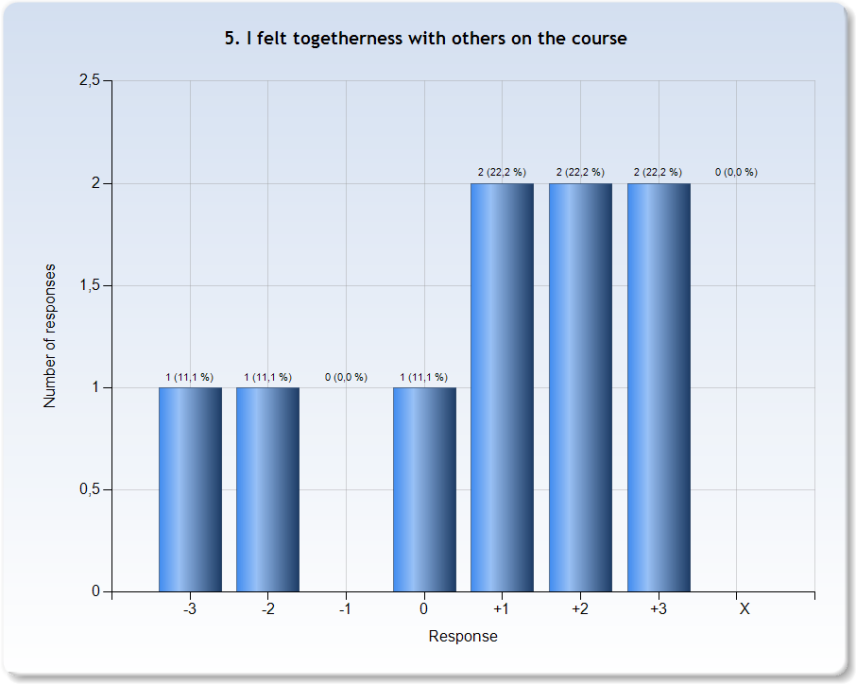


Comments

Comments (My response was: -2)

Some lectures were tedious, the labs were fine



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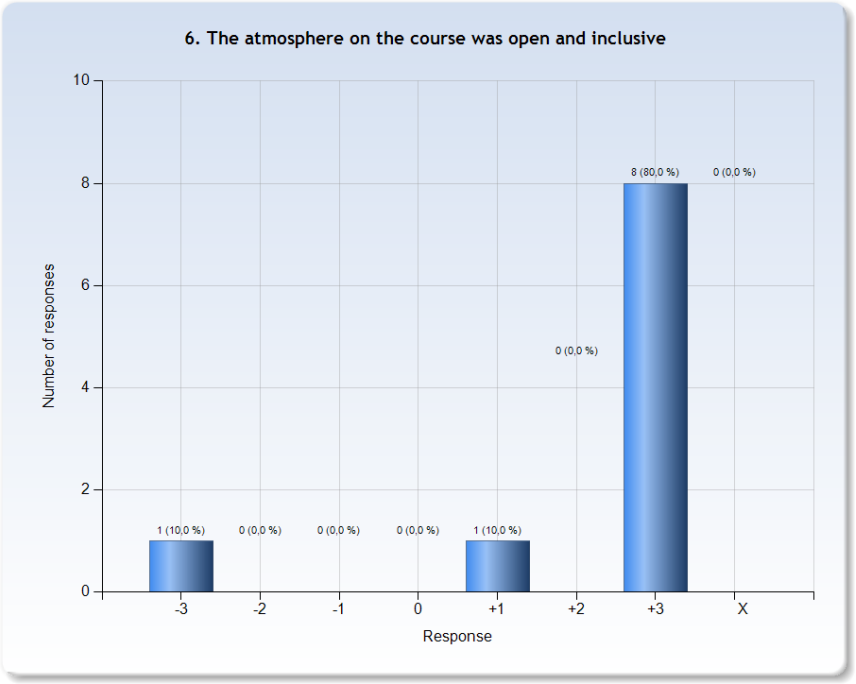
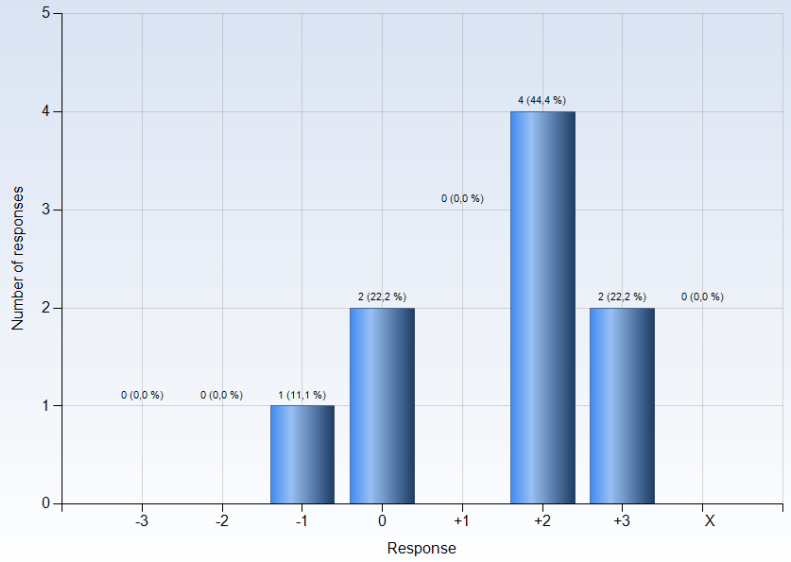


