Quantified Student

Data visualisation

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Version History

Date	Version	Author	Comment
13-09-2022	1	Thijmen Brand, Stijn Verhagen	Document set-up
16-09-2022	1.1	Thijmen Brand, Stijn Verhagen	Overview, Research
23-09-2022	1.2	Thijmen Brand, Stijn Verhagen	Process survey answers
04-10-2022	1.3	Thijmen Brand, Stijn Verhagen	Canvas API research, Graph Typedefs

1. Overview

1.1 Preface

Quantified student is a student dashboard where students can visualise their study performance. They can compare this data to other data sources to discover patterns in the way they study and how they can improve on that. This document is to learn what data sources are valuable for the student and how we can visualise this data.

Assignment

For this assignment we are developing a dashboard in which a student can see his study performance in contrast to other factors that could have an influence on it.

What's it for?

This visualisation of different relevant data points can help the student get better grades and improve his overall study score.

Team

Thijmen Brand

Stijn Verhagen

1.2 Information stakeholder

Eric Slaats

Eric Slaats is a man, father, partner, eager to learn, enthusiastic, spontaneous, musical, musician, guitarist and he also teaches at Fontys Hogeschool ICT. He writes books and is currently researching the behaviour of neural networks in a financial environment. Eric is inspiring and innovative and therefore fits well with the first edition of TEDxVeghel. He is always looking for the next innovation, the next step in the educational field. Enthusiastic looking for reinforcement, nationally, internationally and always looking for distinctive ways to improve education.

1.3 Personal goal - Thijmen

With this document I want to gain insights in how students think about their own performance and how that would be measurable. Then I want to think about how we can visualise this data in a structured and ordered way in which every student can see the insights that they value the most.

1.4 Requirements (MOSCOW)

The checks visualise the completion of the requirements.

Must have

Dashboard

1. As a student I want to be able to choose which graphs I see on my dashboard.
2. As a student I want to be able to move graphs on my dashboard around to organise them in a way I want.
3. As a student I want to be able to grow and shrink graphs on my dashboard to preferable size.
4. As a student I want to be able to combine data points in one graph
5. As a student I want to be able to add or remove a datasource from my dashboard.
6. As a student I want to choose the timespan of an average. - See explanation

Canvas

7. As a student I want to see my Canvas course progression.
8. As a student I want to see how much time I have spent inside my course.
9. As a student I want to be able to see upcoming deadlines.

Attendance

10. As a student I want to see how many hours I have attended at school

Should have

Canvas

11. As a Fontys student I want to see my newest grade in contrast to my overall average grade - See explanation

Could have

FeedPulse

12. As a Fontys student I want to be able to see my feed pulse data

Won’t have

Dashboard

13. As a teacher I want to see the performance of my students

1.4.1 requirements explanation

For the dashboard it is quite important that we show historical data from the student. For example the average grade or the average attendance. But when you have a bad week for example where you are not at school very often or if you score low grades, then these events will impact that average even after a year. In order to compensate for this we will give students the option to choose how far back an average should go. A weekly average, monthly or yearly for example. There also will be the option to see the all time average. If this is the case we will make use of a decaying average.

2. Research

2.1 Relevant information

In order to gather relevant information about what data should be visualised and how we should present it in the dashboard, we sent out an enquete. This enquete is distributed to students who are currently studying at different educational institutions.

The first thing we wanted to know was whether students thought a performance dashboard was useful at all. The results show that 57% of the respondents answered yes to this question and another 35% said maybe. These answers are enough to even start the project.

