

DELFT UNIVERSITY OF TECHNOLOGY

REPORT 13-16

ONLINE MATH EDUCATION (MUMIE)
FOR NUMERICAL ANALYSIS AND LINEAR ALGEBRA
2012-2013

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1 Introduction

This report gives an overview of the work done on MUMIE [2] at TU Delft for the academic year 2012 - 2013. Reports from previous years can be found on our relevant support website [3]. In October 2012 there was a kick-off meeting at TU Berlin regarding the S3M2 project [1]. During this meeting, every participant was assigned to develop material for a specific MUMIE course. For TU Delft this was the Numerical Analysis course.

These materials will be used in a future bridging course between bachelor and master. This will be very beneficial for students from other bachelor programs, other Dutch universities or incoming international students. The material can also be used in the regular Numerical Analysis course. Details on this development can be found in Section 2.

Besides the development of a course for the S3M2 project, the Linear Algebra course in MUMIE was also used at Aerospace Engineering and Computer Science. More details on these courses can be found in Section 3 and 4.

In this report the following abbreviations are used:

LA - Linear Algebra
NA - Numerical Analysis
AE - Aerospace Engineering
CS - Computer Science
CE - Civil Engineering

2 Numerical Analysis for Civil Engineering

As mentioned in the introduction, the development of the NA course for MUMIE is part of the S3M2 project. At the kick-off meeting on the 12th of October [1], a target deadline was set to have a small portion of the course implemented, and test this as a pilot during the NA course for CE. The development of the course had to begin from scratch, developing all the MUMIE TeX documents and Java applets ourselves. This is a considerably different setting then the development of the Linear Algebra course which was done earlier, where most applets could be taken from the German course. The development of applets is however the step that takes most time and which, up to this point in time, was not done at TU Delft, mainly due to the lack of people. So in order to start the development a team was formed.

The team consisted of Peter Wilders; project supervisor. Fons Daalderop; responsible maths professor, providing the input for the course material as well as quality control. Joris van den Oever; programmer of the Java applets. Kirsten Koolstra; elaborating the homework exercise concepts and visualizations such that they can be programmed, as well as testing completed applets. Xiwei Wu; implementing the MUMIE TeX documents as well as providing student support. In the summer of 2013 Peter Wilders left the project and his function was replaced by Fons Daalderop. During the same time period Bert Lobbezoo took over the work of Joris van den Oever as programmer of the Java applets.

The aimed goal was to have a pilot course, covering two topics within NA, ready by the beginning of May 2013 such that it could be used at the NA course for CE. Progress was initially quite slow, due to the fact that most people were new to MUMIE. However the pilot was successfully implemented, covering the theory for non-linear equations and numerical quadrature together with two homework exercises for bisection, two exercises for fixed point methods and an exercise for integral approximation. The results and evaluation of the pilot will be discussed next.

2.1 Exam results of the NA pilot course for CE

Participation in the MUMIE pilot was voluntary. By participating in the pilot, 0.5 bonus point could be earned for the next exam, under the condition of having at least 60% of all homework exercises correct. From the 234 students who took the exam there were 100 students which participated in the pilot.

The results for the exam grades of both groups are displayed in Figure 1. From the figure it is clearly visible that the group participating in the pilot generally has a higher grade then the group not participating. The same result can be observed in Table 1, which shows the percentage of students passed and the average grade for both groups.

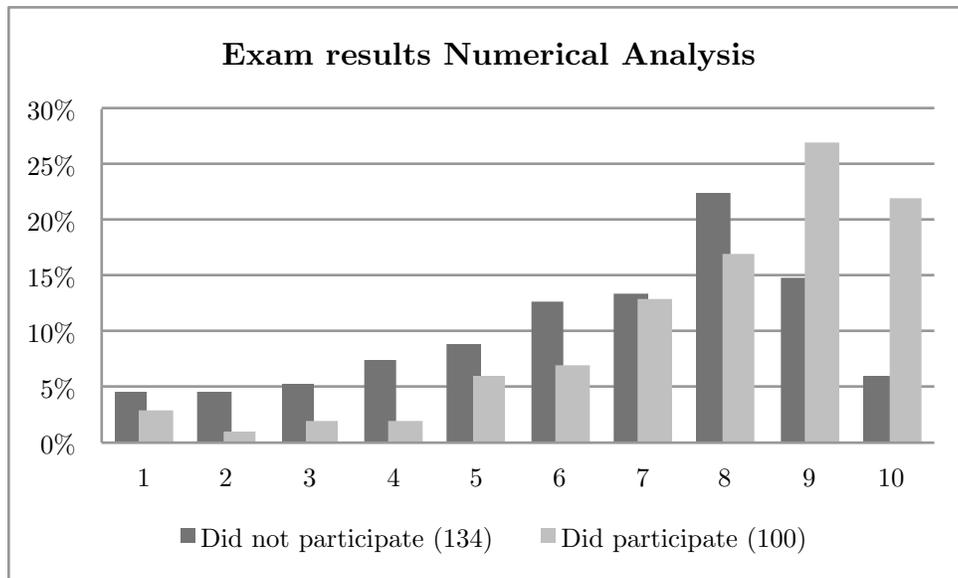


Figure 1: A comparison of the NA exam grades from CE, between students that participated in MUMIE against the students that did not. Participating in MUMIE is defined as receiving the bonus point. The percentage for each group has been normalized. Bonuspoints are not included in the grades plotted in this Figure.

	No MUMIE	MUMIE excl. bonus	incl. bonus
Percentage passed	67%	86%	90%
Average NA grade	6.25	7.58	8.015

Table 1: The percentage of students passed, and the average NA grade for the two groups, belonging to the data of Figure 1.

Trying to find an explanation for the difference between the groups is not easy due to the fact that many variables are involved. Students participating in the pilot are probably more involved in the course, and not only because of the bonus point. Also, because of the periodic deadlines, students are ‘forced’ keep up their work and not wait to the last minute. Furthermore, students in the pilot get exposed to the learning material more. To say that students perform better because of the MUMIE course itself is hard say. The pilot only covered a small part of the material and the material that was covered was relatively easy. Nonetheless, adding the MUMIE material to the course does have a positive influence on the student exam grades.

2.2 Student evaluation of the NA pilot course for CE

Not only were the exam grades analysed. The students also had to fill in a survey at the end of the course. The survey consisted of 13 multiple choice question and an open question for further remarks / suggestions / comments. In total of 109 CE students filled in the survey. Below you find the highlights of the survey outcome. The results for the entire survey can be found in Appendix A.

Highlights of multiple choice questions

Regarding the difficulty of the homework exercises in MUMIE, the majority of students (approximately 70%) indicated that they were (too) easy. This result was to be expected, as the exercises in the pilot were relatively easy and certainly not at the level as the exam. Having questions that are too easy can be dangerous in the sense that students can underestimate the difficulty of the course. On the other side, by having easy questions, this can motivate students that initially struggle with the course to keep on going.

The majority of the students (approximately 70%) also indicated that the applets in MUMIE helped them understand the course material and motivated them to learn the course. This, together with the result that almost 80% of the CE students would recommend to use MUMIE for the NA course is quite a strong indicator that MUMIE has a positive stimulating effect on students.

Highlights of open question

The results of the feedback questions have been categorized and summarized below, ordered by most frequently mentioned category.

Java problems (15 entries)

The main problem students encountered were Java related, this is a problem that is not only related to this course, but to MUMIE in general. With the latest Java releases, security policies have changed such that older versions of Java are blocked by the browser by default. Because the computer networks at TU Delft were not running the latest version of Java, MUMIE would not work as expected on these computers.

Updating to the latest Java version would solve this problem and is recommended to students working on their own computer, however several students still complained about a lot of security confirmation pop-ups, every time an applet had to be loaded, this not being very user friendly.

Also, students mentioned slow loading pages regarding applets and exercises. This also has to do with the Java part in MUMIE. Especially when applets are loaded for a first time on a computer it can take a few seconds for it to load, which can be understandably quite annoying.

Increase difficulty (8 entries)

Secondly, students made remarks that the exercises were (too) easy. At least there should be exercises that are approximately the same level as exam questions.

This is a valid point that is addressed by the students. However this was still a pilot test. Also, development of the exercises (in the form of applets) is still a new process to the team and therefore the initial progress was quite slow.

Positive (6 entries)

Next are students leaving a positive remark. Having MUMIE as an extra possibility was found useful and motivated (some) students for the course.

Limited scope (5 entries)

Several students suggested that the material that was covered in MUMIE should be increased, since it currently only covers a limited amount of subjects. This remark could be expected beforehand, knowing that this pilot only covered two specific topics from the NA course.

Bugs in homework exercise(s) (4 entries)

Furthermore, a few students remarked that the training exercises were too similar to the homework exercises. In such a way, that the training exercises would generate exactly the same parameters as the homework exercise.

Add more questions (3 entries)

This category is, similar to the limited scope, strongly related to the fact that this MUMIE course was still in the pilot stage. There were only a very limited number of exercises available.

Unclear on grading of an exercise (2 entries)

Finally, there were a couple of students who had trouble to see how well they performed on the exercises.

Other (13 entries)

These are the remaining remarks that could not be put in one of the above mentioned categories.

3 Linear Algebra for Aerospace Engineering

Because of the development of the NA MUMIE course for the S3M2 project, the Linear Algebra course in MUMIE remained mostly untouched this year. The only major change in the LA course for AE was that the course was shortened to just one quarter, instead of two. This did not have any influence on the existing MUMIE course however, the two sub-courses just got merged into one big course with no change to the content.

3.1 Exam results of the LA course for AE

Participation in the LA MUMIE course remained similar to previous years for AE. Participation was voluntary and by getting a score of at least 60% or higher over all exercises 1 bonus point could be earned for the exam. In total there were 280 students participating in the exam, of which 200 students participated in MUMIE.

The results for the exam grades of both groups are displayed in Figure 2. One can see a similar pattern for both groups, however the group participating in MUMIE is shifted to the right, getting a better score on average. This can be confirmed when looking at the data in Table 2. In fact, the data is very similar to the results from previous years [3].