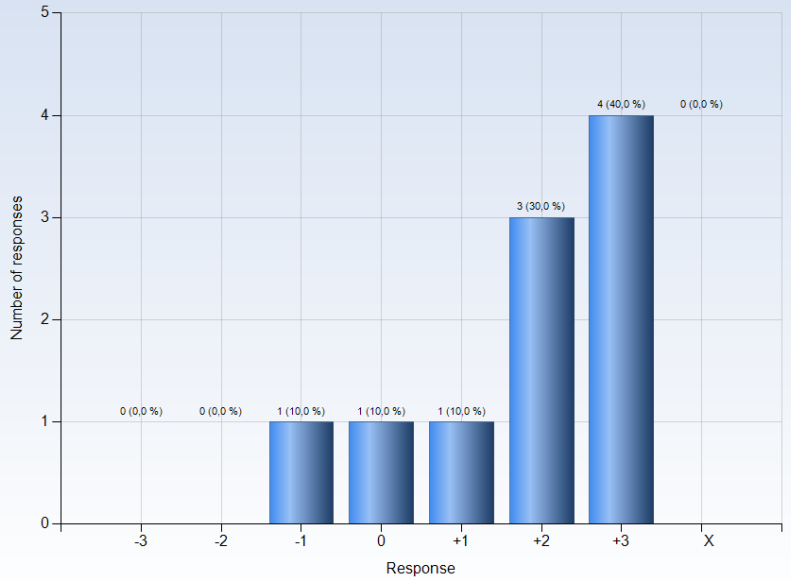
Comments

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



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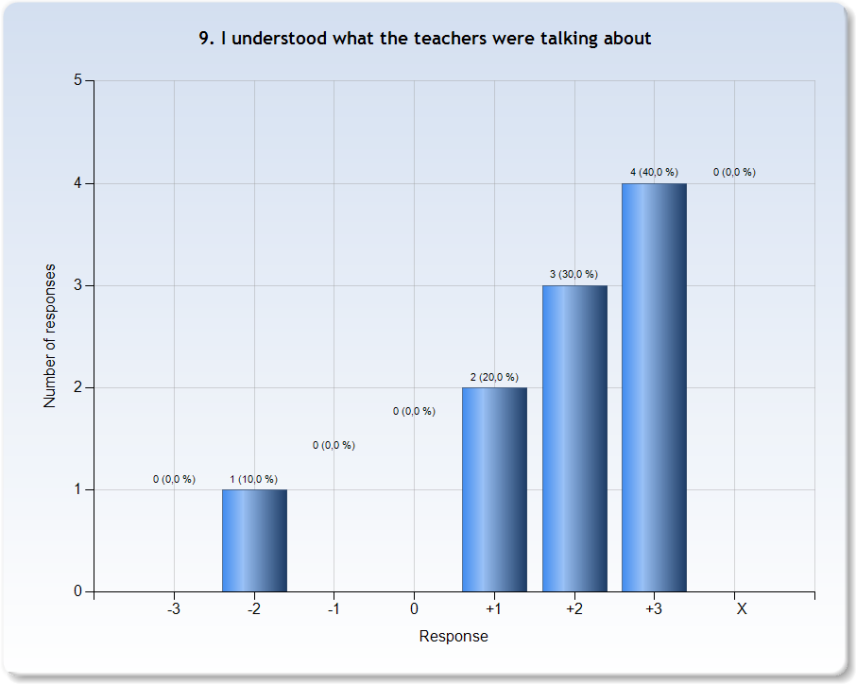