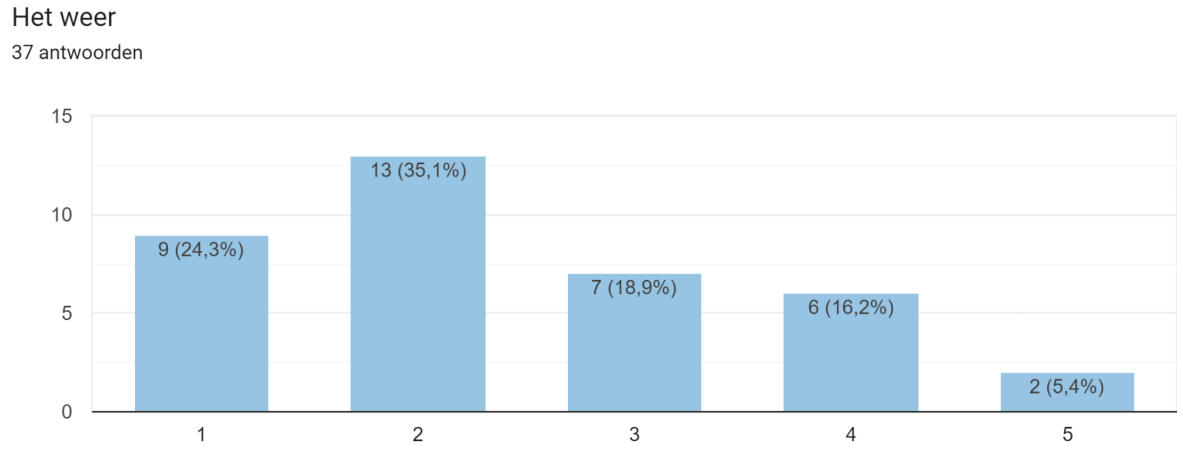
Before we sent out the form, we already had some factors that could have an impact on study performance, and we first wanted to test whether people agreed with the factors we defined. The results are as follows;

2.1.1 Enquete

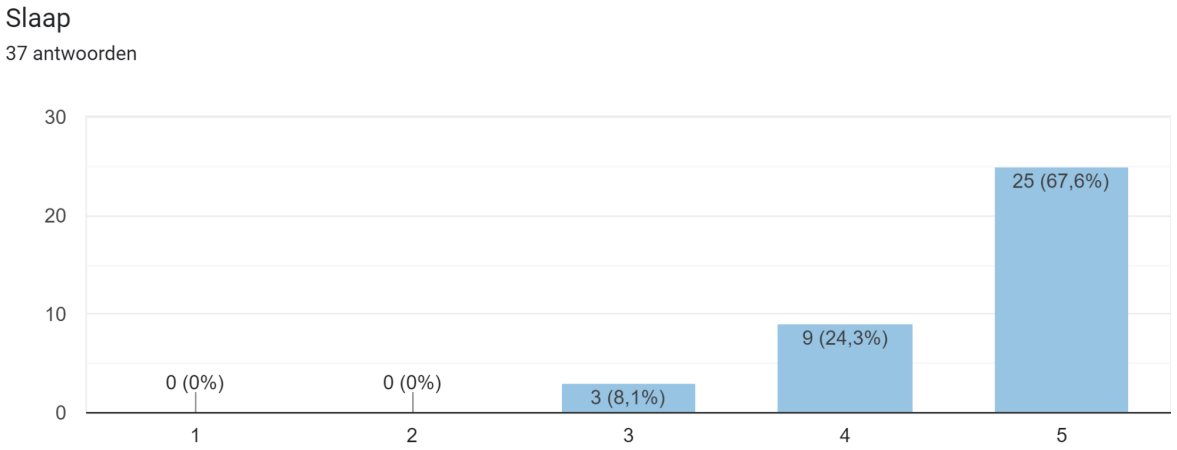
The survey we conducted is visible on the quantified student github

[Enquete location]

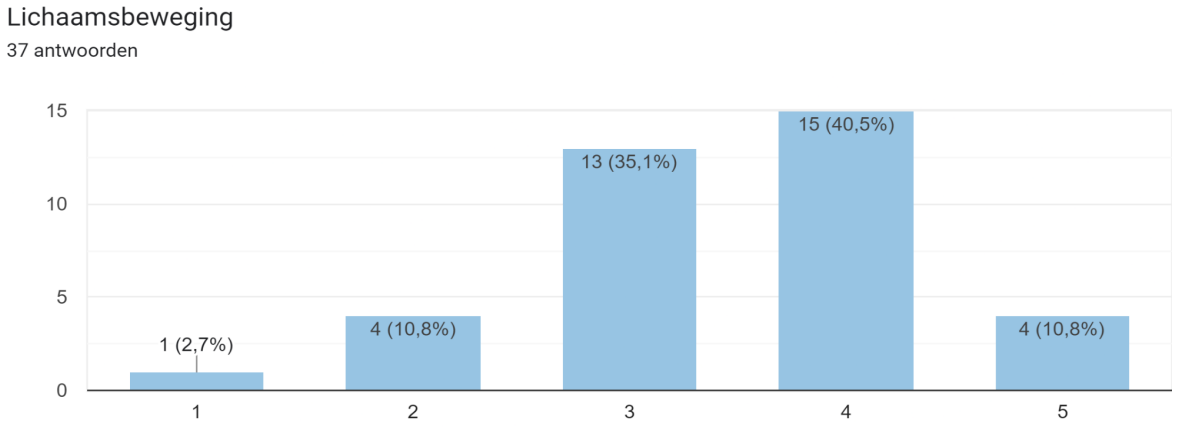
(Answers are on a set scale from 1 with least influential to 5 most influential)