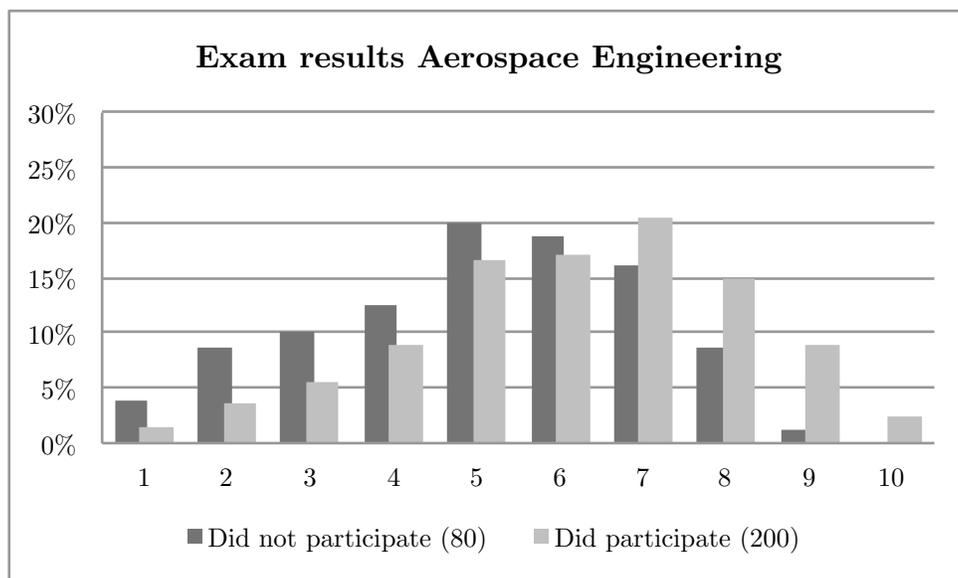


Figure 2: A comparison of the LA exam grades from EA, between students that participated in MUMIE against the students that did not. Participating in MUMIE is defined as receiving the bonus point. The percentage for each group has been normalized. Bonuspoints are not included in the grades plotted in this Figure.

	No MUMIE	MUMIE excl. bonus	incl. bonus
Percentage passed	45%	64%	80%
Average LA grade	5.09	6.15	7.14

Table 2: The percentage of AE students passed, and the average LA grade for the two groups, belonging to the data of Figure 2.

3.2 Student evaluation of the LA course for AE

Similar to CE, the AE students had to fill in a survey at the end of the course. The survey consisted of 15 multiple choice question and an open question for further remarks / suggestions / comments. In total of 160 AE students filled in the survey. Below you find the highlights of the survey outcome. The results for the entire survey can be found in Appendix A.

Highlights of multiple choice questions

The majority of the students (approximately 60%) indicated that the applets in MUMIE helped them understand the course material and motivated them to learn the course. This, together with the result that almost 80% of the AE students would recommend to use MUMIE for the LA course. These numbers are very similar to the outcome of the survey for the NA by CE students and are quite a strong indicator that MUMIE has a positive stimulating effect on students.

Highlights of open question

The results of the feedback questions have been categorized and summarized below, ordered by most frequently mentioned category.

Java problems (26 entries)

The Java problems for this course are exactly the same as mentioned in Section 2.2. Java is being blocked by the browser because of outdated version, lots of security confirmations from the Java side and slow loading times.

User-friendliness (20 entries)

Although a variety of topic are grouped in this category. Students mainly comment that it wasn't always clear what had to be done in a homework exercise and that they should be easier to use. Besides this, it was not easy to get an overview of the graded exercise. Or, due to small screen sizes, certain information such as the 'Save' button would not appear on the screen.

Positive (12 entries)

This category contains entries with positive remarks from students, where MUMIE is a useful and motivating tool to study the course. Also it forces students (through the timeframes) to keep up with course.

Too much difference from book and / or exam (9 entries)

Several students commented on the fact that the course and exercises presented in MUMIE differed muchman too from the book and exam and therefor confusing (and not helping) students when learning the course.

Too easy (6 entries)

Some remarks from students mention that exercises in MUMIE are too easy, or at least, the course should also contain exercises with a higher difficulty level. Currently exercises don't go much further then the 'basic principles'.

Improve timeframes (4 entries)

And then there were a few remarks that the timeframes were not always properly in sync with the lectures. Although some comments in this category seem to contradict each other.

Other (9 entries)

Finally some other remarks which could not be grouped in a specific category.

4 Linear Algebra for Computer Science

As mentioned in Section 3 the LA course remained unchanged because of the focus on the development of the NA course. The LA course for CS was still given in two quarters, so the same course from previous year was used .

4.1 Exam results of the LA course for CS

Participation in the LA MUMIE for course remained similar to last year. Participation was voluntary and by getting a score of at least 70% or higher over all exercises 0.5 bonus point could be earned for the exam for each quarter, resulting in a maxixum of 1 bonus point. In total 92 students participated in the exam for the first part, 22 of which also participated in MUMIE. For the second part 148 participated in the exam, 17 of which participated in the exam. As one might have noticed, the percentage of students participating in MUMIE was very low in comparison with the AE and NA students. Because of this, it makes it harder to come to conclusions when looking at the exam grades and survey outcome.

The results for the exam grades of part 1 for both groups are displayed in Figure 3. From this figure it is hard to find any major differences between the two groups, again, this is probably due to the low numbers of participation. In fact, if we look at the data in Table 3, the average grade for the MUMIE group is slightly lower than the non-MUMIE group.

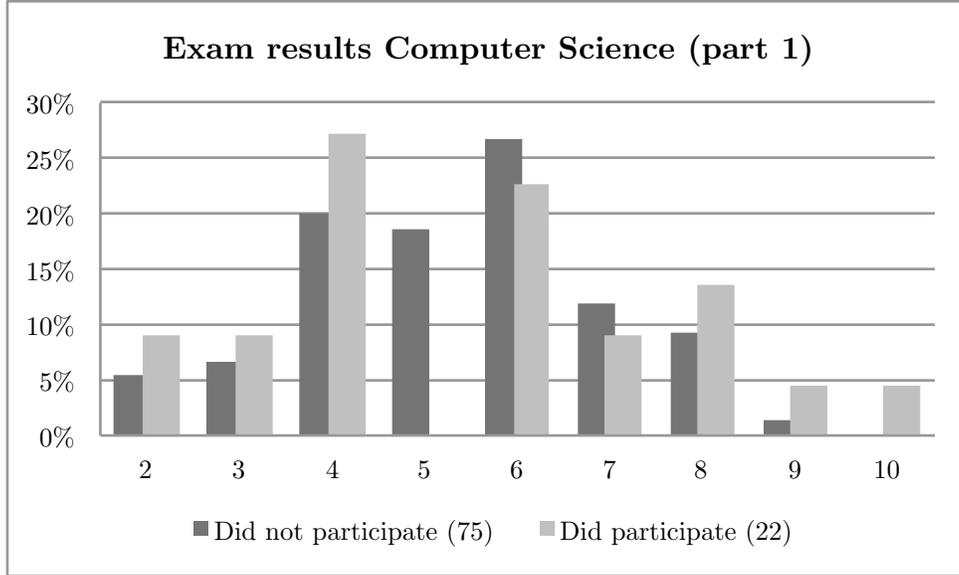


Figure 3: A comparison of the LA part 1 exam grades from CS, between students that participated in MUMIE against the students that did not. Participating in MUMIE is defined as receiving the bonus point. The percentage for each group has been normalized. Bonuspoints are not included in the grades plotted in this Figure.

	No MUMIE	MUMIE excl. bonus	incl. bonus
Percentage passed	49%	55%	55%
Average LA1 grade	5.33	5.27	5.77

Table 3: The percentage of CS students passed, and the average LA part 1 grade for the two groups, belonging to the data of Figure 3.

The results for the exam grades of part 2 are displayed in Figure 4. Even though the group participating in MUMIE is shifted slightly to the right, the participation in MUMIE for this part was even lower then in part 1, so it is hard to draw any conclusions from this. Again, the average grade and percentage passed is presented in Table 4.

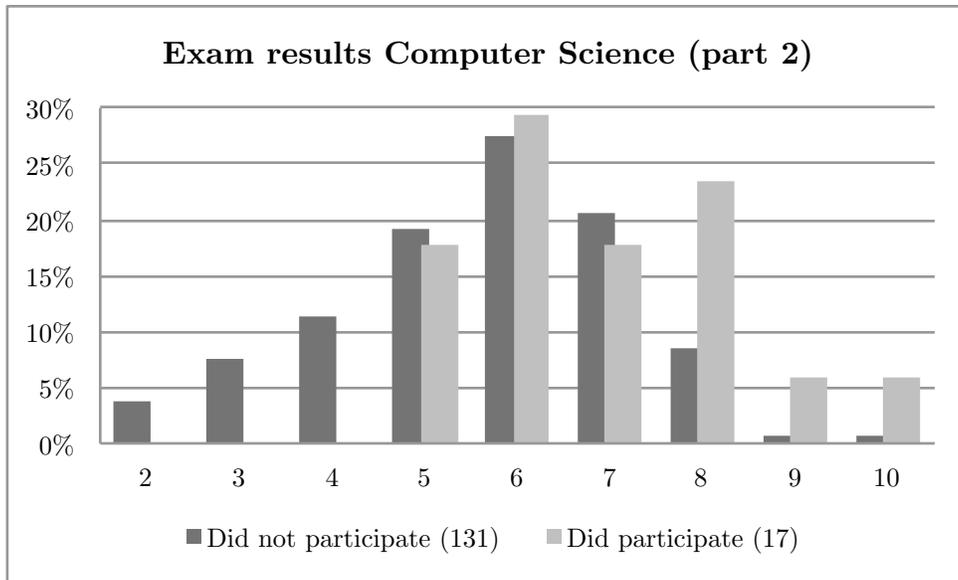


Figure 4: A comparison of the LA part 2 exam grades from CS, between students that participated in MUMIE against the students that did not. Participating in MUMIE is defined as receiving the bonus point. The percentage for each group has been normalized. Bonuspoints are not included in the grades plotted in this Figure.

	No MUMIE	MUMIE excl. bonus	incl. bonus
Percentage passed	58%	82%	88%
Average LA2 grade	5.33	6.53	7.00

Table 4: The percentage of CS students passed, and the average LA part 2 grade for the two groups, belonging to the data of Figure 4.

4.2 Student evaluation of the LA course for CS

Also the CS students had to fill in a survey at the end of the course (one survey for each quarter). The survey consisted of 15 multiple choice question and an open question for further remarks / suggestions / comments. In total 33 CS students filled in the survey for part 1 and 28 students filled in the survey for part 2 . Below you find the highlights of the survey outcome. The results for the entire survey can be found in Appendix A. Again keep in mind that the number of participants is low, which also affects the accuracy of the survey results.