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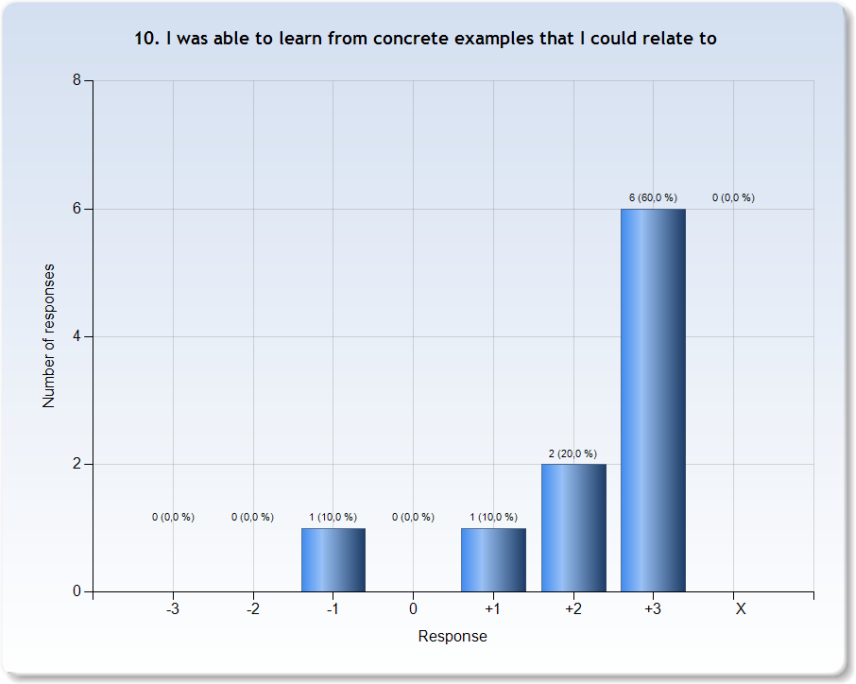

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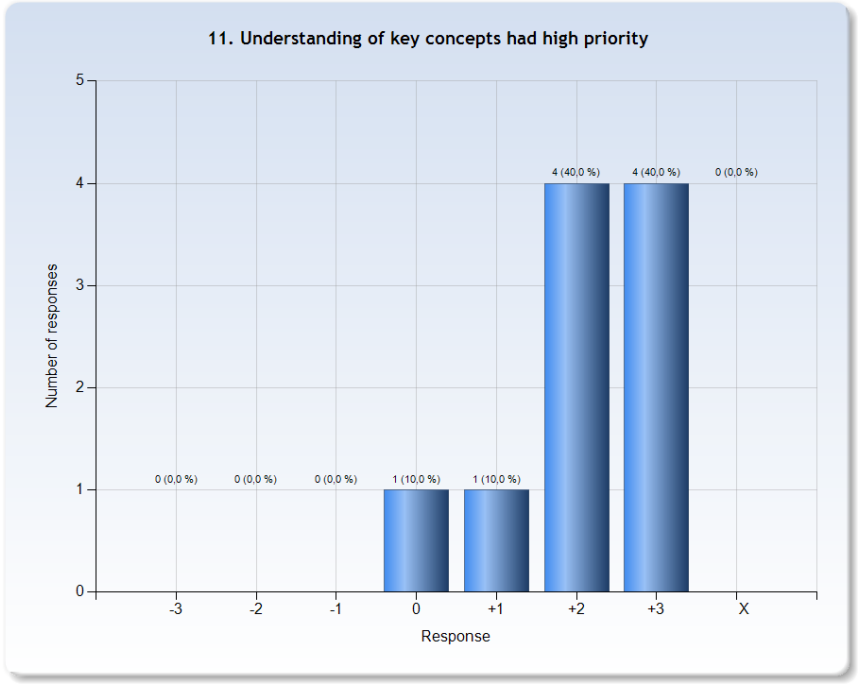
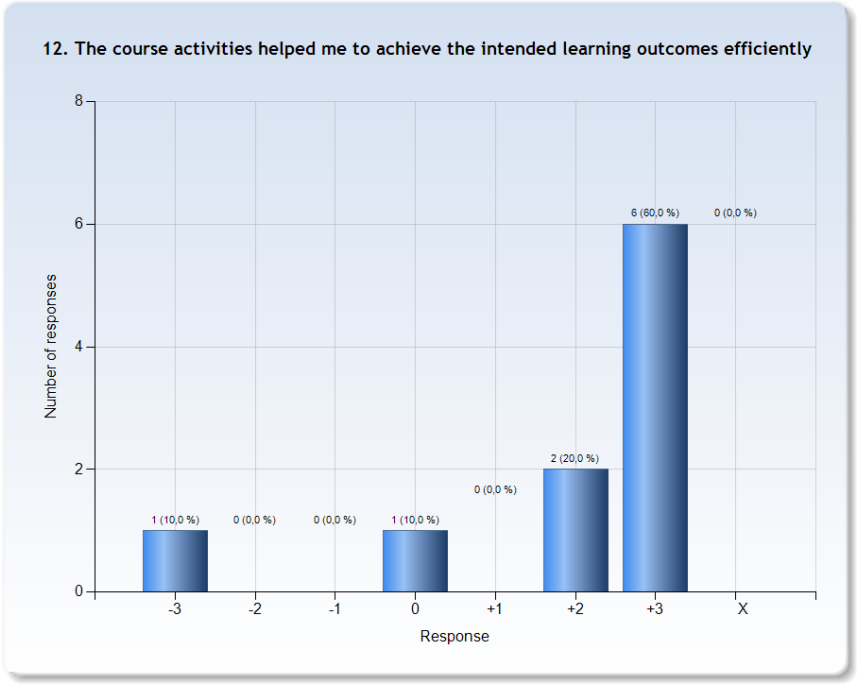