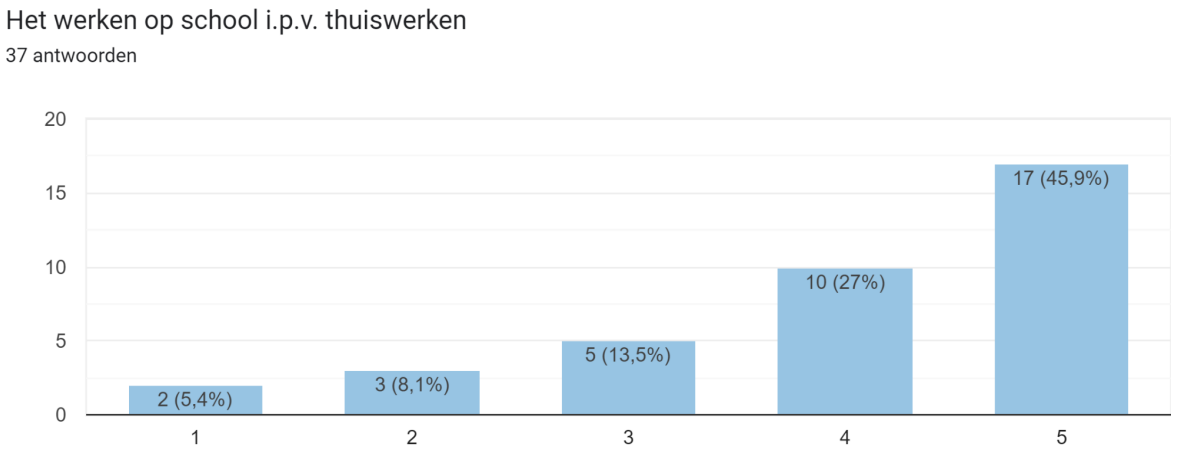
The main reason people found weather less influential on their study performance was that they just didn't care for two reasons, or they were most of the time inside and the weather didn't bother them, or they had to travel either way and just took it for granted.



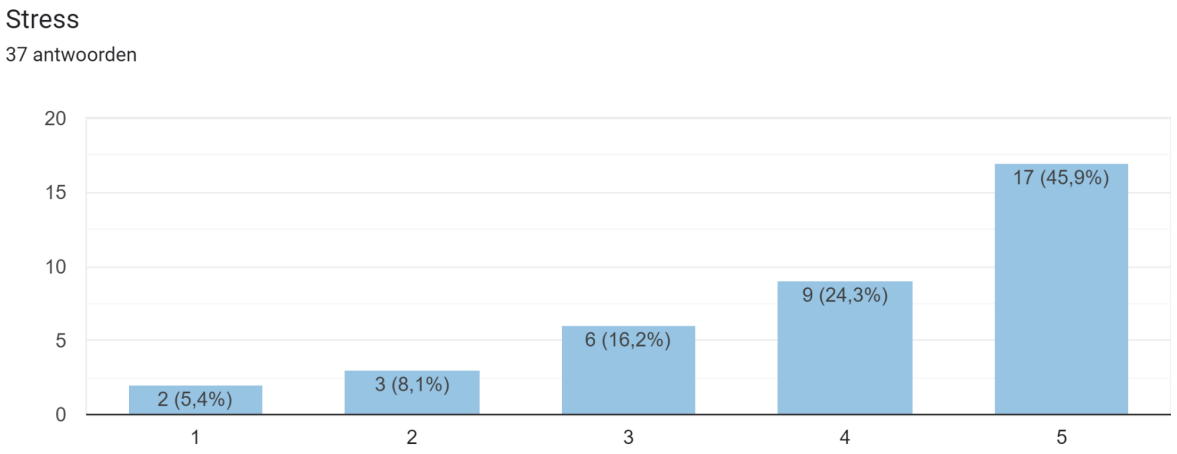
Sleep appears to be one of the most important factors for study motivation. Students mostly feel like they are lousy and without energy when they don't sleep well.



