KTH Computer Science and Communication

DT2119: Speech and Speaker Recognition
Course Analysis VT2017

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 VT2017 the course consisted of 12 lectures, 3 computer labs each evaluated with oral presentation and a final project evaluated with a written report, peer review and a poster session. The main differences with previous years (DT2118, VT2016) were the following:

- the course has now A-F grades for PRO1 and for the final grade.
- grading criteria have been consequently developed.
- one more lecture was introduced to expand on deep neural networks and signal processing
- the course material was managed through Canvas and the forum function was extensively used to communicate with the students
- the computer labs are evaluated orally by the teaching assistants. This allows for better assessment also considering that the students work in groups and the TAs could make sure that all members of each group had understood the material.
- one quiz was introduced using Canvas functionality to cover speech production.
- the third lab was improved, but is still based on pre made software packages

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?

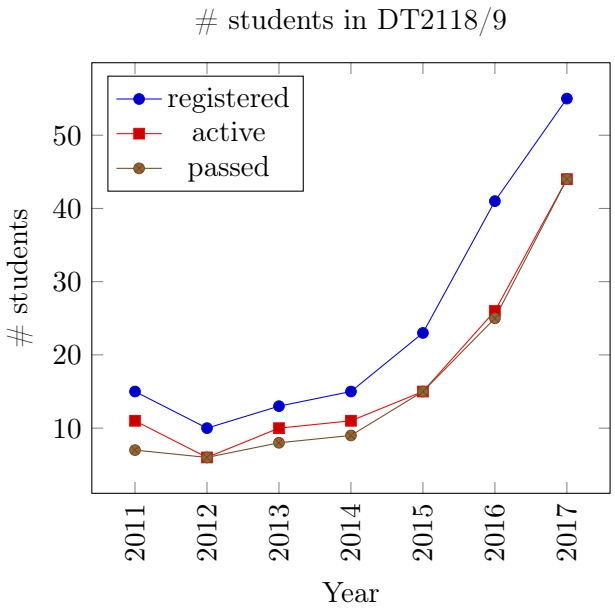
The students who participated in this course belonged to eight different programs (CDATE, CINTE, CMIEL, D, TMAIM, TMETM, TMLEM, TSCRM) and had, therefore different backgrounds. Consequently, the workload exhibits large variations, ranging from 3-5 hours/week (one student) to 30-32 hours/week for another. The average of the students answering the survey was 11.6-13.6 hours/week which is a low compared to the 40 hours/1.5 credits, that would correspond to 20 hours/week. Some commented that much of the time went into lab 3 that was more time

consuming than the other labs. I plan to redesign this lab and make it more pedagogically interesting. I am also planning to add some more assessment activities in order to test the students on some of the topics that are not included in the labs or projects. One example is by defining more quizzes, but I am also considering to add a fourth lab, given that the reported work load is not high.

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 who registered to the course (source Canvas). Of them, 44 were active during the course and passed the course at the end. This is a significant increase compared to previous years following a general trend. The figure below shows the evolution of registered, active and successful students in recent years. Note that the course code in the past years was DT2118, and the final grade P/F. The change in grading system can have contributed to the increase of students, but the trend was already present before which implies that it was the continuous development of the course that is responsible for its success or a general increase in interest in machine learning related courses.



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 15 students out of 55 responded to the survey. The overall impression is that the students highly enjoyed the course and found it stimulating (Q1=6.1). They find the course challenging but also rewarding (Q4.8). They enjoy the possibility to choose what to work on (Q20=6.5) and to learn by trying own ideas (Q3=5.8). They find the activities aligned (Q12=5.6, Q13=5.1), and the organisation seems to work well (Q7=5.1, Q8=5.5).

The lowest score is on Q14=4.4 ("I received regular feedback that helped me to see my progress"). Although this is not a low score, if resources are available, I plan to define regular meetings with the students during the project to check their progress.

The only subgroups identified by the survey system are men vs all and international vs Swedish students. In the first case, the result for men is very close to the total, which may mean that there were too few answers from women. However, the results for men are slightly lower than for the total, implying that the few women who responded gave higher scores than the men. For the second case, there is more variation. However, considering that each group has very few members, it is hard to draw conclusions. Perhaps it is interesting to note the 3.3 score on Q13 ("I understood what I was expected to learn in order to obtain a certain grade") by the international students. I am planning to improve on the grading criteria.

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 even further is the feedback and definition of grading criteria. Also this year, the students did not find the course as challenging as previous years. This might depend on the background of students who participated that is shifting more towards machine learning than in the past. If this is true, it should be possible to design more challenging tasks for next years.

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. Students seem to like different aspects in the course. Some like the labs, others the possibility to work on a topic they choose, others are just interested in speech recognition. Positive feedback is also given to the lectures that seem to be informative and worth to attend.

Some of the suggestions for improvement are very specific, for example some parts of the labs. Many suggest to improve lab 3. Also, the computational resources at the Parallel Data Centre seem to be hard to work with and we should be improved or we should find alternatives.

PRIORITY COURSE DEVELOPMENT

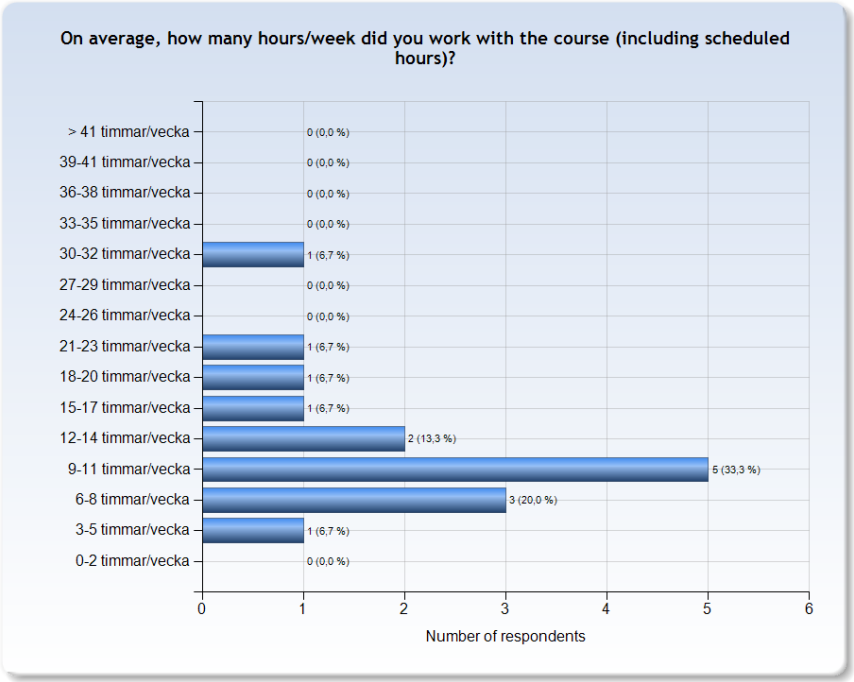
What aspects of the course should primarily be developed? How could these aspects be developed in the short or long term?

The highest priority is to re-design lab 3, so to allow the students to implement the methods instead of running pre-defined software packages. Also, the grading criteria should be improved to make it clear what the students need to do to achieve a certain grade. Discussions should be initiated with PDC in order to facilitate the access to computational resources for students. Minor changes should be done to lab 1 and 2 to improve the pedagogical aspects.