Comments

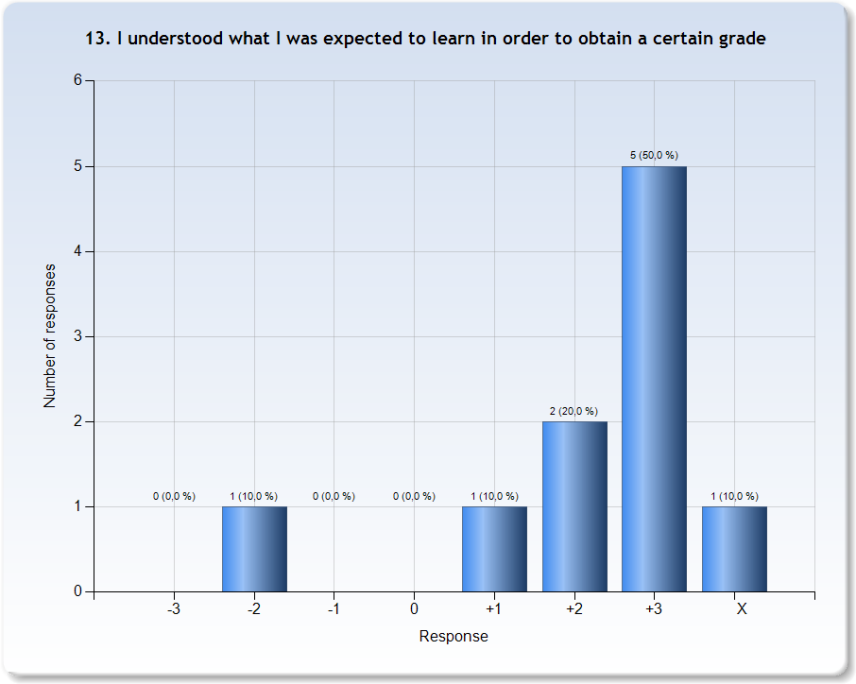
Comments (My response was: +1)

I think it would've helped me to learn the (theoretical) key concepts if there had been more incentives to do so, e.g. little tests or even an exam.