Highlights of multiple choice questions

For part 1, the majority of the CS students (approximately 70%) indicated that the applets in MUMIE helped them understand the course material and motivated them to learn the course. For

this part, almost 90% of the CS students would also recommend to use MUMIE for the LA course. These results are quite similar to the results from AE and NA from which can be concluded that MUMIE has a positive stimulating effect on students.

For part 2, only approximately 45% of the students indicated that the applets in MUMIE helped them understand the course material and motivate them to learn the course. However, still roughly 80% of the students still recommend to use MUMIE for the LA course.

The reason why the second part has lower percentages could be because this part still misses certain topics within the LA course.

Highlights of open question

The results of the feedback questions have been categorized and summarized, ordered by most frequently mentioned category. Since the categories have very little entries and are actually quite similar to the responses from AE and NA only the categories will be mentioned below.

Java problems (9 entries)

Positive (3 entries)

User-friendliness (2 entries)

Discuss more topics (2 entries)

Improve bonus system (2 entries)

Improve timeframes (2 entries)

Other (6 entries)

5 Conclusions

In this final section, an overview of the conclusions will be presented based upon the previous sections. In Section 5.1 a summary of the exam results, specifically the difference between the MUMIE and non-MUMIE group, will be presented. Section 5.2 will give an overview of the overall experience from students using MUMIE. Finally in Section 5.3 the work that will be focussed on for next year will be given.

5.1 Exam grades

From the analysis of the exam grades in Section 2 and 3 it is clear that the group of students that used MUMIE get a better mark on their exam compared to the group of students that does not use MUMIE. From this it can be concluded that adding MUMIE to either the LA or NA course has a positive effect on student learning performance.

As mentioned in Section 2.1 it is difficult to address this positive effect entirely to MUMIE because there are a lot of variables involved in student learning. Participating students in the MUMIE

course¹; (i) probably have an increased involvement in the course, (ii) forces students to periodic deadlines, therefore keep up with the course schedule and not wait until last minute, and (iii) get exposed to the learning material more. Even though it is hard to say from our current comparison why the MUMIE group scores higher marks on the exam in general, the exam results show that the MUMIE group scores on average approximately 1 point higher on their exam.

Interestingly for the current year, this difference in exam grades between the MUMIE and non-MUMIE group is not clearly visible for the CS students. The most likely explanation for this is that the percentage of CS students participating in MUMIE is very low this year. Approximately only 20 CS students (from a total of 100) participated in MUMIE. With these numbers, outliers can have a big influence on the results

5.2 Overall student experience of MUMIE

The last multiple choice question in the student survey is if students would recommend to use MUMIE in the future for the course. The outcome of this question is quite relevant to whether to continue with the MUMIE project. 55% of the students (applicable to all studies, CE, AE and CS) would recommend MUMIE to be used in the course and another 25% (again applying to CE, AE and CS) would *strongly* recommend MUMIE to be used in the course. That is approximately 80% of the students (strongly) recommending MUMIE to be used in the course. This number has been very consistent in comparison to previous years. In contrast, only 5% of the students would either not recommend MUMIE to be used in the course or would even declare it unfit. Furthermore, approximately 60-70% of the CE, AE and CS students indicated that MUMIE helped them understand the material and motivated them to learn the course. These percentages are a strong indicator that MUMIE definitely has something to add to the course and is appreciated by the students.

Of course there are certain ‘complaints’ from the students that can be improved. The main problem students have is related to Java, which is needed to run the applets within MUMIE. The fact that Java needs to be used has been a complaint in the previous years too, however this year the proportion of Java complaints is much higher. The main reason for this is that Java has introduced some security policies when running applets. Computers with a Java version that is not up-to-date will block Java applets by default. Because the computers at TU Delft have an ‘old’ version of Java running, students had problems using MUMIE on computers at the TU Delft. Integral Learning (the developer of MUMIE) has been busy in the last 1.5 year to upgrade MUMIE to use Javascript (which is natively supported by the browser) to run the applets instead of Java. However, due to complications this change still hasn’t been done. This change to Javascript is however still a crucial one in order to keep up with the advancing technology and improve the usability of MUMIE.

Furthermore, CE students commented that the material in the NA MUMIE course was too easy, was limited in scope and should have more exercises. This could somewhat be expected, since the NA MUMIE course was still a pilot and the course is still heavily in development. Also AE engineering students commented that the material in the LA MUMIE course was too different from the book and exam.

¹Note that these are just a selection of variables that come to mind, this list is not exhaustive

5.3 Future work

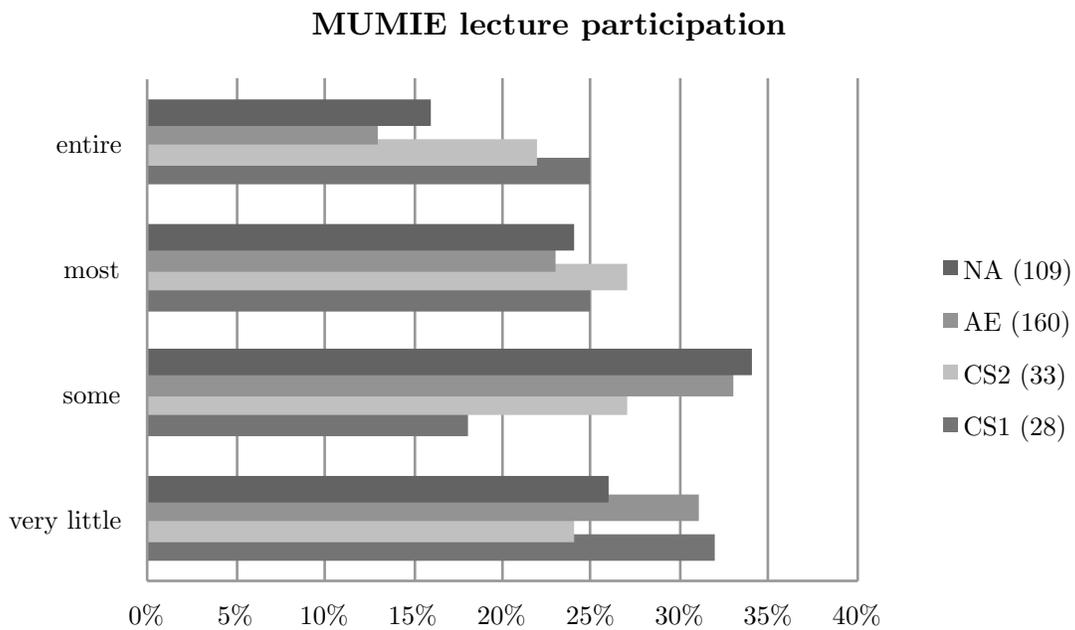
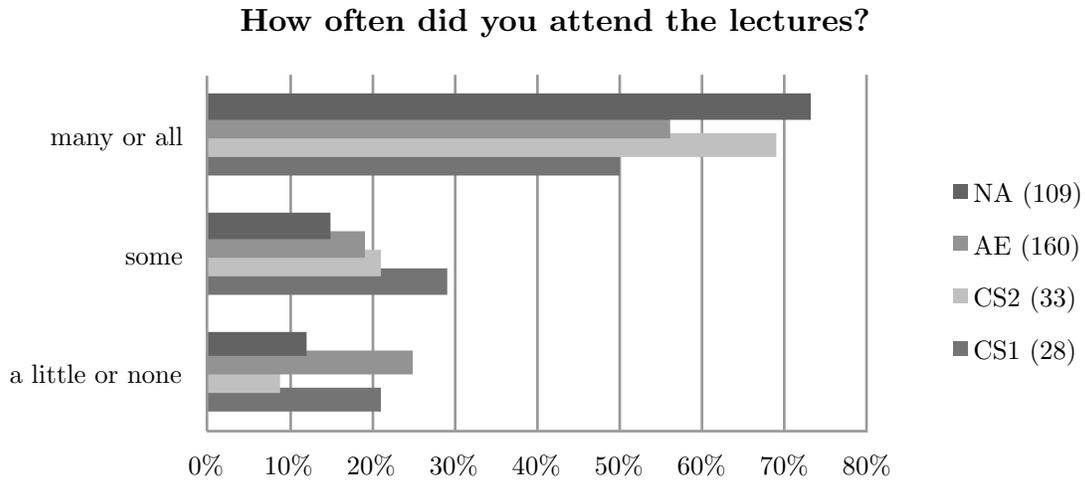
All the work for next year is focussed on the development of the NA MUMIE course for the S3M2 project. More topics within NA are added to the course, both theory, examples, training and homework exercises. Because of this, the LA MUMIE course will remain unchanged for next year, even though that course could still be improved. This however can not be done, due to the lack of people.

Since the development of the Java applets is the process that takes the most time, it would be beneficial to find a second programmer that can help out with the development of homework and training exercises to speed up this process.