DT2119 - 2017-06-21

Antal respondenter: 53
Antal svar: 15
Svarsfrekvens: 28,30 %

ESTIMATED WORKLOAD



Comments

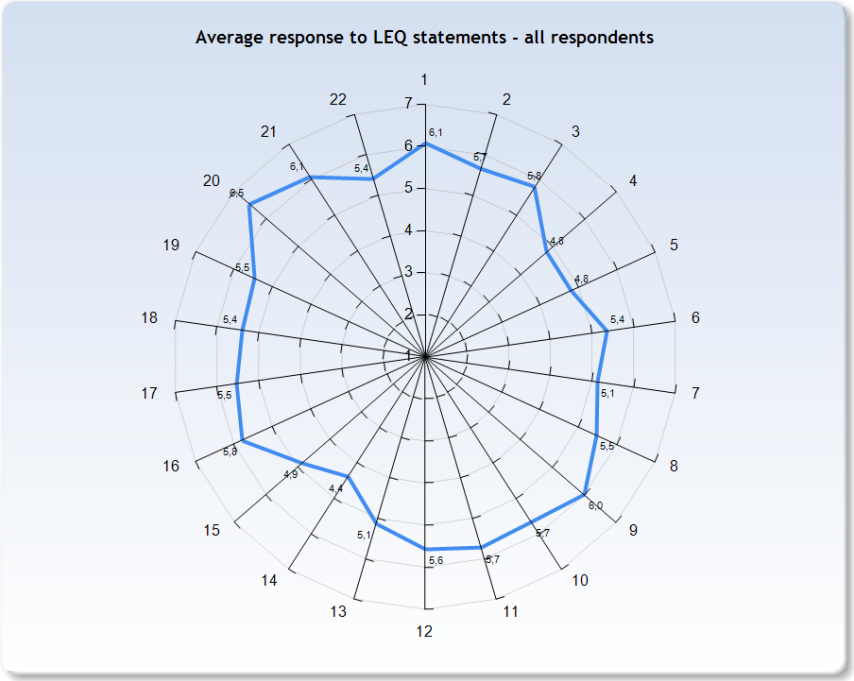
Comments (I worked: 15-17 timmar/vecka)
Most work done concerns the labs / project. Especially lab 3 was very time consuming.

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.

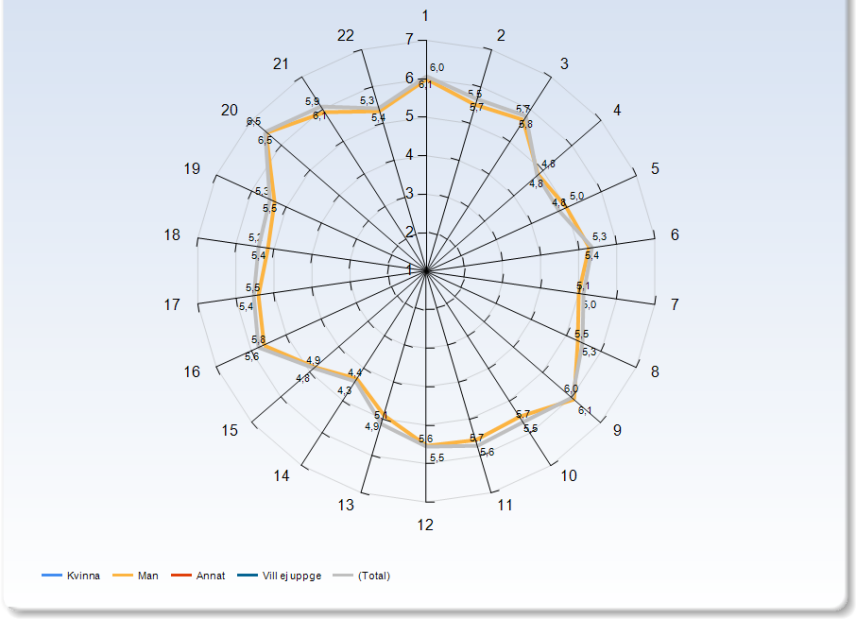
Biggs J. & Tang, C. (2011). *Teaching for Quality Learning at University*, Chapter 6, pp. 95-110. Maidenhead: McGraw Hill.

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.

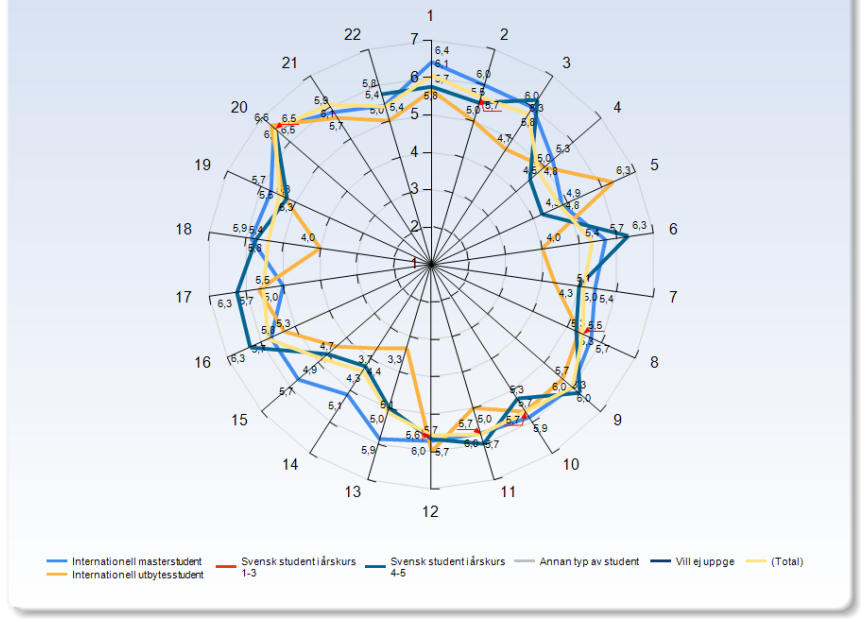
Average response to LEQ statements - per gender



Comments

Comments (I am: Vill ej uppge)
I you really want this to be anonymous and untraceable, providing this information is counterproductive

Average response to LEQ statements - per type of student



Comments

Comments (I am: Internationell masterstudent)
Master systems, control and robotics.

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 project

What was the best aspect of the course? (I worked: 6-8 timmar/vecka)
Doing an open project related to speech and speaker recognition.

What was the best aspect of the course? (I worked: 9-11 timmar/vecka)
Very interesting subject matter
Experimenting many different machine learning methods
The best aspect of the course is that it gives you both a good introduction on how to handle temporal data/signals in general as well as how to treat speech data in particular. The lecturer and the lectures were good!

What was the best aspect of the course? (I worked: 12-14 timmar/vecka)
Being able to work with speech

What was the best aspect of the course? (I worked: 15-17 timmar/vecka)
Labs 1 and 2 were interesting.

What was the best aspect of the course? (I worked: 21-23 timmar/vecka)
The best aspect I think was the poster presentation. At the poster presentation day, we appreciated so many great and various projects that were done by other students.

What would you suggest to improve?

What would you suggest to improve? (I worked: 3-5 timmar/vecka)
Resources in PDC: it was impossible to work with The general aspect of the lectures: less theoretical and more practical. More detail.
The extra points in the labs are worthless? More discussion about the project topics

What would you suggest to improve? (I worked: 6-8 timmar/vecka)
Instruction for the 3rd lab, and a wider introduction to ANNs and DNNs.