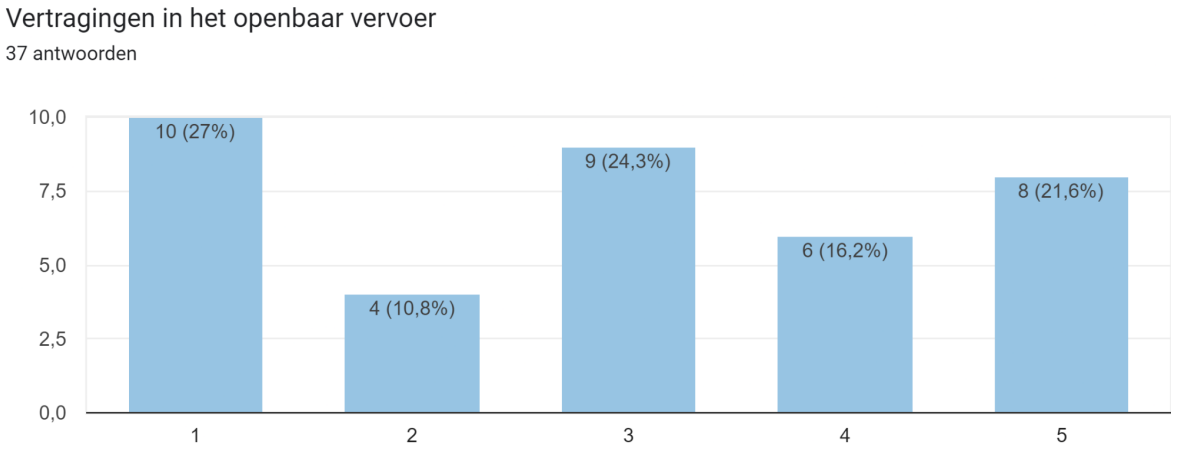
Physical activity makes students more relaxed, focused and alert, which has a positive effect on learning performance.



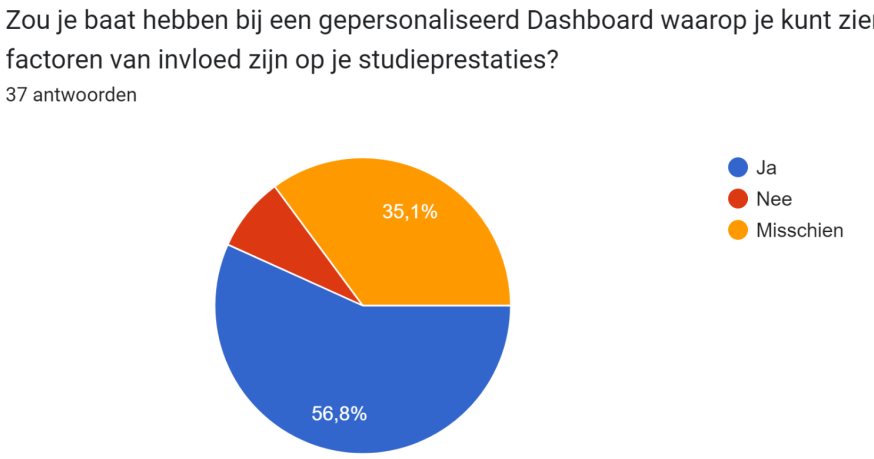
Working on site also seems to be an important factor for the students. They feel more motivated to work / learn on projects and get more done. The main reason for this is that students feel that they have to accomplish something when they work on campus.