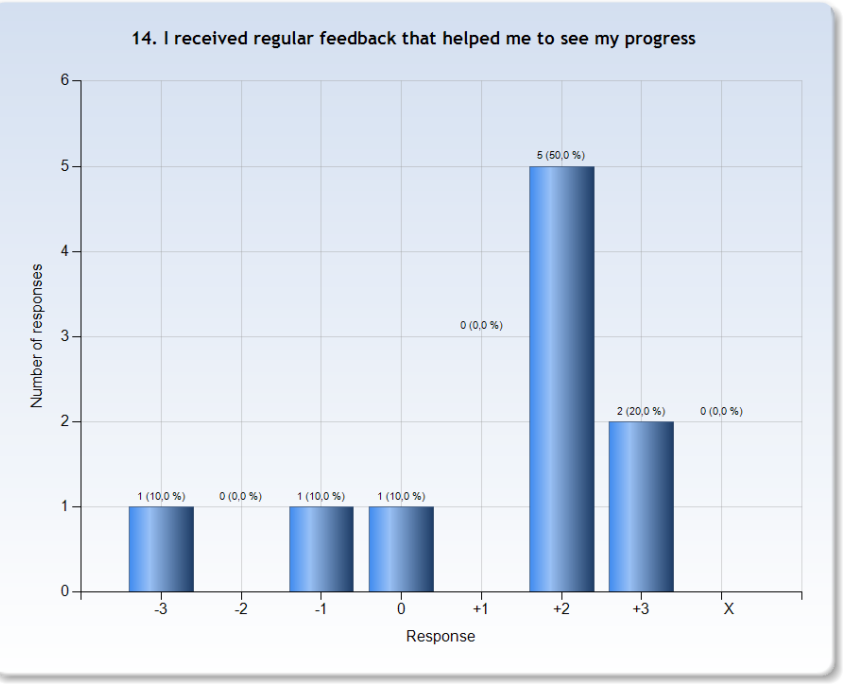
Comments

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



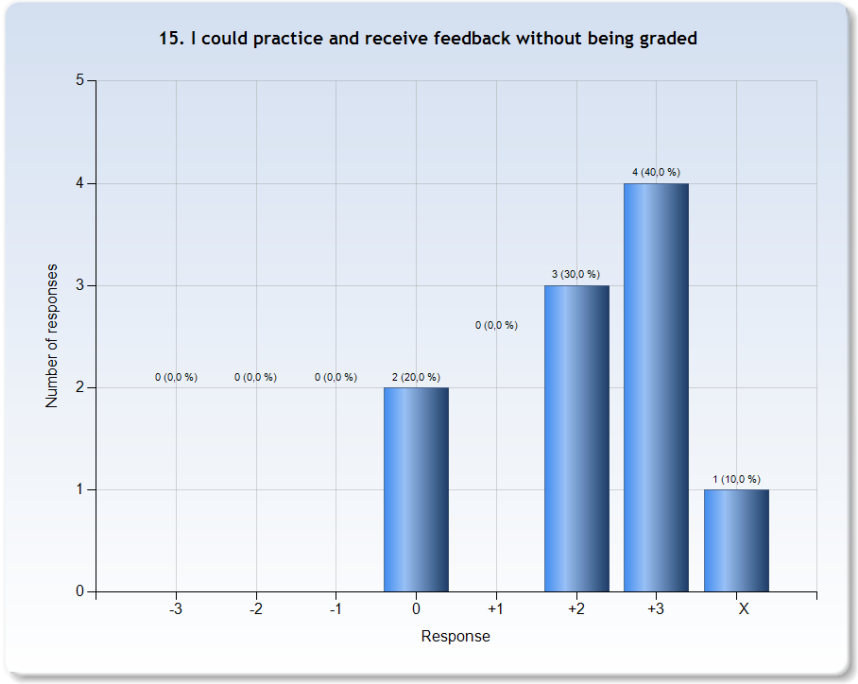
Comments

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



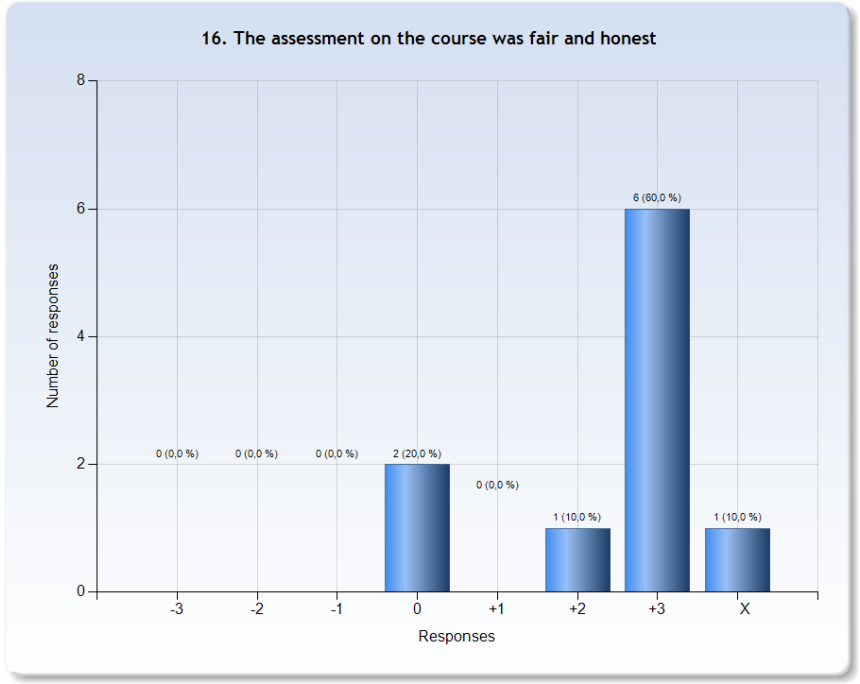
Comments