What would you suggest to improve? (I worked: 9-11 timmar/vecka)
I think the project at the end felt a bit rushed. I would suggest to maybe reduce the scope a bit or allow more time for it, and only allow experiments and remove literature studies completely.
Sometimes the results of the labs were weird, the second lab for example gave the GMM model better than the HMM model... we would have expected the contrary.
Sometimes it felt like some lectures were not very relevant for the course work. This always necessary a bad thing - you cannot always have labs/exercises on everything and sometimes it is good to just give some introductory information. However, maybe I had this feeling a bit too often in the course.
I think it would be good if there were a bit more concrete questions that the course participants would need to answer for the labs. As it is now the labs are good and you really feel like you are actually implementing simple ASR systems. However, since the lab instructions were very guiding, some extra questions would be good.

What would you suggest to improve? (I worked: 12-14 timmar/vecka)
It's a bit hard to choose the project topic given that I didn't have any prior experience with speech recognition. Although having a project is a good idea, more guidance during project topic choice would probably be nice.

What would you suggest to improve? (I worked: 15-17 timmar/vecka)
I think lab 3 was poorly designed. For non informaticians, a lot of commands were not explicited enough. As a result, we spent several hours trying to send data to PDC or have things in the good format. So we spent 10% of the time we dedicated to the lab on the real problems (understanding how to use deep learning for speech recognition). I was disappointed about that.

What would you suggest to improve? (I worked: 21-23 timmar/vecka)
It would be nice if more speech recognition tools are available in PDC.

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)
If the course keeps the same, you should research on your own and expect nothing from the professor (really busy)

What advice would you like to give to future participants? (I worked: 6-8 timmar/vecka)
Wide foundations on machine learning are needed.

What advice would you like to give to future participants? (I worked: 9-11 timmar/vecka)
get involved in the project from the beginning, dont try to implement everything yourself, use libraries.
Revise the contents of each lecture and really think through what you are doing in the lab assignments.

What advice would you like to give to future participants? (I worked: 12-14 timmar/vecka)
Start thinking about the project topic during the first lecture already :)

What advice would you like to give to future participants? (I worked: 15-17 timmar/vecka)
Help each other for the parts of the lab that don't concern directly the problem. There is no need to spend 5 hours because of an error in a command line when the neighbor group has the answer and can save you some time.

What advice would you like to give to future participants? (I worked: 21-23 timmar/vecka)
learn some signal processing in advance if you did not take any related course before.

Is there anything else you would like to add?

SPECIFIC QUESTIONS

Was the workload equally spread during the course round?

Was the workload equally spread during the course round?
It seemed so.
It was fairly balanced, yeah
no, rush for the final project and last lab took une a very long time.
No, the work load was a lot more important at the end (lab 3 and project).
Yes.
Yes
There was quite much more work for the last lab and the project.
I guess, though the project workload is usually more demanding
From what I know most of the people started projects rather late in the period, so the biggest workload was at the end

Did the laboratories help me understand the theoretical aspects?

Did the laboratories help me understand the theoretical aspects?
A lot, the laboratories are quite useful to understand all concepts. But more explanations were needed about deep learning networks and concerning the instructions for the 3rd lab.
Yes
Yes they did
For lab 1 and 2 yes. For lab 3, i think i did not learn anything.
Yes. especially for the first two labs, I got a good understanding of signal processing.
Yes
Yes
Yes
Yes

Was the forum on Canvas active and useful?

Was the forum on Canvas active and useful?
Yes, quite a useful tool.
It helped, but I feel like they weren't as active as KTH social comments on other courses.
Yes it was helpful
Yes.
Yes. the forum was active and I could find the answer I needed in time.
I didn't use it, so I don't know
Yes
Not as much as I have liked
Yes

Was it useful to have access to the computational resources at PDC?

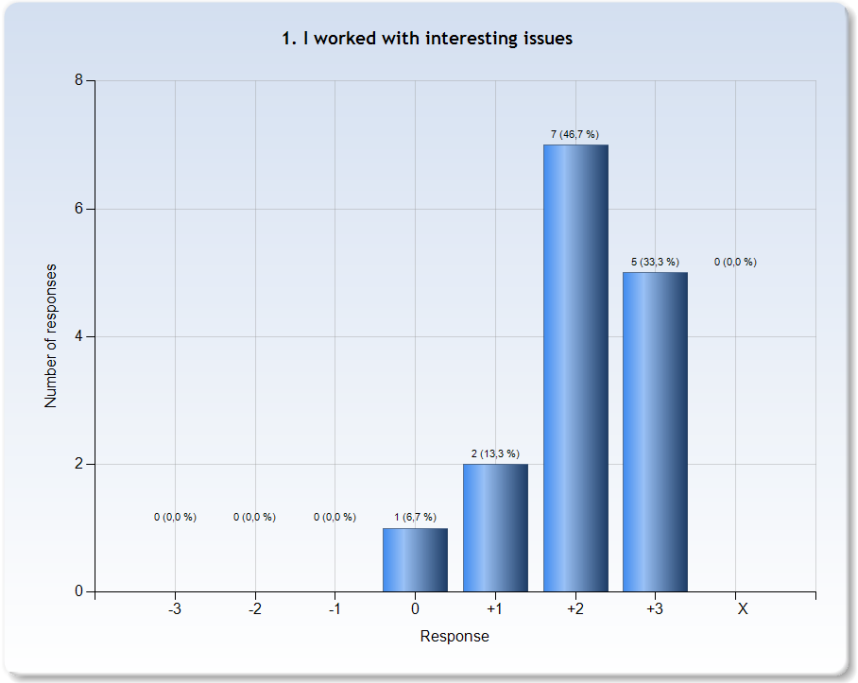
Was it useful to have access to the computational resources at PDC?
Yes, but it was really hard to get allocation during the project.
Yes
Yes but quite long to master how to interact with the PDC machines
Yes, although waiting 10 hours in front of a computer to obtain a ticket to access the resource is frustrating.
Yes. but we used AWS resource for the project because PDC resources were difficult to apply for sometimes.
Yes, very useful!
Yes
Yes and no. It would be useful if we could really work with it. Since there were no available nodes most of the time it was quite a pain to work with it.
Very

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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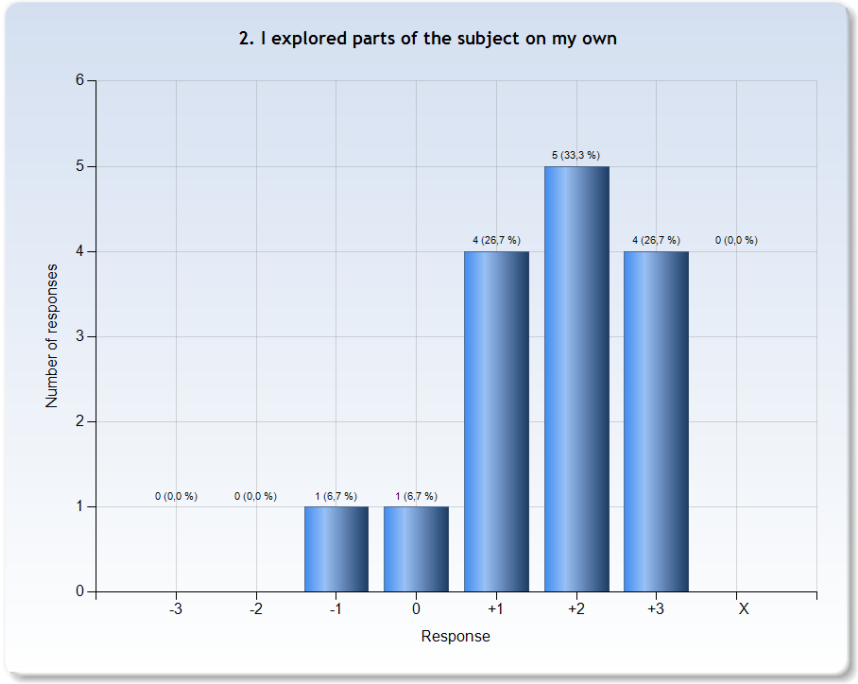