Students who are under stress seem to work either more or less, the answers vary. Some students feel more motivated and can achieve more when they work under stress, while others feel demotivated and start procrastinating under stress. Either way, they believe it has a big impact on their motivation at school.



Public transport seems to be very distributed among the respondents. This can be explained by the fact that not all students use public transport and use other alternatives such as the bicycle or the car. However, those who do use public transport say that it can have quite an impact when, for example, trains do not arrive on time or public transport goes on strike again.



Most students think that a student motivation dashboard is useful for their personal development. 35.1% of the students do not know if the dashboard will help them in any way. This could be related to the fact that they do not know exactly what data will be included in the dashboard.

2.2 New data points

The survey consisted of some confirmations of the data points already defined. But we also wanted to see if students had other factors that they thought had an impact on their academic performance. The students surveyed brought in a lot of different points that we hadn't thought of yet, however not all of these factors were measurable for us. We selected four new factors that we found interesting to include in the performance dashboard, namely:

1. Workload
2. Physical activity
3. Lesson times
4. Screen time

But these points are not measurable in an easily visualised way. Some of this data is also not accessible for us to collect.

2.3 Canvas API

We have analysed the Canvas Api endpoints to discover possible new data points that we could use and from which we could gain new insights. In doing so, we concluded that there are no new useful endpoints that could be used for the purpose described above.

2.4 Graphs

Many graphs are based on one on multiple. With this I mean for example a grade graph is based on one course, but people often have more than one course. People must be able to choose for which course they want to visualise their data. This then could be platform wide, or just for one graph.

2.4.1 Grade graph

In order to visualise the past grades a student has gotten we want to make use of a line graph. This way a student can easily see a trend in the grade. This graph then only has an x axis where the grades are plotted.

But with grades already comes a problem. That is that there are many different grading schemes. Some institutions work with 1-5 some with 0-10, others with USGE and a whole bunch more. To accommodate for this difference we have two solutions. The first is to recognise which grading scheme is beïng used for the canvas data and automatically apply that in the graph. The second option is to add some configuration to a graph (The grading graph in particular). Then the user can select the grading scheme themselves which is the safest and most reliable option.

2.4.1.1 Average grade vs last grade

To emphasise the grade graph and to provide more insights in the grades a student gets we make use of a graph which compares the last gotten grade against an average[1] grade.

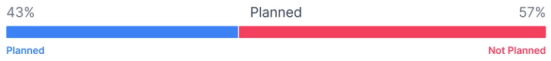
[1] For an term explanation of the term average, see chapter 1.4.1 on page 7

2.4.2 Course graphs

This configuration on the grade graph comes in handy for these types of graphs too. As said earlier, students are in multiple courses, or students don't follow a course anymore but it is still in their canvas. This problem can easily be solved by letting the student choose which course(s) he wants to see.

2.4.2.1 Ongoing courses

A course has assignments in it that need to be made. We think it is valuable for a student to be able to see the amount of assignments submitted versus the total amount of assignments in a course. This way a student can see if they need to get productive or not.

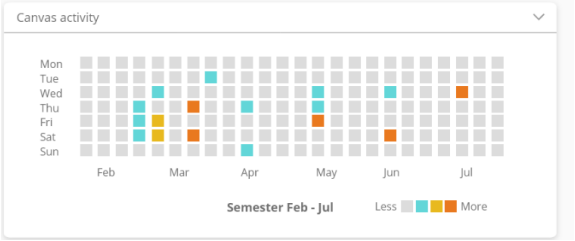


2.4.2.2 Spent hours in a course

Apart from the submitted assignment, the time you spent in a course can be of value too. This can provide insights into how much you have already done or how much of the information you already know. A student can then configure which course he wants to see and over what time period[2]

2.4.2.3 Canvas activity

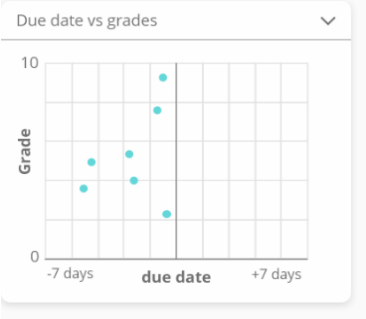
We can imagine that some periods of the year are less productive than others. That is why an overall activity plot could be very useful. It gives students insights in more and less productive periods over the year.