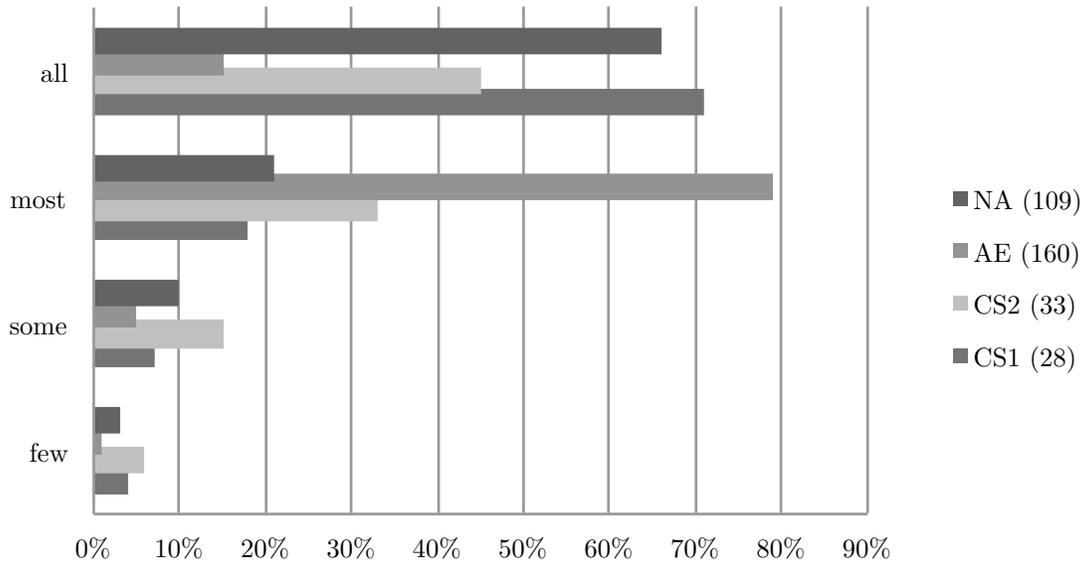
A Survey results

A.1 Multiple choice questions

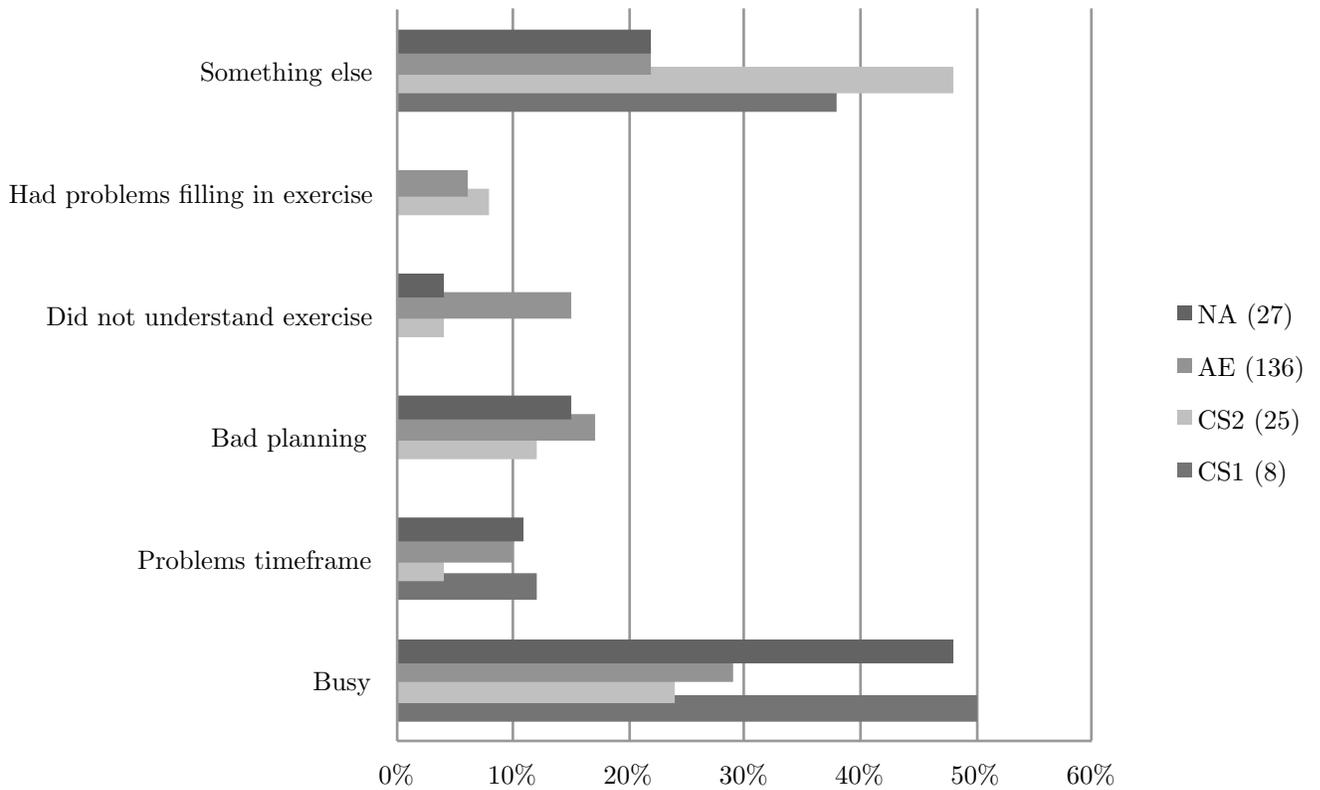
Here you can find the multiple choice results of the survey. The caption below every bar chart are the questions that were asked. Each bar chart shows the results from this years survey grouped by specific study. The number in brackets in the legend indicates the number of responses.