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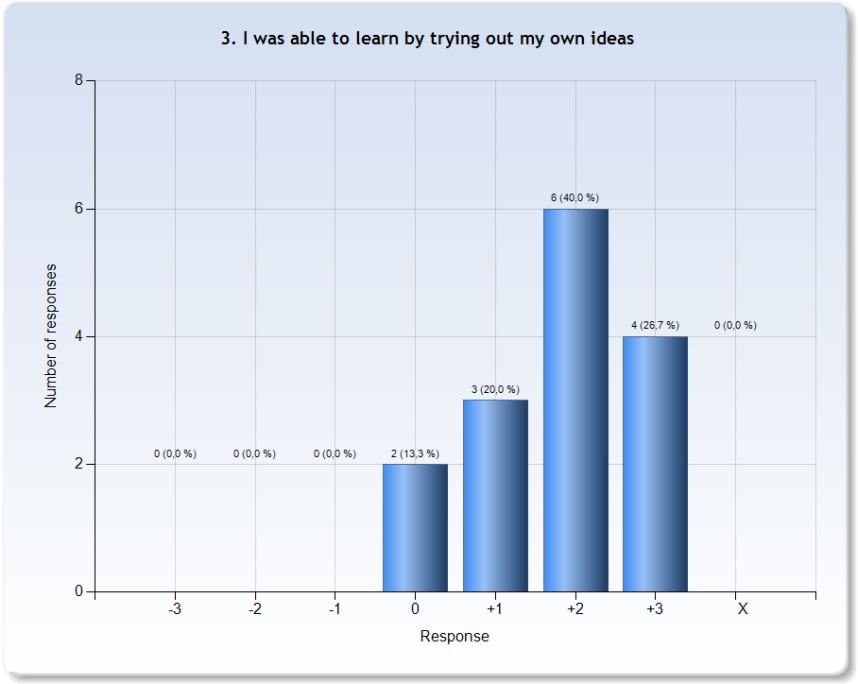

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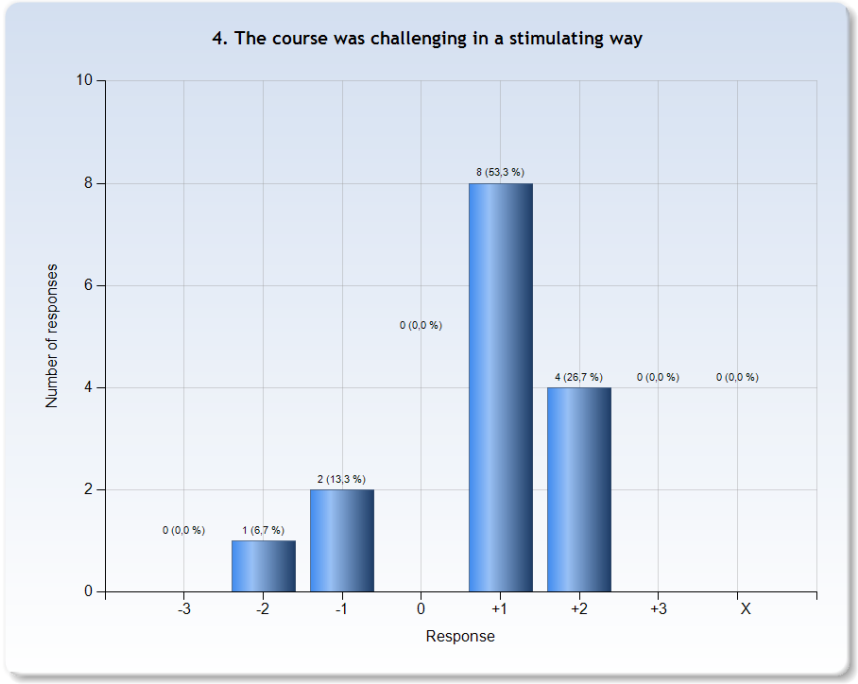

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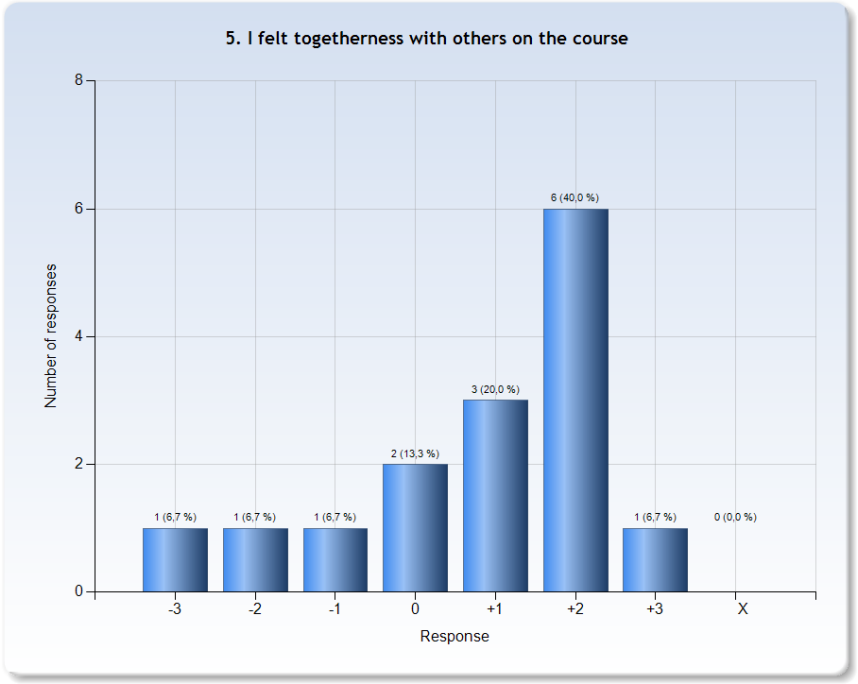