[2] For time periods and averages explanation, see chapter 1.4.1 on page 7

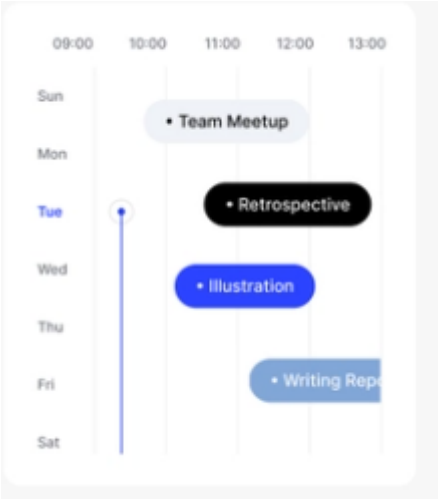
2.4.2.4 Due date versus grade

It can be insightful for students to see the relation between the due date of a project and the grade that submission resulted in. For example a student can be way to late with submitting or way to early where he better had overlooked his work once again



2.4.2.5 Upcoming deadlines

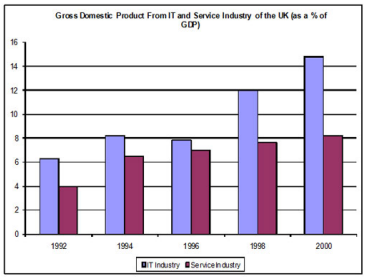
When a student has many different things in his life, it is understandable that some deadlines will slip through or get forgotten until the last moment. That's why it can be handy to include an upcoming deadlines section in the dashboard to always see the deadlines you have



2.4.3 Attendance

Proven is that the more a student is present at school and attends lectures, the better his study prestations are. That is why an attendance graph could have great value. Here again, can the student choose its own time span and average[3]

[3] For time periods and averages explanation, see chapter 1.4.1 on page 7

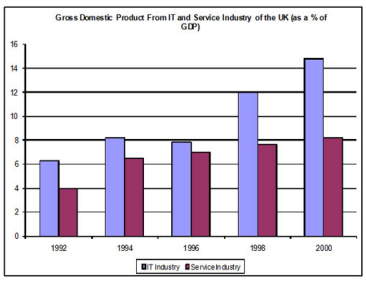


2.4.4 Biometrics

A big part of the mental health of a student comes from movement, social activities and sleep. And when the mental health isn't good, most likely that study performance isn't good either. That is why it can be valuable to see data like hours slept or activity hours.

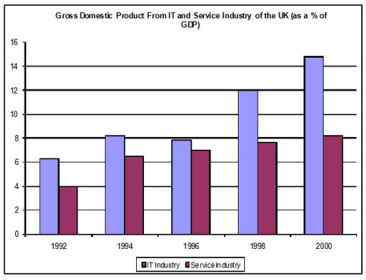
2.4.4.1 Hours slept

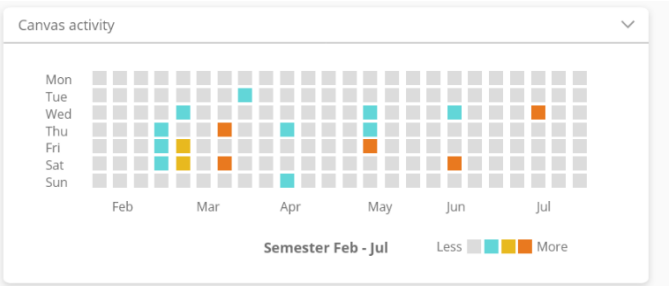
When a student sleeps badly or very late, we can maybe see that grades are dropping. Or maybe a student can see patterns in his sleep where he sleeps very late, but also wakes up at the end of the morning. Then he can think about another living pattern. That's why sleep data can be useful



2.4.4.2 Activity

A student needs activity to be able to focus properly.





3.4.5 Combining graphs

We realise that some things can have correlation, as said earlier. That is why we want to provide users with the option to combine graphs in one. For example sleep and grades can be something that has correlation. Or attendance and grades.