Comments (My response was: +2)
The lab sessions



Comments

Comments (My response was: +3)
Lab sessions



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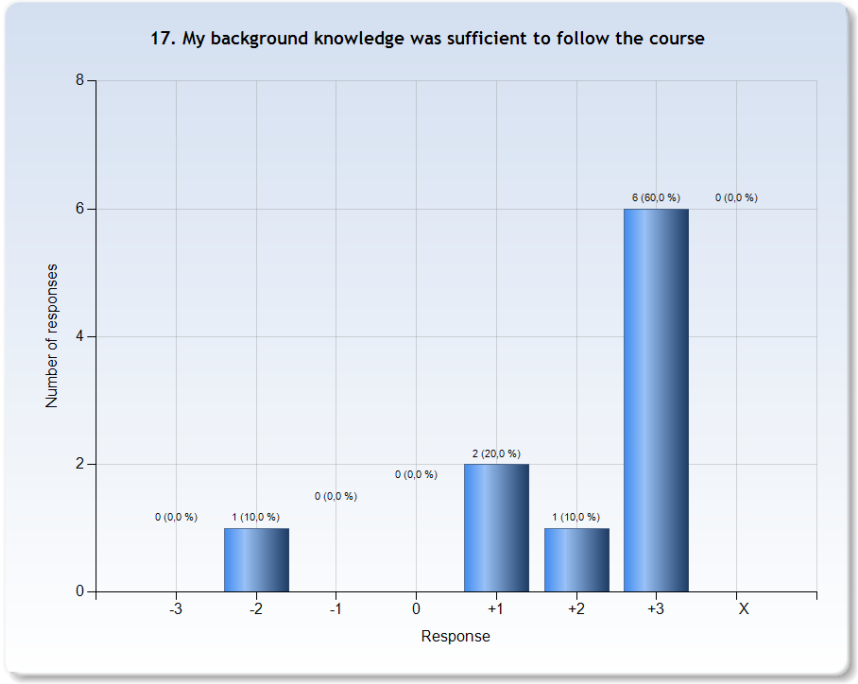

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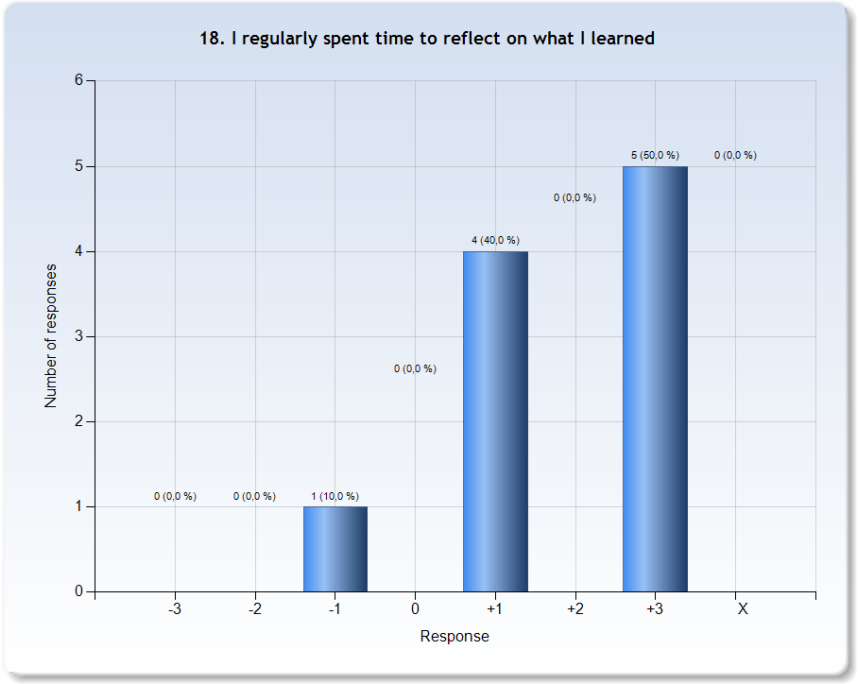