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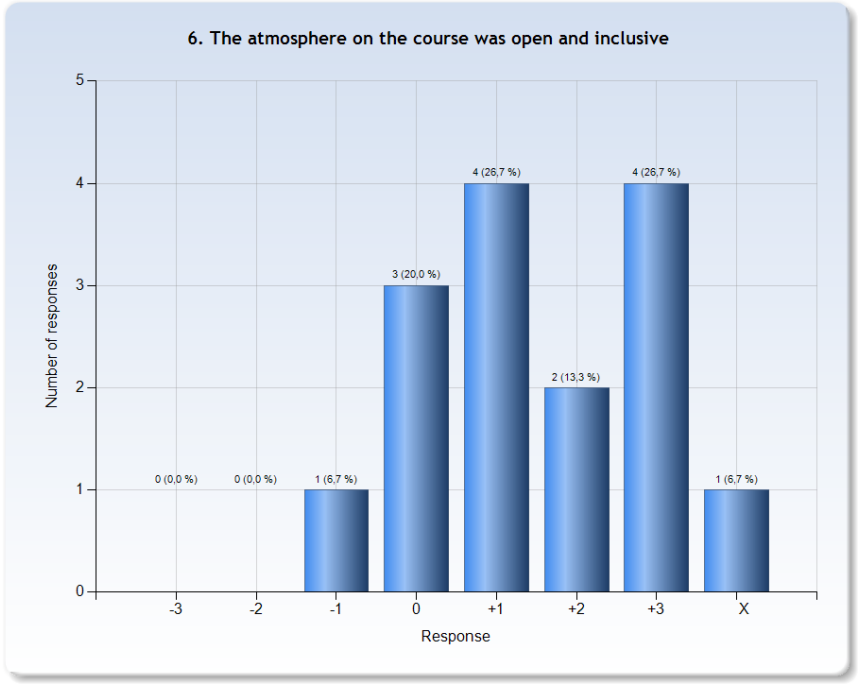

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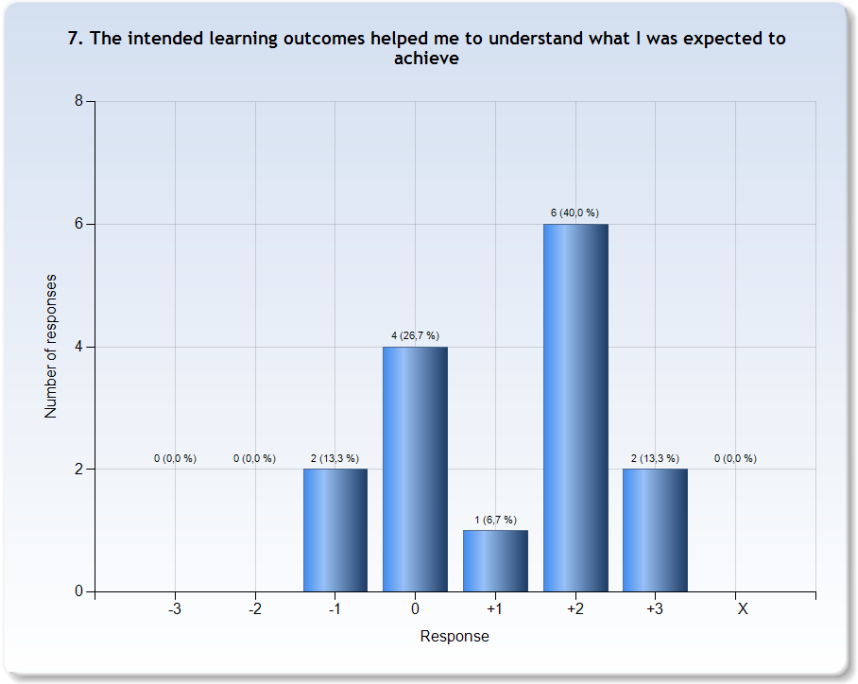

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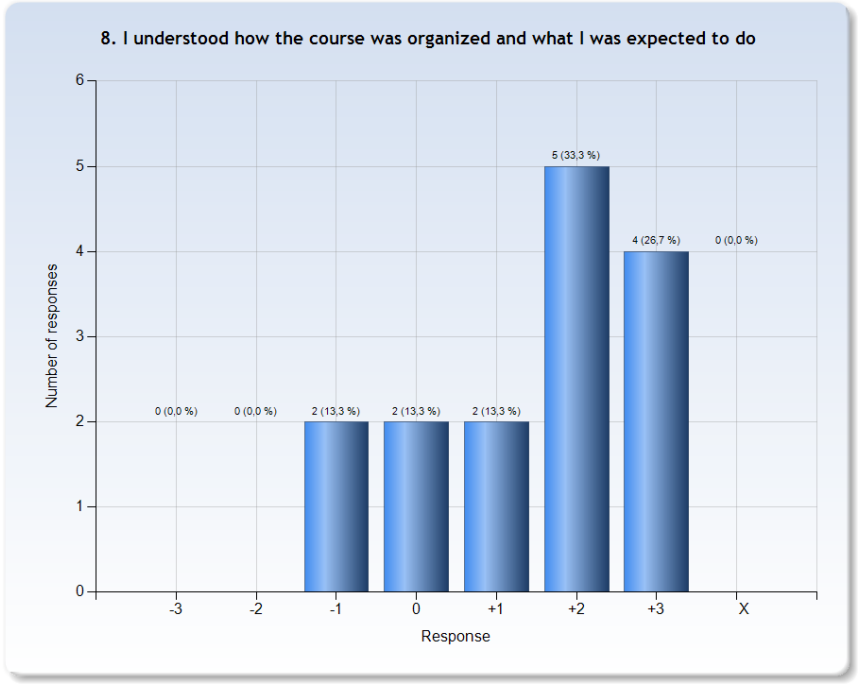

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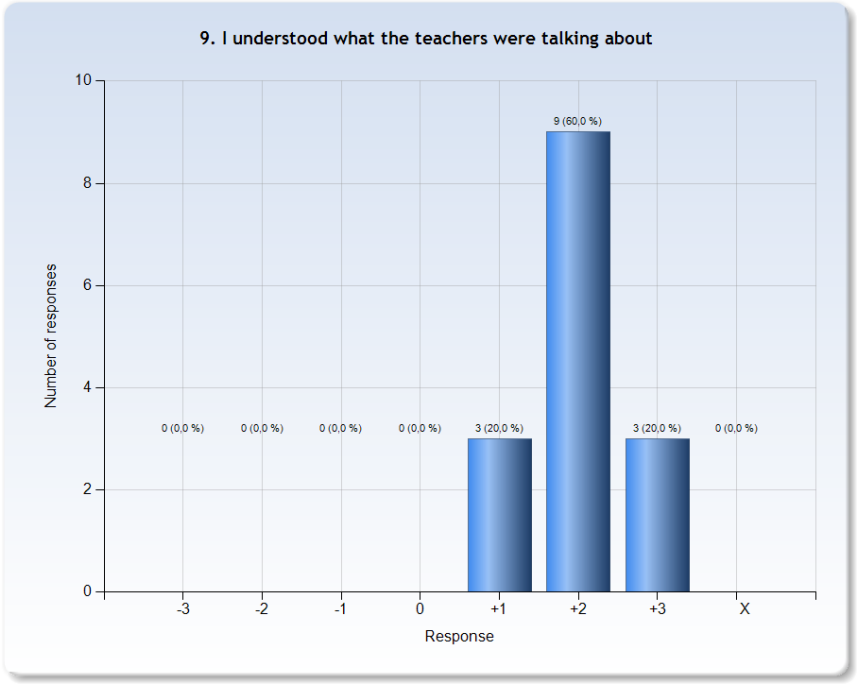