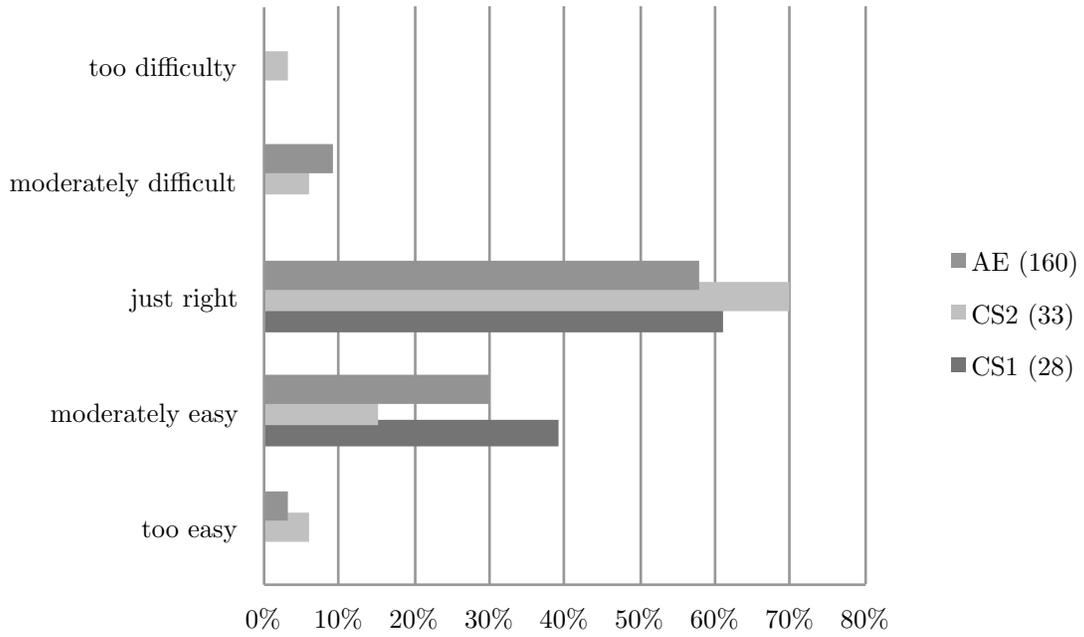
MUMIE homework participation



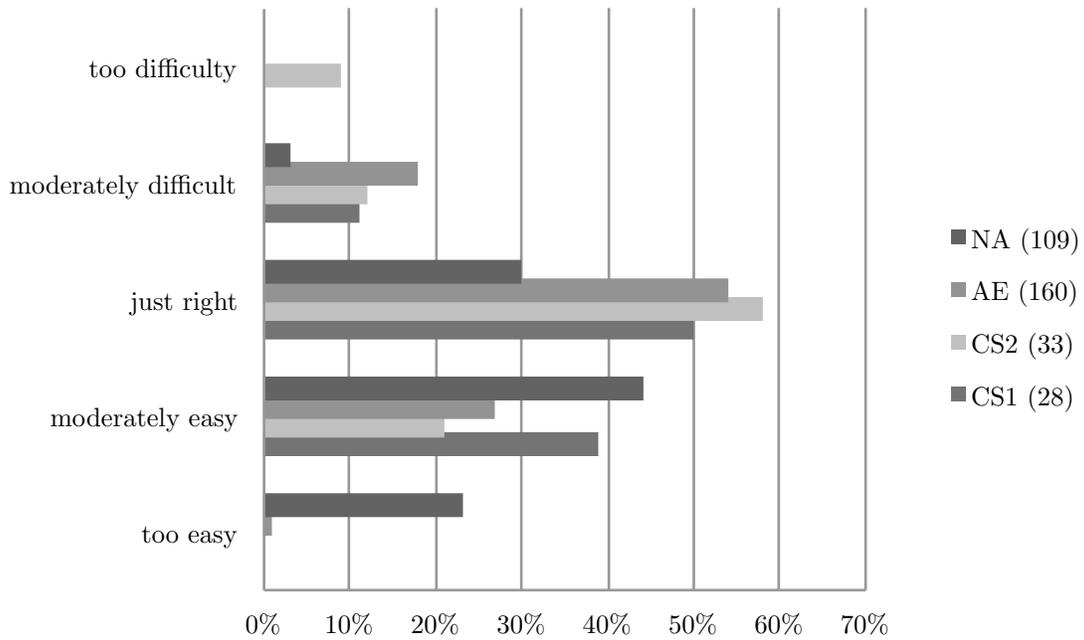
Reasons for not doing all homework



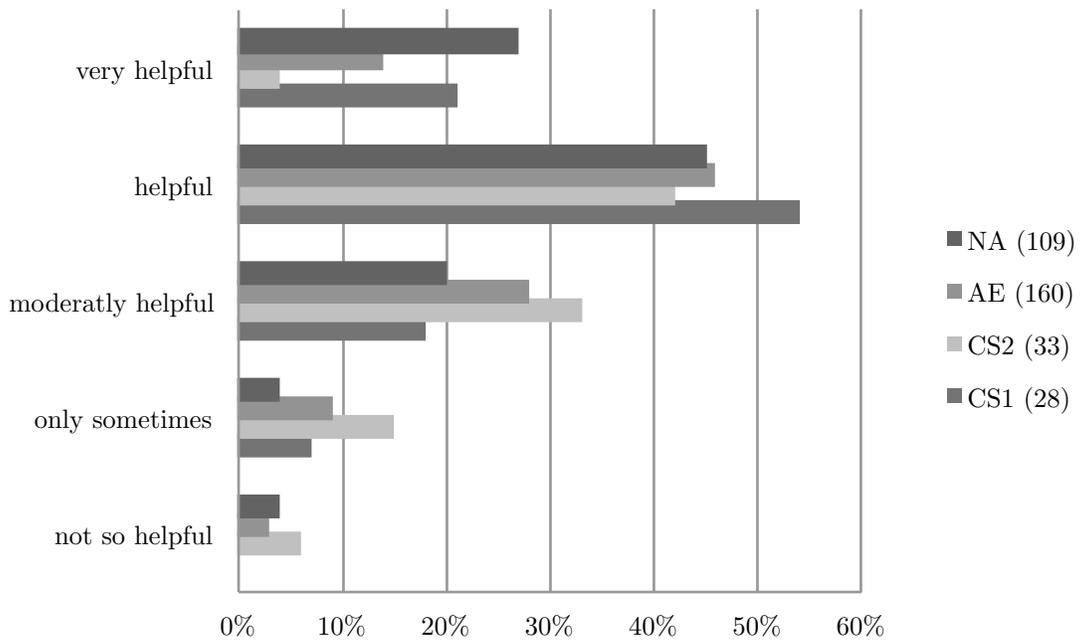
Difficulty of applets in lecture



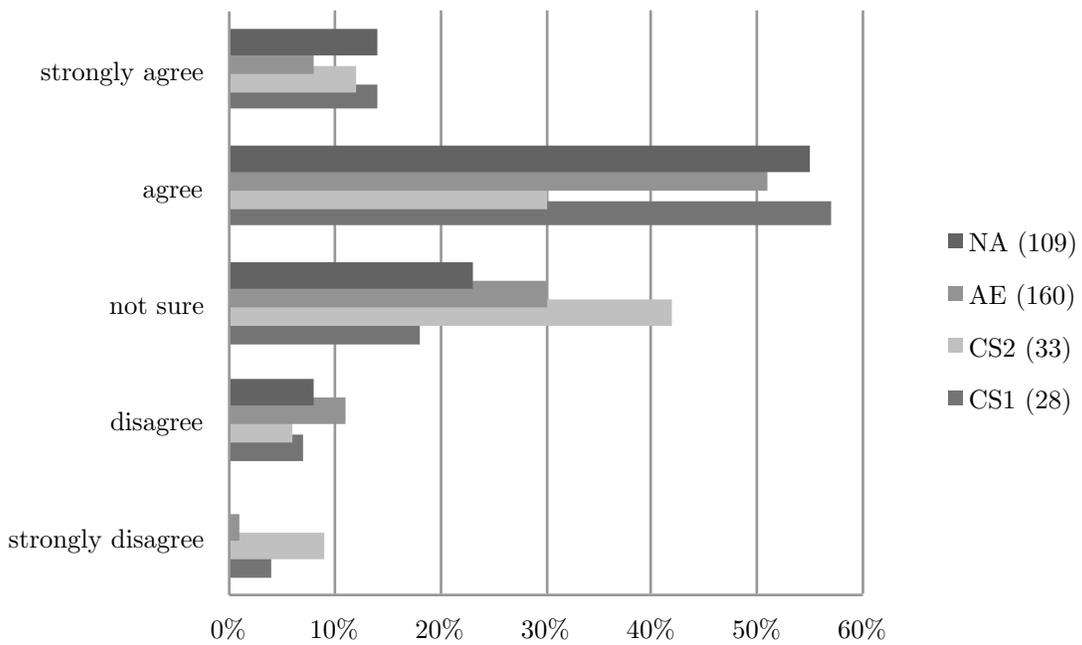
Difficulty of homework exercises



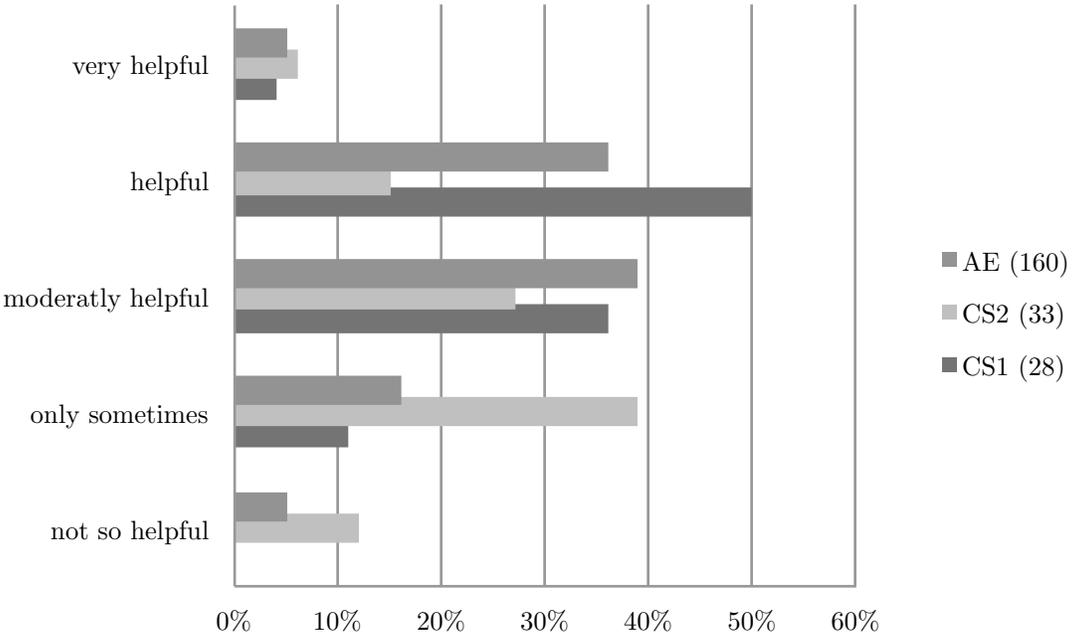
Applets help understand course material



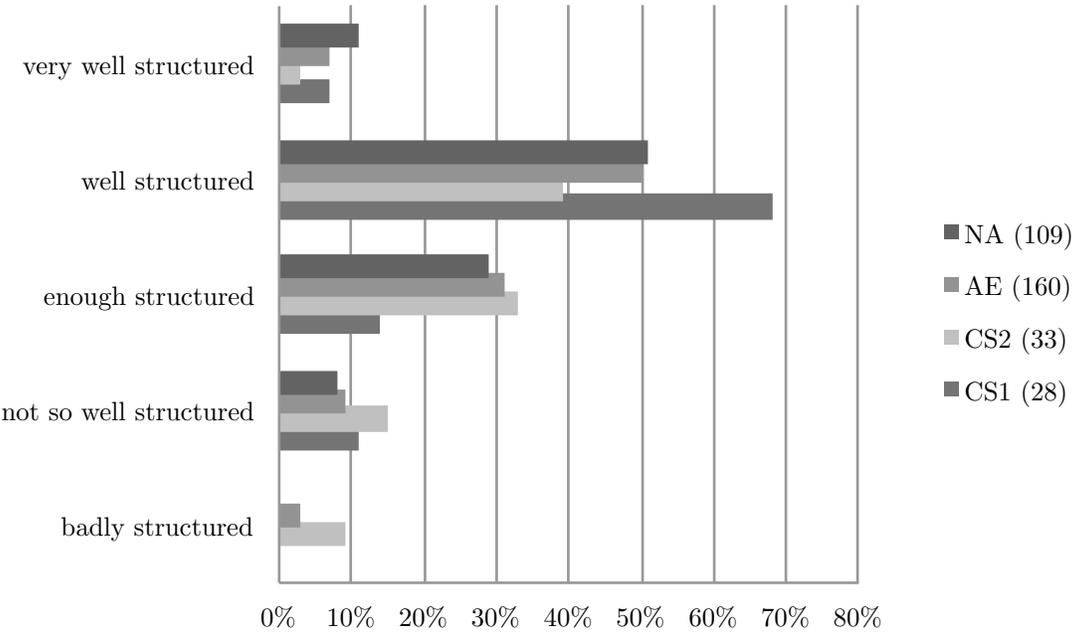
Applets motivated to learn the course



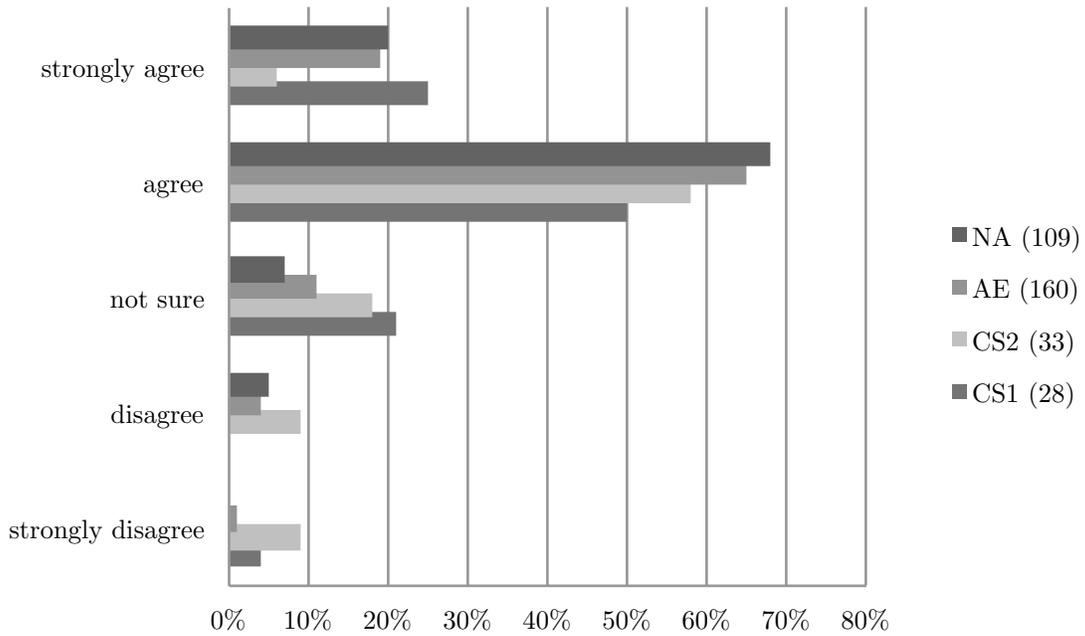
MUMIE helped with exercises from the book (Lay)