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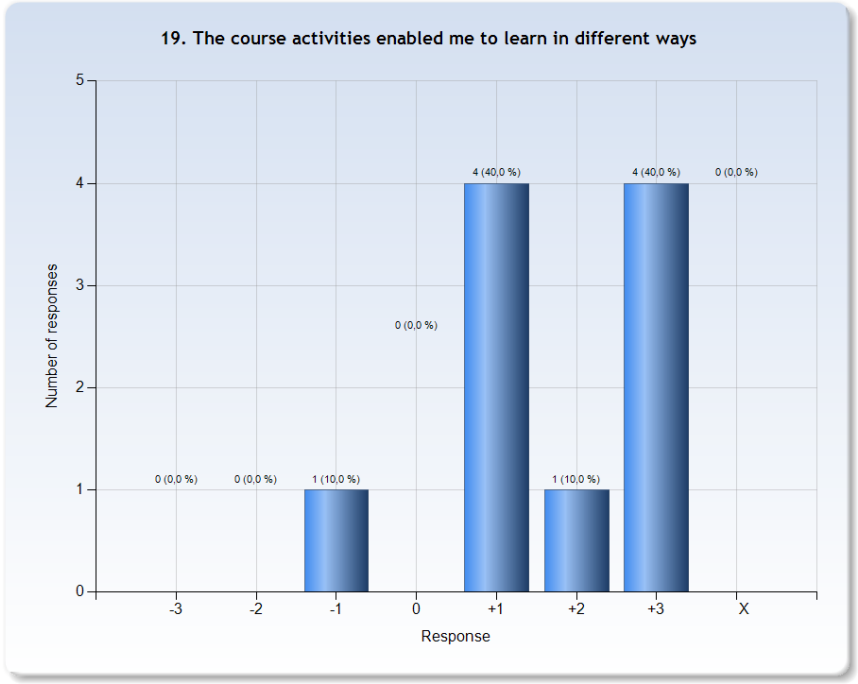