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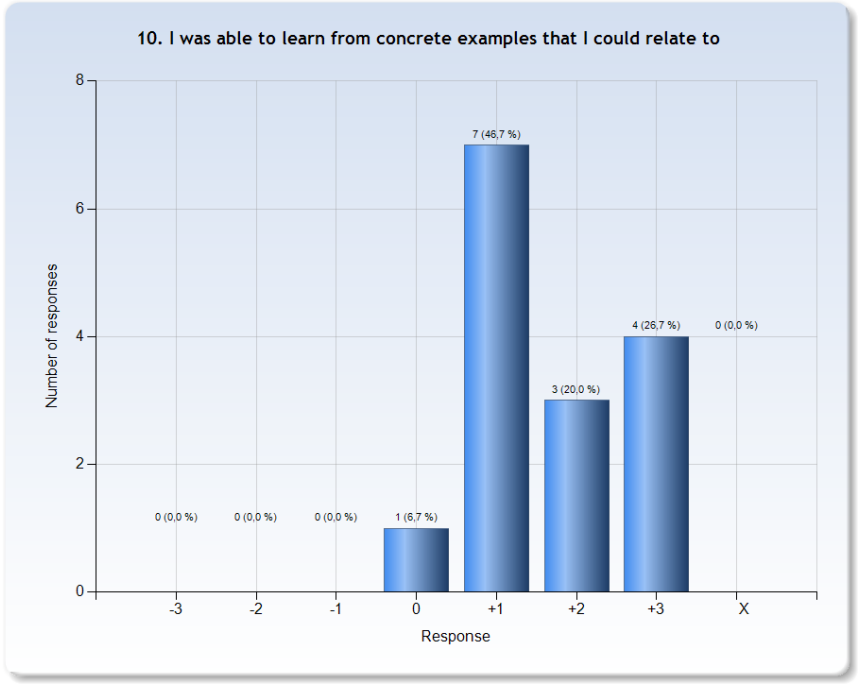

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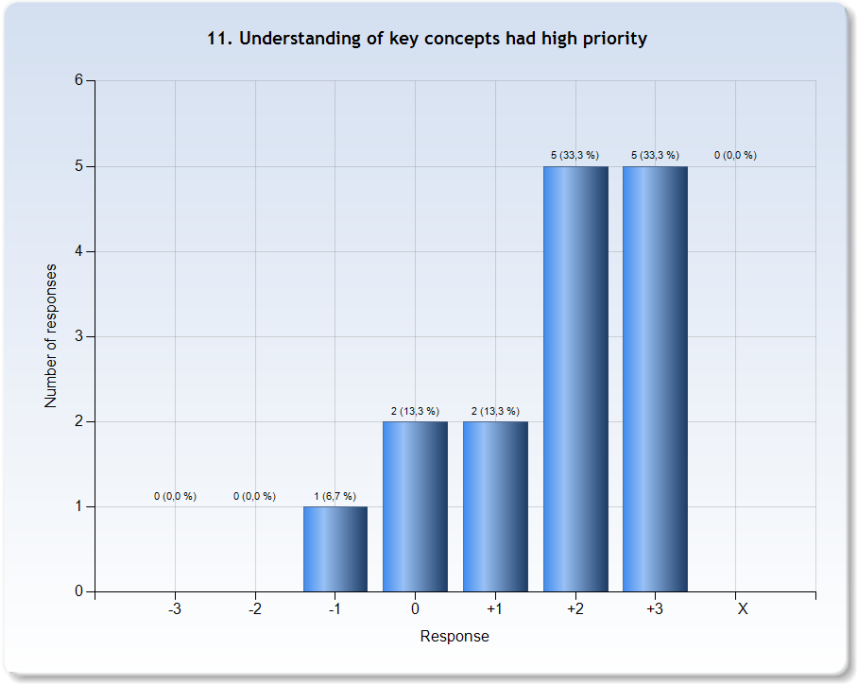
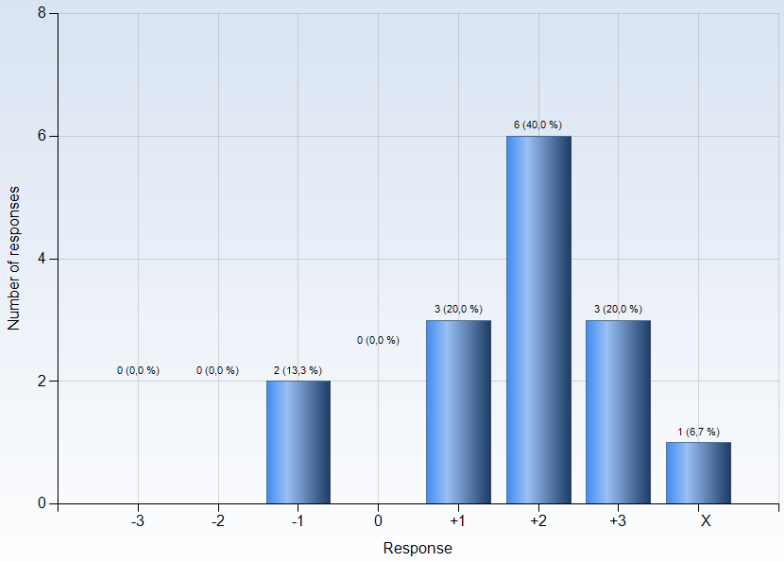


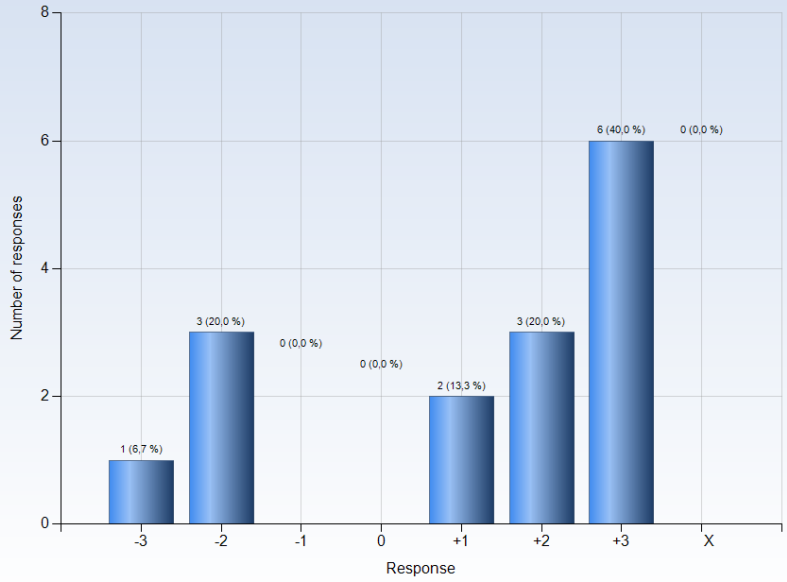
Comments

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



Comments

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



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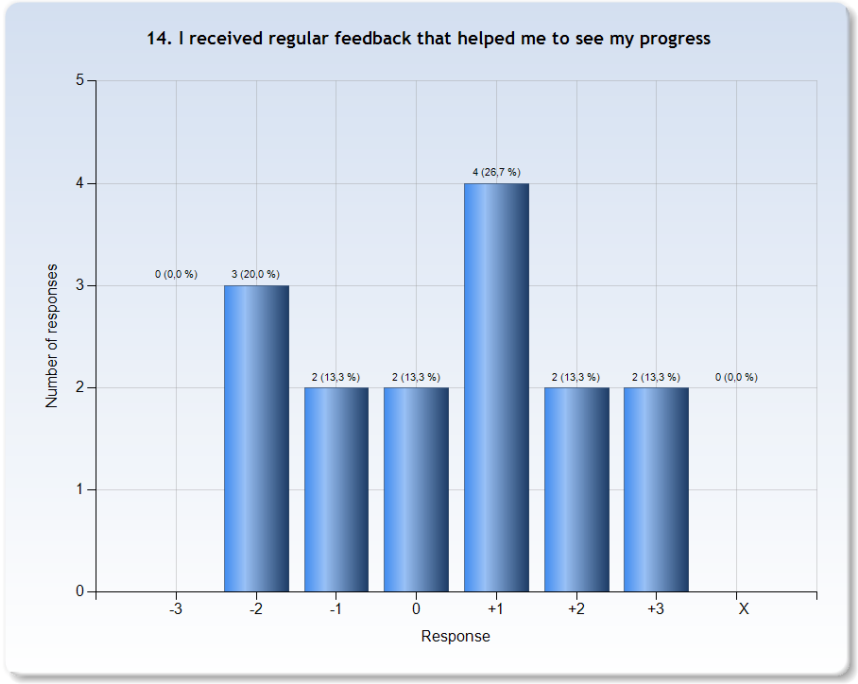