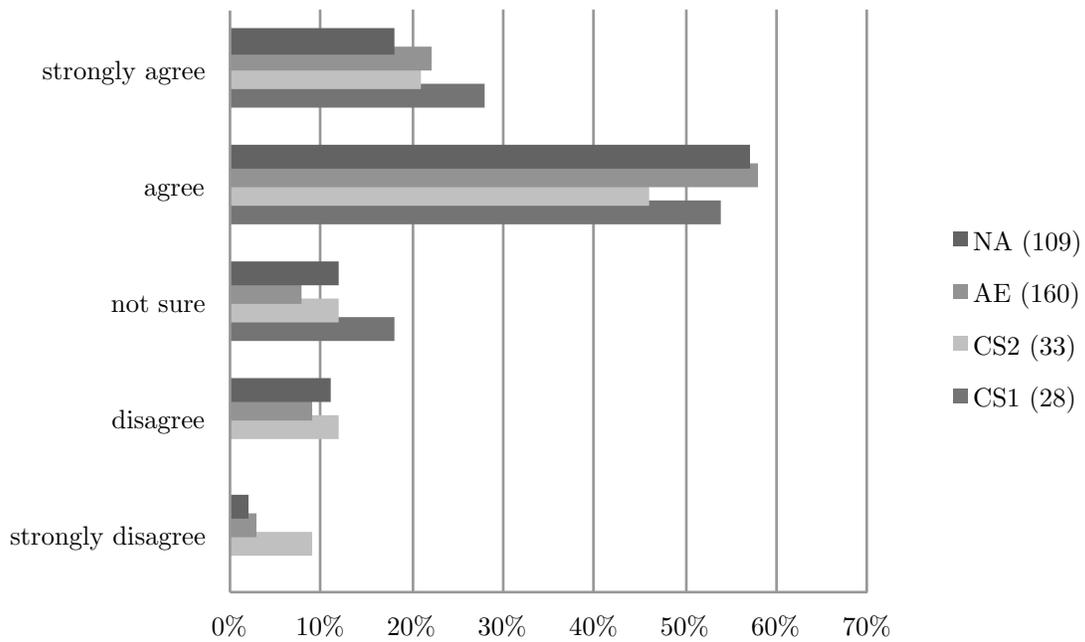
Overall MUMIE structure



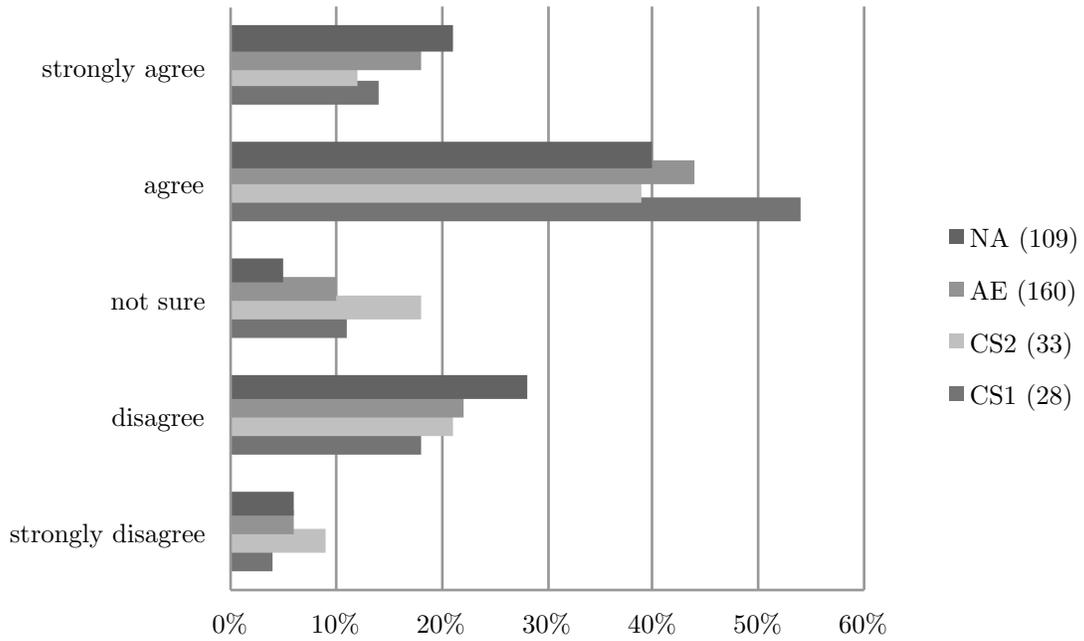
Enough MUMIE documentation



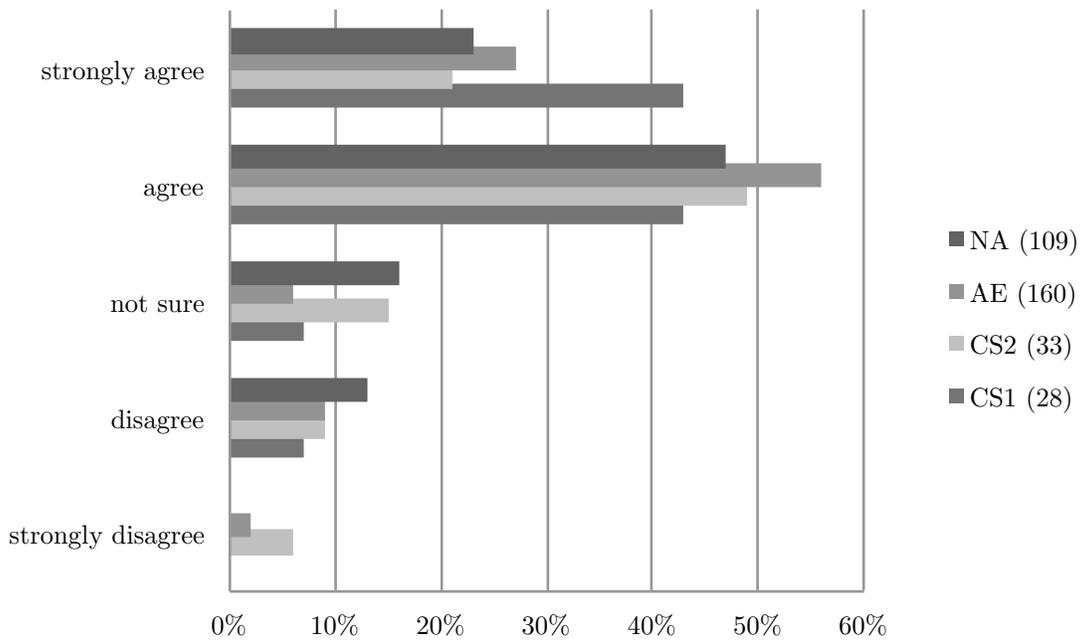
No problem with requirements for MUMIE



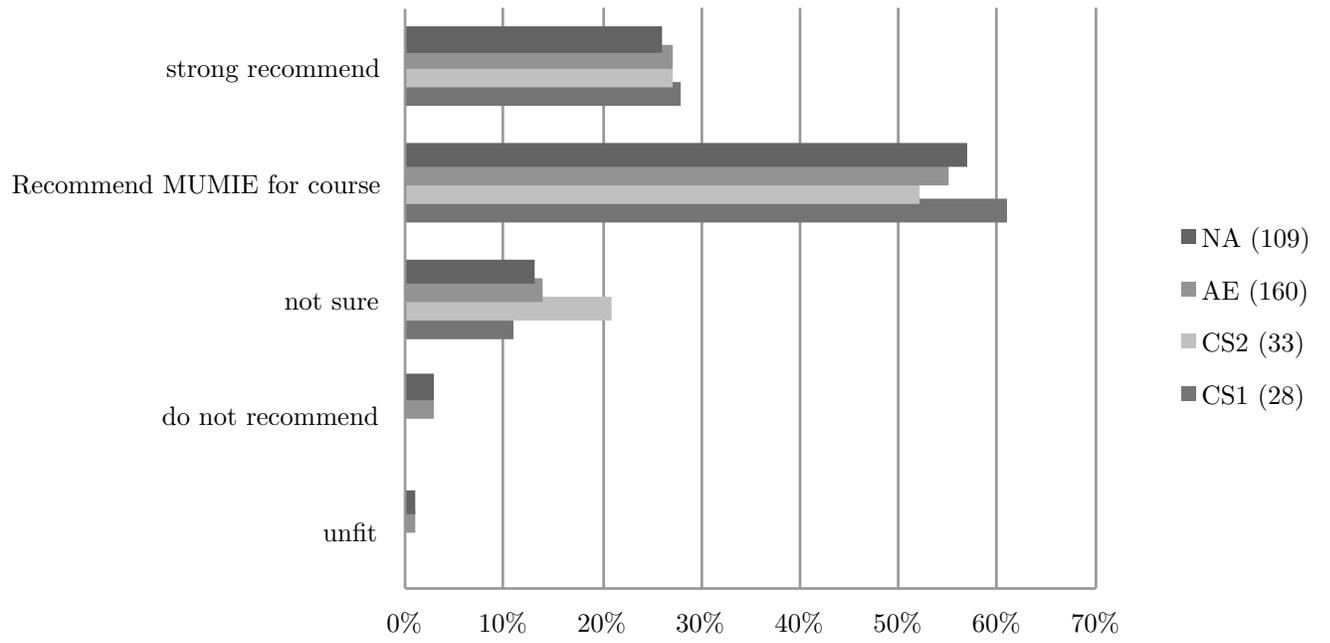
No problem entering solutions in MUMIE



It was clear which homework exercises I have done



Recommend MUMIE for the course



A.2 Categorized comments/remarks/suggestions

In order to make the comments the students made a bit more comprehensible they have already been categorized into groups. The result can be found below, the top row of the table indicates the categorization type. The categorization types are sorted by amount of items contained in the group.

A.2.1 Numerical Analysis

Java problems *15 entries*

The first time I had a little trouble 1 with making the applet work (java). On the TU Delft computers, in the Chrome Browser, you could click 'Run this time and then java would work and the edit option became clickable.

Technically and functionally, the MUMIE website and applets could be improved quite a bit. In the first place, the applets didn't work at the TU Delft computers. Second, some (though not all) of the applets contained errors according to a message of the Java software installed on my home computer, which might be the cause of the slow and unstable working of the applets. However the error messages could also have to do with compatibility problems with respect to the Java version I use: I'm working on Mac OS X 10.6.8 with Java version 1.6.0.45

The only problem was the java neceseraty. But after downloading that, is was an easygoing program.

The Mumie program is not working on the computers at my faculty. Making this work might be a good idea. (I think a Java update is required. But you need the right authority to do so.)

Make sure it works on TU computers

I had java trouble. Just tell people before logging in to install java. Java is disable at the pc's at the TU. Highly annoying.

I was unable to enter my solutions for the HW exercises on the TU Delft computers. Some comment in advance of this would have been appreciated.

Niet alle computers hebben JAVA-script of accepteren dat en dat is wel lastig.

I had a lot of difficulties with running the program. I tried on 3 different computers before it worked.

Java gave an error in Google Chrome, so I had to use Firefox.

Mumie werkt erg goed, de Lectures ook. Helaas werkt het slecht op de CITG computers en al helemaal niet op mijn persoonlijke computer. Wel erg goed initiatief maar ik zou een simpele Mapletoets maken, waarbij iedereen eenvoudig kan inloggen en het ook per definitie goed werkt. Op het moment is het te omslachtig om goed werkzaam te krijgen voor iedereen.