Users can add graphs that are compatible together. So a line and a bar graph can go together, or two line graphs. But you can't combine a heatmap with an line graph.

2.5 Design

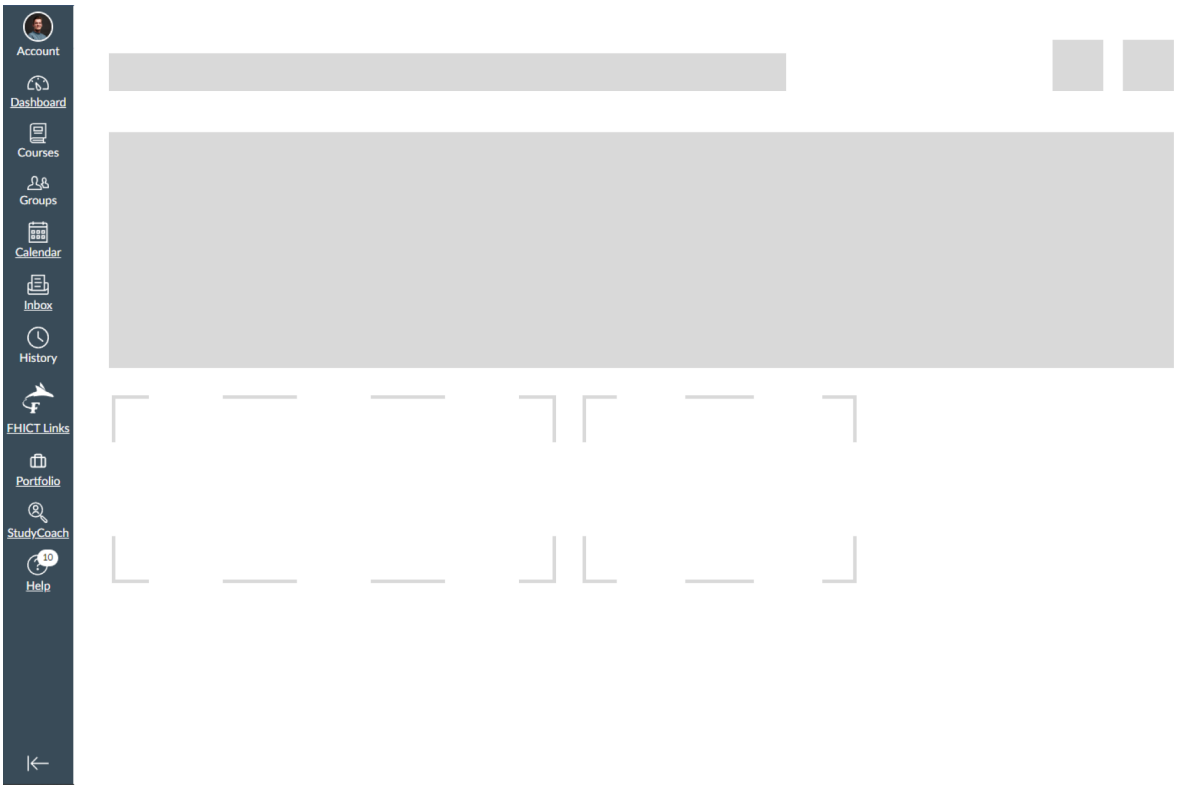
2.5.1 User experience

There are a lot of data points the user can draw conclusions from and not every user finds the same data relevant. So in order to make the dashboard work for everyone it has to be customisable to a student's needs.

To realise this extent of customizability we have come up with a few requirements.

1. As a user I want to be able to add and remove data points from my dashboard.
2. As a user I want to be able to rescale data points that I think are more or less relevant.
3. As a user I want to be able to rearrange date data points on my dashboard.
4. As a user I want to be able to define what performance it is.

2.5.2 Wireframe



3. Result

In this document we wanted to discover what different data sources are valuable to a student in a way they can improve their study performance. In order to do this we have surveyed different students from different study institutions. We have come up with a few different data sources and tested the validity of them in our survey. We also asked the student what data could be valuable for them to gain new insights we possibly didn’t think of. The results of this survey have been analysed and worked out in chapter 2.1. After this we taught about the completion of these graphs and data sources. This can be found at chapter 2.4