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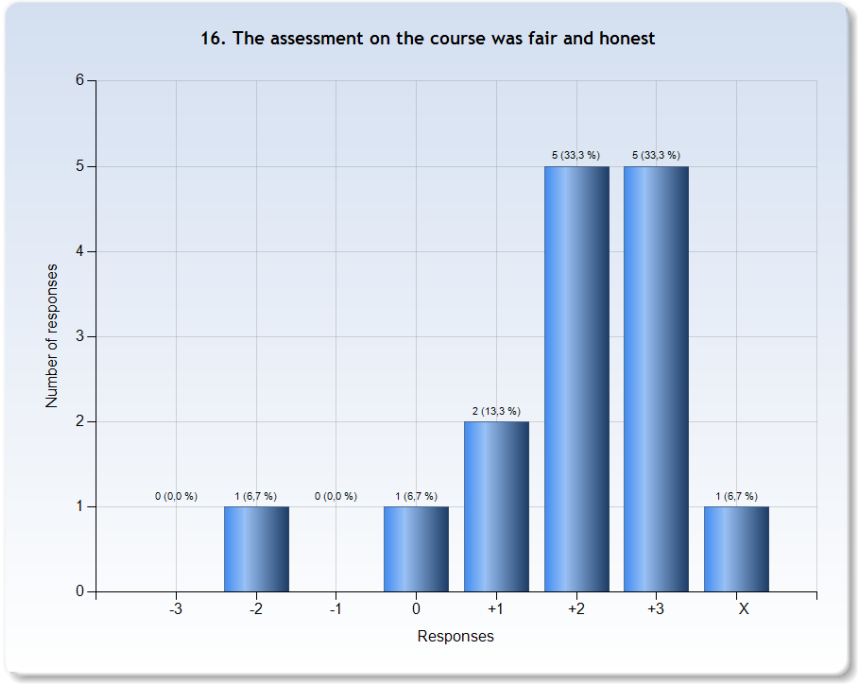

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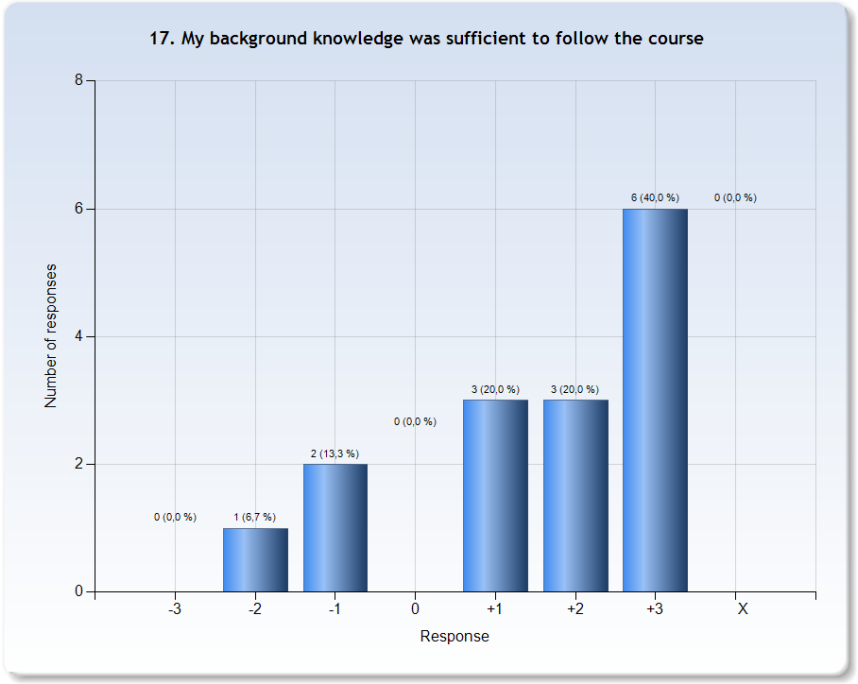


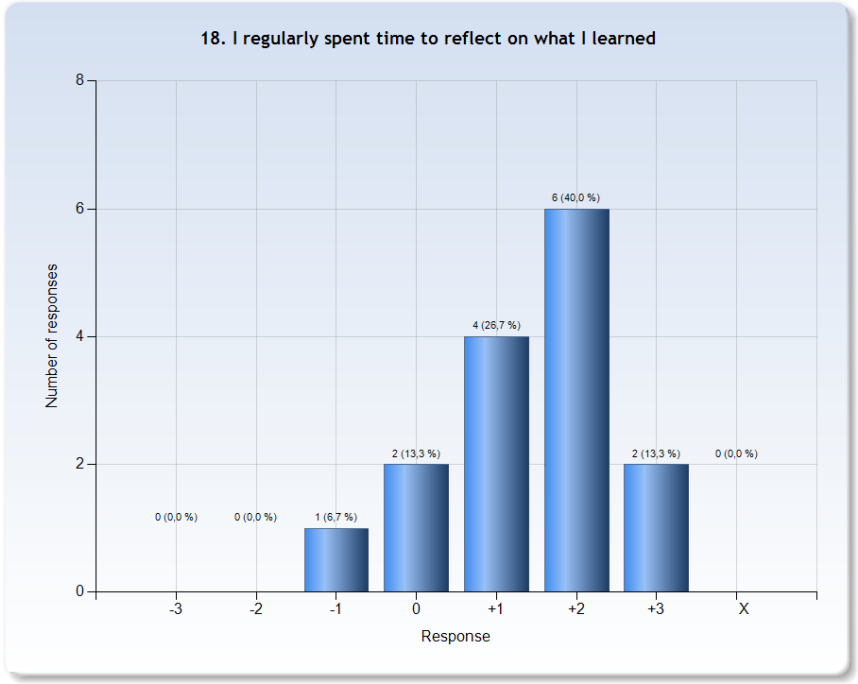
Comments

Comments (My response was: -1)

My knowledge in signal processing was not sufficient.

Comments (My response was: +1)

Some background in physics would have been nices. Never worked with waves at all.