It's a pity that you can't do the exercises at the campus.

i entered 'not sure' to the last question because i only recommend the mumie program if the problems with entering the solutions are solved. Because right now students loose a lot of studing time trying to open the questions

The use of Java is nowhere mentioned to run the applets. First time i had slight problem with that, also heard other students complaining about that. If it is mentioned in the guide it will be clear you have to use Java.

Het mumie programma werkt traag. Misschien zijn er snellere / betere programma's beschikbaar die ingezet kunnen worden.

Increase difficulty *8 entries*

The exercises were a little too easy though. use more subtasks: from easy to difficult question.

1)The current state of the program isn't that useful yet. By improving the difficulty(especially add more variety to the exercises) I think it will motivate people to learn better.

Increase in difficulty

The exercises of mumie are not of the level of the exercises in the book or the exam. It would be better to make them more difficult and to increase the amount of explanation

Besides that most questions were very easy (but maybe that's just me doing this course for the 3rd time).

Misschien enige opbouw in de exercises, ze waren vrij makkelijk, als ze nu makkelijk beginnen en in de loop wat moeilijker worden is het misschien nog interessant voor de examen (stof/toets)

I think the Mumie course certainly stimulates you to study the material. It may have been a little easy, this time, though.

It was actually quite a nice way to practice the exercises, but the questions were far too easy. They should have about the same difficulty as the exam for the course.

Positive *6 entries*

Besides some small errors in the program, the mumie system worked quite well.

very useful.

was ok

Nice application, after you find out need to download java I' filled it in before but wanted to say that (I just made an exam) I found the exercises useful, if you make them too hard, people get demotivated, they were easy, but I really found myself thinking 'wait I have done this in the mummie' Suprised myself!

Apart from that, great to be able to practice in such easy way and be able to get a bonus out of it! Motivates double.

in MUMIE. It is a great way to get to know the topics, even if you cannot attend the lectures. All-in-all a great way to illustrate numerical methods!

Limited scope *5 entries*

The Mumie program should be used earlier in the period, not the last three weeks. In that way you can practice more subject of the course.

The explanations in the mumie program were really clear and I learned a lot from them. It is a pity we only did three small subjects. I think it would be nice to cover more of the exam-subjects from the start of the period.

expand the mumie program. Now there were only 4 exercises, covering little of the knowledge you'll have to have.

It would be nice to have an applet for all the numerical methods (i.e. Euler-forward, backward, modified-Euler etc.)

The Mumie program was very helpful in understanding certain methods. If more methods could be added then that would be great!

Bugs in homework exercise(s) *4 entries*

The training exercises were to similar to the assignments. If you cycle through them enough times you will actually find the actual assignment.

Het is handig om aan te geven wanneer een opdracht wordt nagekeken en dat het antwoord pas na de deadline bekend is. Verder is het mogelijk om net zo lang op next example te klikken totdat je eigen parameters verschijnen.

Vragen waren veel te makkelijk en leken teveel op het voorbeeld, waardoor het eigenlijk gewoon het voorbeeld opnieuw invullen was.

Last exercise it said i only had 50% answered but i filled in everything. I think this is a bug. (FIXED)

Add more questions *3 entries*

2)Also a adding more questions can allow small mistakes so you won't fail a course completely after answering one question wrong.

Increase in quantity.

Eerder beschikbaar stellen en meer vragen.

Unclear on grading of an exercise *2 entries*

I'm not sure i had the answers correct. That was not clear. I find it handy to see how well I do at the excersises.

It would be helpfull if I was able to see which question were right or wrong, maybe some kind of total score at the end.

Other 13 entries

3) If layout/format of the exercise of the Bisection method is the most effective I think. It gives a very clear picture of what you are doing and how it works.

Have you tried Maple TA? It is a program that other courses use and is really user friendly.

It's a good opportunity to practice the course material. However, Mumie would not be my program of choice.

It would be nice if we get an e-mail or something like with the answers and the explanation with more detailed answer (in the form of the test exercise)

The final date for some homework exercise have not passed yet. I still have to do some of the exercises.

There were some problems in the beginning but eventually they were solved.

Maybe at the correction an explanation about how to solve the problem exactly, than just the answer. I think that will give mayor feedback to everybody.

I didn't know Mumie I had to do Mumie, so I missed the first assignment. There is a lot of unnecessary chaos on Blackboard. But Mumie is really a great tool!

Please some more detailed information about the number of exercises in advance, and when you can start 'adding the applets' Also information about where and when and where this questionnaire could be found. 'Should you find it somewhere (active) or just relax and wait till it arrives (passive)?' Other point, this survey should have been communicated via Blackboard. Or a better mail. Now it really looked like spam... - No subject - Unknown sender - starting tekst like 'Hoi Xiwei, onderst...' Different time intervals for the questions helps! For continuity. So more tasks with deadlines like every one or two weeks would be a good idea. The exercises/contents/ explanations were short and clear :)

It might be useful to directly grade the answer, and maybe give 3 chances to answer it correctly. This way you know if you made a miscalculation and can give it another shot. This is what happened to me, I didn't make enough calculations for a certain problem, causing me to fail for this particular problem. But if I knew it was wrong the first time, I could have tried it again.

In the beginning it was unclear to me if the decimal mark when entering answers had to be a point or a comma. I figured it out to be a point, but it could be made a little bit clearer.

some question examples are although structured, unclear. Perhaps some more text to explain each step would be helpful for students who haven't studied the material enough.

A schedule with due dates would be handy.

A.2.2 Aerospace Engineering

Problems with Java *26 entries*

It is usefull for learning Linear algebra, but MUMIE is a terrible program to work with. it looks and operates as if it was programmed in 1945. Please improve this as it was really frustrating to work with it. It is slow and user unfriendly. If it hadn't been this bad a programm i would have finished all excercises instead of stopping when i reached 60%, just because the programm annoyed me to much. I believe i am speaking for all of my study mates, as this is the common opinion about mumie. It is too bad actually, because the excercise/bonus system can really help students learning.

every time i would start the webpage, my computer would freeze for a couple seconds, sometimes randomly reloading all the open tabs in my browser. this happened on multiple computers. i'm not an expert but it didnt feel like it was ideally programmed/ set up.

The one thing I found very annoying was the Java-applet. On some computers at the faculty it did not work properly (so no excercises could be opened). From all the electronic homework 'programmes' I used this year (COZ, MAPLE, MUMIE), I found MUMIE the least favorable, which I mostly account to the JAVA-applet (loadingtime etc.)

The Java applet has some difficulties with Mac. Sometimes it was not possible to enter the answers or to check the answers.

I dislike the way there is a seperate pop up window in which you have to complete the excersises, that made it verry annoying to deal with as often they didnt load very quickly.

It just didn't feel smooth. It would be much more user friendly if it was structured in a manner similar to the mastering engineering / mastering physics excercises.

Sometimes the site is buggy and it is difficult to open the applet/ the site freezes. Most of the time this did not happen or only required one restart. once however, I had to try 5 times before being able to fill in my answers.

The things I liked about mumie: The lectures were a great summary. The things I didn't like about mumie: There were some typos Answer input went slowly. EVERY SINGLE TIME JAVA ASKED ME IF THE PROGRAM WAS SAVE. That was just very annoying.

The java applet did not always work in combination with chrome.

The applet was very slow and got stuck quite often.

increase user friendliness (trouble with java)

The use of Javascripts and applets is horrible, please consider using html5 which is a much more modern language and works across all platforms instead of Javascripts and applets.

Make MUMIE iPad friendly

Java kept on asking me to allow it. Even if I selected "allow always" and "do not show again" it kept on asking or it every time I opened a new eercise. I do not know if it is my computer's configuration or a Mummie flaw...

Problems with Java *continued*

One major point of improvement is the requirements for using mumie. I couldn't get the app working well on my laptop. That i am not able to get the java applet of mumie working on my computer is my problem and not the problem of the MUMIE staff. To solve the problem I decided to make my exercises on the computers at the University. To my astonishment, the computers in the library and fellowship couldn't handle the applet as well. Sometimes it wouldn't load the site (this is not due to the internet connection because at the same time i was able to acces rhe website with my laptop which was connected to eduroam). Eventually i solved the problem by making my exercises on the computer of a roommate. In my opinion it is unacceptable that a course obligates you to make exercises in a certain program that cannot be run by the computers on the campus.

The big problem with mumie is, that it is really slow. it took quite a time to start. probably that can be improved.

The last weeks I got an error before opening the applet: Application blocked by security settings, so I couldn't submit my answers to the exercises of the last two weeks.

The applets were slow and required firewall adjustments.

Mumie was alright, but the java applet crashed quite a bit.

The fact that a java applet was needed for answering questions was sometimes not nice, because it did not always work The last two days prior to the deadline I had a problem with MUMIE. The program crashed as I tried to start the applet, regardless of the computer, browser or OS, as I tried it on several different computers. Because of this I was unable to finish the last exercises. A spoke to other students who had the same problem. Due to this problem I possibly missed my bonus.

The Applets are very annoying to start up, because at each different exersize you have to allow it to start.

The applet loading times are sometimes a bit longer than it should be...

Switching between problems or following links inside the program is awfully slow and should update faster, if possible.

The Java applets is very slow, wich works very annoying.

The handling of mumie is quite slow as it takes very long to load and usesjava which is not so stable on some computers.

At my home computer, the JAVA applet did not work. I have sent an email to the mumie support email address to report this, but got no respons. Luckily for me, it worked on my laptop otherwise I would not have been able to earn the bonus point.

User-friendliness *20 entries*

The program works, but user friendliness could seriously improve a students motivation. The fact that every exercise had to be executed in a new window was slightly annoying.

the user interface isn't good enough

The grading section did not always update automatically.

Sometimes you had to click on each of the exercises to get a grade for them, which was rather inconvenient.

Furthermore, the way to insert solutions could be done quicker for some types of exercises. Examples: - in the first block, getting to red echelon form would be way easier to do on paper and then just insert the solution, since the program is so slow - the way to insert solution sets, for example subspaces or eigenspaces was quite complicated, and I just skipped over those exercises

The way to submit answers was overall clear, but somewhat vague from time to time. For example if you had to select certain vectors, you had to first select the vectors in the main exercise screen and then open the java applet where your choices would appear. This made it unclear as to whether you had the right ones selected and how to delete selections, etc.