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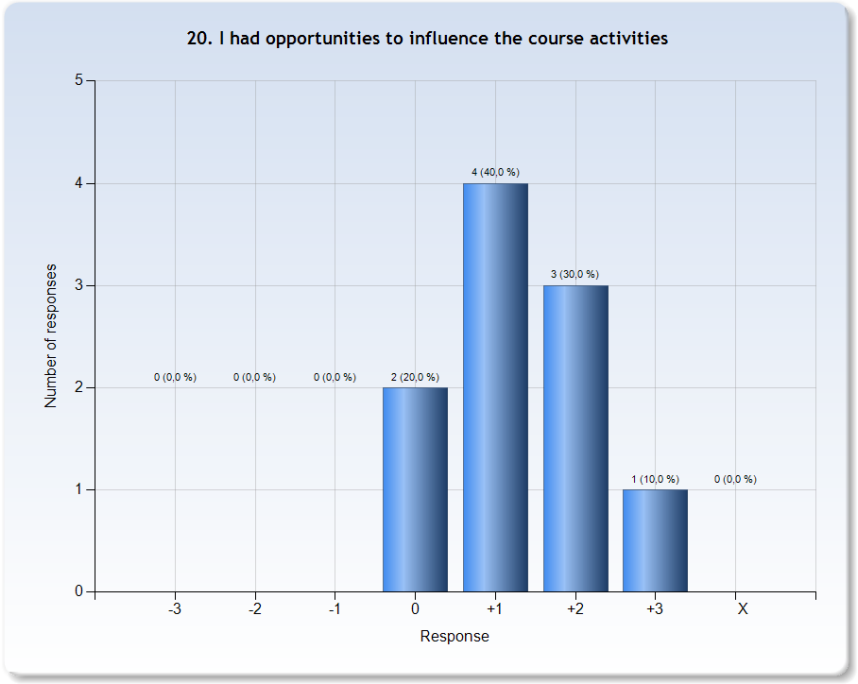
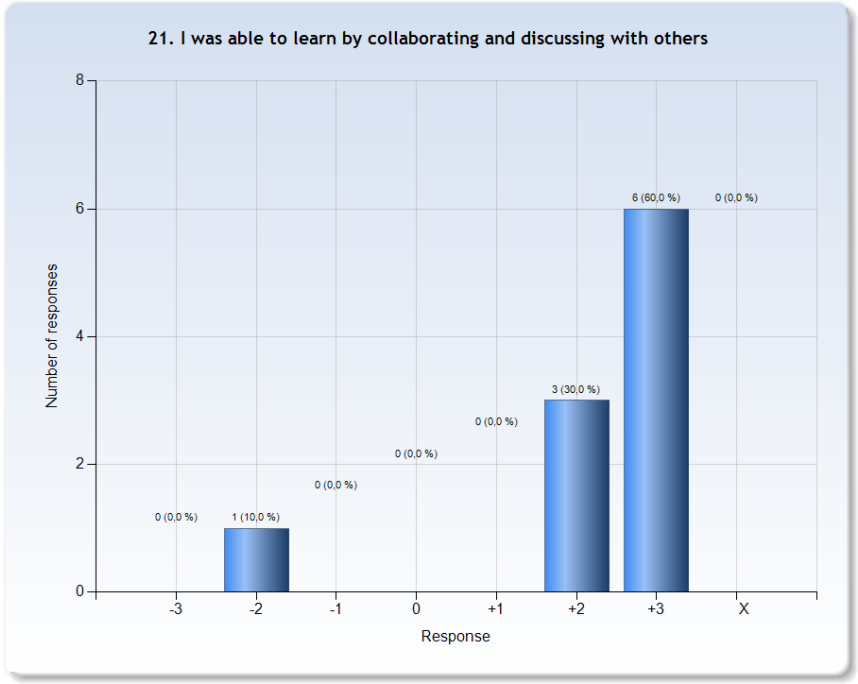


Comments

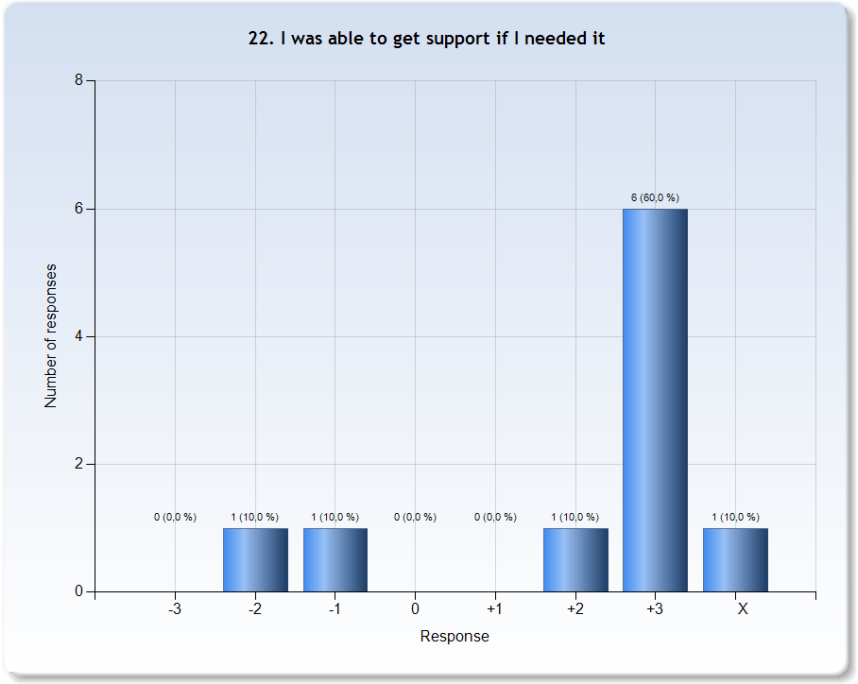
Comments (My response was: +3)

Free choice of the topic for the final project



Comments

Comments (My response was: +3)
Mostly during the project



Comments