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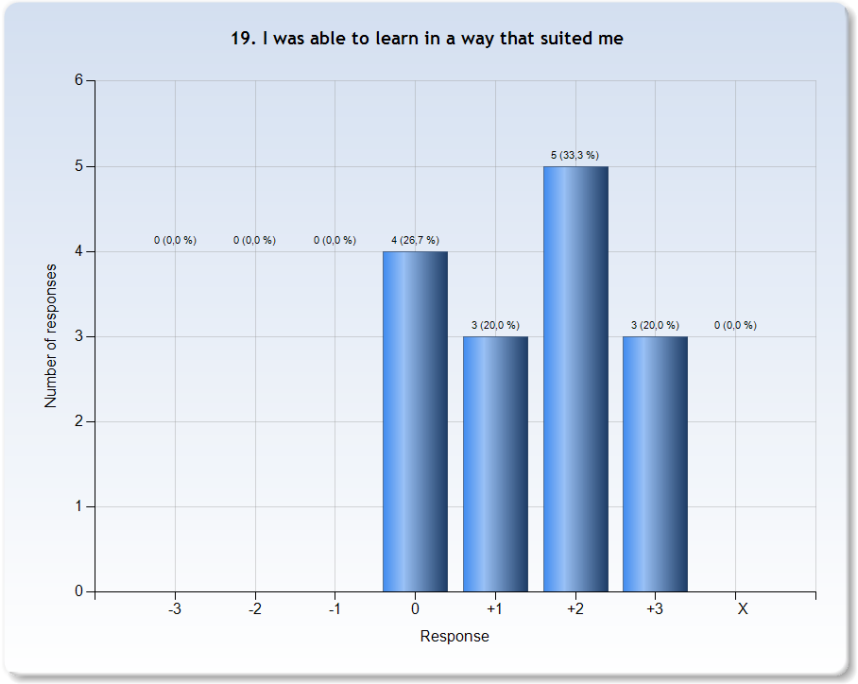

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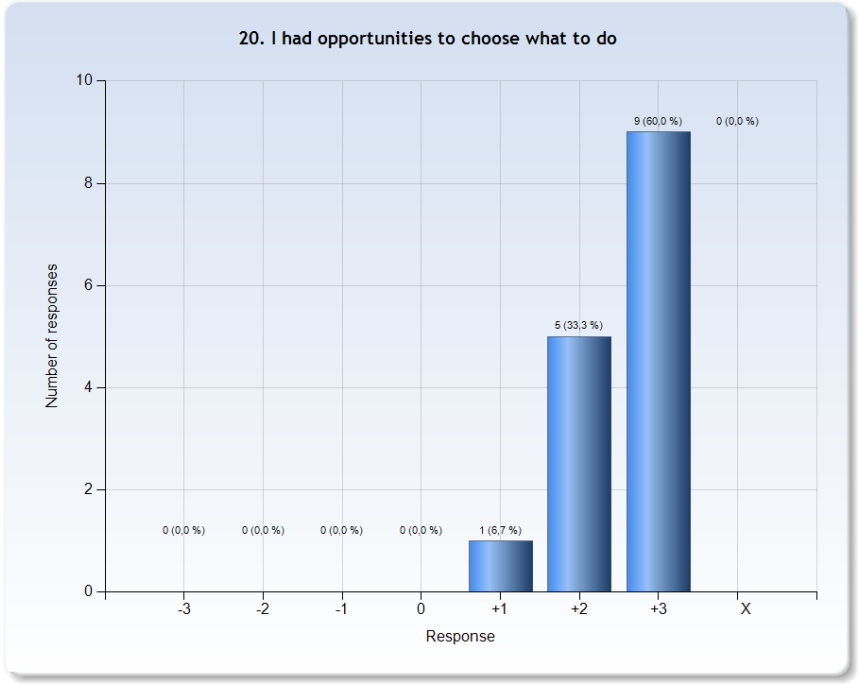

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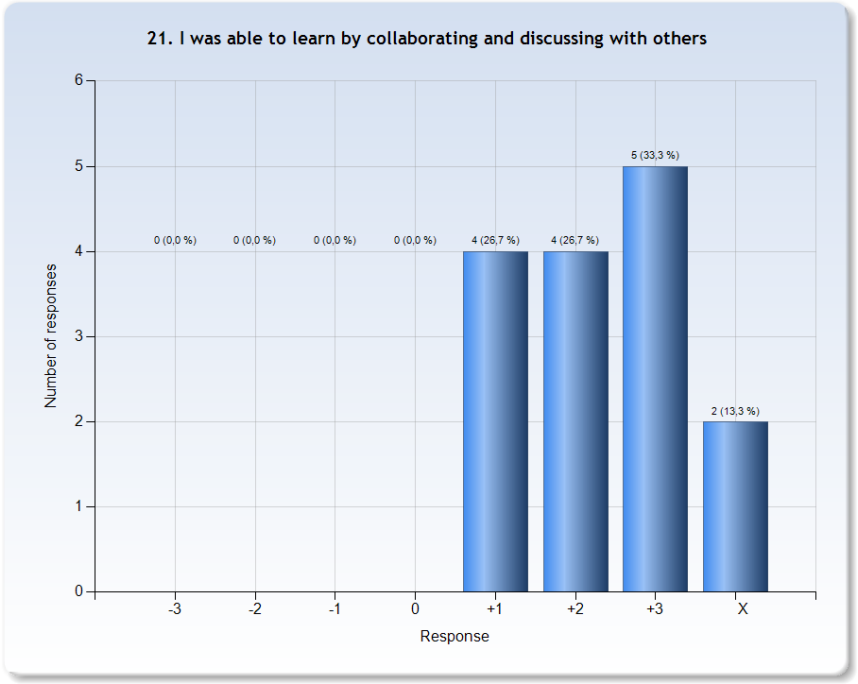
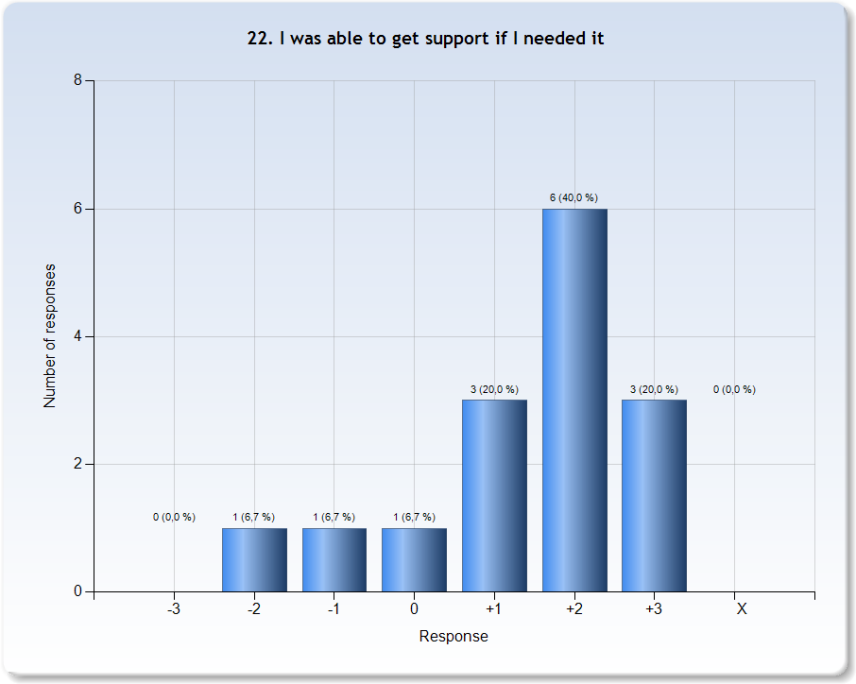


Comments


22. I was able to get support if I needed it
Number of responses
Response
0 (0,0 %)
1 (6,7 %)
1 (6,7 %)
1 (6,7 %)
3 (20,0 %)
6 (40,0 %)
3 (20,0 %)
0 (0,0 %)
-3
-2
-1
0
+1
+2
+3
X

Comments