The button for viewing your Grades should be made bigger or located in the center

maybe add a bit more explanation in lecture part and indicate how to use certain applets

Sometimes it was not clear in the exercise what had to be done.

Sometimes it wasn't clear what had to be filled in.

Make the programme more user friendly, sometimes the browser crashed running mummie. And make the (some of the) homework problems more related to the theorems and training excersises in the program. Sometimes it was not really obvious what the purpose of the excersise was.

i sometimes found the excercises very confusing because i was sure i had the answer right but i didn't know how to enter the solution.

The applets should be easier to use.

The problems in mumie are overall helpful but filling in the applet was a hassle. Sometimes I had to click 3 times on a box before it would let me fill it in, which for a 6x7 matrix for example gets really annoying and made me not want to do mumie anymore as soon as I got my 60%.. If filling in answers I would have done the last weeks as well.

On some screen sizes answers could not be typed in

The mumie program was fine but some things could be better. It was sometimes unclear in wich format an answer should be entered.

I think the excersises in which vectors have to be selected in a different screen than the screen of the excersise are not clear.

I have a very small computer, so sometimes I was not able to save my solution, because the applet size was to big for my screen.

It was not always easy to save excercises because sometimes the 'save' button did not appear on the screen.

You can only see your grade when you first click all the assignments you had to make.

Positive *12 entries*

I think the platform MUMIE is a very useful and motivating tool to study Linear Algebra. It definitely helped me throughout the course.

Especially the example applets with interactive graphs helped a bunch to understand various concepts which are harder to apprehend without visual aid.

Even though it was clear what exercises had been filled in, it sometimes was confusing whether or not the part you filled in was saved or not. Other than that it is a very logical and self explanatory system. It greatly helped me in studying for my exam.

I like the mummy program and it encourages me to study.

MUMIE was a helpful tool in studying for the exam, especially the 'Algorithm' module, which helped me understand the steps to be taken for certain types of questions.

Mumie is a good way to do "something" in the period. Most students leave studying to a few weeks before the test, by doing mummie you sort of keep up with the lessons

No, it was very helpful, maybe for next year a little higher percentage, because 60% was quite easy.

For the rest, the explanations of the topics was pretty well done and helped me understand some more difficult concepts.

Besides that the mummy exercises were a great addition to the course.

For the rest of the period the program worked fine and I thought it was very helpful.

Mumie motivates most students to do at least some exercises so they get familiar with the material.

Strongly recommended as it animates the student to work, but sometimes it could be more userfriendly.

To much difference from book / exam 9 entries

The level of difficulty varied along the whole MUMIE program, some exercises way harder than they should be. And there was not always a clear connection between Lay and some exercises of MUMIE. But maybe the biggest problem is that the bonus for MUMIE only counts for the exam and not the resit. I personally was not able to attend the exam and I don't like it that I spend a fair amount of time in MUMIE to also gain the bonus point, but only hear very late in the period that it will not count for the resit. I can't understand why this was done.

exercises could have been more similar to the final test.

I thought that sometimes the exercises differed from what was written in the book. In a way it is a good thing to have different kinds of exercises, however sometimes I felt that I had no idea what I was doing on MUMIE and I believe there should be more links between MUMIE and the book in itself

It would be very helpful to others to integrate more exercises into the Mumie course that are similar to the homework exercises from the book. So you know were to look for help with Mumie.

The lecture parts of Mumie didn't even compare to the book.

If I relied on Mumie to pass these exams it would have been impossible as most things were pretty badly explained. The book was far better preparation. In all honestly, after doing mumie I didn't really feel like I learnt anything. We got these questions that weren't even exam level and were therefore slightly deceptive and made linear algebra look easier than it actually is.

I felt like the exam was way different than the MUMIE exercises

Also the last part of the Mumie exercise was very confusing. In this case, I did not know how to relate the learnt chapters and the exercises from book to the mumie questions. For the other 3 parts, this was fine!

I believe the mumie exercises should be more varied (greater number), and more applicable to the test.

Increase difficulty *6 entries*

In general the mandatory exercises were moderately easy. So it might be useful to add some more difficult (exam level) exercises. This way you can grasp the concepts of a certain subject with some easy exercises and further extend your understanding and knowledge of the subject with more difficult exercises.

Mumie was a helpful tool to understand the very basics of Linear Algebra. Unfortunately it was not so helpful to me in studying for the subject, since the kinds of questions asked in the exam were far more difficult and complex than the basics required by mumie. Also I would prefer an applet that is included in the webpage than always having to switch to a secondary window to type in the answers and then having to switch back to find the next question.

I would suggest working in difficulty levels, eg: basic principles (easy) /getting to know the course material (moderately easy) /exam level (hard). I think this would contribute to a better understanding of the course material.

I would like to see the level a little more difficult than now.

Right now Mumie is okay for understanding the basic principles, but does not really go deep into the material.

Mumie would be greatly improved with a less buggy app and harder questions. The lecture part isn't needed as we have the book, which is more than enough theory wise. You should make it more similar to coz in that regard, but keep the practice exercises as they help quite a bit when doing mumie. Good idea, but with a few fixes it could be really good.

Improve timeframes *4 entries*

Sometimes questions already had to be made before a deadline about material which hadn't been covered yet in class.

Especially the first block took quite long to close. In the meantime the lectures continued about other subjects. It would be better if all the relevant exercises could be done right after the lectures. This was not always possible since the content of Monday lectures was not included when the block was to close the next day. The new block would only open after the previous block.(except for the last week?!)

It might be useful to use weekly deadlines.

Also a lot of deadlines were on the same day as the Physics 2 exams, which made it difficult for me to complete the very last set of mumie exercises.

Other 9 entries

I noticed that there were new versions of MUMIE without JAVA, although i think it was just a pilot. Perhaps you should consider testing that version.

i had some problems with saving, after i finished the exercises of the last week it showed it was saved, but when i relogged a couple of days later it none of the exercises were saved.

It was very enjoying that sometimes it reloaded my internet browser (I was using Maxthon), maybe there could be a fix for that.

At some questions, I could't save my answers, which resulted in a blank answer and no points of that part.

I would have appreciated the possibility to have the entries corrected instantly and have maybe one extra chance of getting a wrong answer right.

I think MUMIE would be more helpful if it was possible to review your homework live. This way, if you make mistakes you still have the possibility to alter your answer correctly before it gets checked and graded.

Sometimes the demo told you exactly what to do, making the exercise itself pretty simple, because you only had to repeat the method used. I think it would be more of a learning experience if the demo would not be completely similar to the exercise.

It would be nice if the exercises would open again during the study weeks.

halfway the homework exercises, there were 2 exercises which weren't mandatory, but you would get points for them. So it was a bit unclear if you had to make these questions, or if you always get the points. So I asked the professor and therefore they changed it in Mumie. So for next year, please change that as well.

A.2.3 Computer Science part 1 and 2

Problems with Java 9 entries

I think using JavaScript instead of Java would make the amount of time needed to load the web pages in MUMIE lower. Also, there would be no need for users to install a Java JRE if JavaScript would be used.

Since I updated Java, starting any applet caused a security dialog to appear. The option to remember my choice (allow) did not work for Mumie.

Applet didn't work on Safari on OS X

I couldn't make any of the exercises because the applet never loaded (even after waiting half an hour). This was the same for Linear Algebra 1 in Q3. I tried about 4 web browsers. I tried it on the TU Delft computers. I tried it at my home computer. All with no success. I think it's unfair that some were able to get bonus points for this reason and others weren't.

Good practice, applet bit slow gave a few problems in the beginning but once you get to know the way it's been done through the applet it's quite easy.

it was good practice system with java applet sometimes slow

Had some problems running the applets, because of expired jre's. Needed to change my Java Security settings.

I have encountered difficulty to run JRE for applet .

MUMIE did not work at some TU campus computers because Java was outdated.

Positive 3 entries

slow system, though did not add to motivation to do more for the class but was fun to do online exercises instead of only paper work

Mumie is a very good means to exercise your skills in linear algebra and learn more about linear algebra. It motivates students if there is a reward for the ones who are dedicated.

Please keep mumie in the programme for future students!

User-friendliness 2 entries

I'd recommend somehow being able to view your saved answer more easily. This is quite tedious when the next question depends on your choice at the previous one.

it was very (very) difficult to get the cursor inside the textboxes. sometimes I managed, but most my time spent on mummie was trying to do just that.

Discuss more topics 2 entries

Er zouden meer onderwerpen behandeld kunnen worden.

Misschien toch meer onderwerpen behandelen in de huiswerkopgaven, Ik miste wel wat onderwerpen.

Improve bonus system 2 entries

Also, one thing that you should consider changing is how the bonuspoints are awarded. It seems to me that the giving of bonus-points are intended to stimulate participation. Right now, it has the opposite effect, because you have to have more than 70% correct to get any bonus. What would be more effective is to make it relative to how well you did, for instance, if you have 10% of the exercises correct, then you get 0.1 bonuspoint, and if you have 50% you get 0.5 bonuspoint. That way, you have 6 independent points where you are stimulated to go and make exercises. Now, if you do not make the first 2, for whatever reason, there is nothing to gain from making the other 4, because even if you would get 100% on each of those exercises, you would only get 66% maximum, which is below 70%, so no bonuspoints. This is demotivating, and this is the reason I (and many classmates with me) stopped using Mumie. Please reconsider this, because even though there is still a lot to be done about Mumie, it can be a good tool to help people to pass the class.

Also, apply bonus according to a students score. Student scored 50% of the points? -i Give 50% of half a point bonus. If you miss one week (because of illness for example) it's almost impossible to get the bonus (70% requirement), that doesn't seem fair. Overall, the system is good, but tell students about it (make sure all teachers do!) and mention deadlines

Improve timeframes *2 entries*

From each week an assignment!

Even though I did not miss any of the exercises. A notification to my mail when a new timeframe of an exercise opens, would be useful. By registering my e-mail.

Other *6 entries*

Question 18, I do not recommend. I think it's ridiculous that that is not an option. What do you mean coloured survey?

It would be extremely useful if the existence of MUMIE was even MENTIONED during the lectures. You need to search on BlackBoard to accidentally find something about Mumie. Also, it might be fair to mention Deadlines in lecture. Because I know a lot of student who didn't even know deadlines had already passed...

Solution comments are in German.

Start the e-mail with statement that this survey is mandatory for the bonuspoint.

Question 18 is biased... There's no option "don't recommend"

Make sure everyone KNOWS about Mumie.. many students didn't even know what Mumie was..

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