# EduQR

## Group 12:

Avgerinos Demosthenous s2343460 Christian Jerkovic s2089033 Jean Luis Clement S1985205 Gratsiela Lyutskanova s2167352 Mengmeng Li s2357682 Shuhang Tian s2357682

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### **Background & Motivation**

Teachers and educators in different fields have a central part in our society. Their role is to inspire, encourage, motivate and leave a positive influence on students' lives while helping them achieve their dreams and pushing the limits of their potential. Every year a new generation of students appears while the old generation leaves to prospect for a positive future and play an important role in the world's social and economic life.

Even though teachers are the ones we look up to for knowledge and guidance, their lifelong learning is what characterizes them as good teachers. For them to continuously improve, feedback and self-assessment are the tools needed for their hard work to be rewarded in the form of appreciative comments and honest evaluations. The importance of feedback to promote personal and professional growth is crucial at all levels of education and might have an immediate impact on the performance and learning process.

Additionally, according to a study from the Hamdard Institute of Science and Research in Delhi, India (Husain & Khan, 2016), two-thirds of students and teachers agreed that student feedback is an effective tool for faculty development and overall assessment of a teacher. Therefore, our aim for this project is to *empower education* by gathering valuable feedback from students using scientifically validated surveys to improve course and teaching performance. Our goal is to create an easy-to-use bilateral feedback collector to increase student participation as well as a teacher ranking system that may help students make the right choices when selecting a course, program or even university.

**Keywords**: education, student feedback, teacher assessment, teacher quality survey, course survey, validated survey, teacher ranking, teacher performance, QR code

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# 1. Introduction

In the following section, we will discuss the positive and negative sides of existing feedback approaches that assess teacher qualities and educational courses. By stating the problem at the beginning, we will lay a foundation for our proposed solution and the change it can bring to education. We will then continue with a brief introduction of our product – an innovative tool for feedback collection with positive-driven aspects – and most importantly discuss why we think it can solve the problem of the existing approaches.

#### The existing approach

In general, high educational institutions have established a substantial feedback approach at the end of their courses. This approach, however, is not only applied in universities and colleges but also in all sorts of schools and training facilities. At the end of every course, module or semester a survey is distributed among students, most commonly via email. In practice participation is not mandatory and often anonymous to minimize bias and help students freely express their concerns and opinions without fear of negative consequences.

#### Advantages and disadvantages of the existing approach

Certainly, course evaluation surveys have the advantages of being enduring, unbiased and detailed enough to gather as much important feedback as possible to help improve the overall course structure. This approach is well established and has been used for decades, proven to collect meaningful data. However, it rarely targets specific teacher's qualities and often focuses on the course organization only. Moreover, it is long and contains countless open questions which are extensively time-consuming, and it is one of the most common reasons for low participation.

For example, at the University of Twente, after every module, an evaluation survey is distributed among students. Unfortunately, it mostly asks for feedback about the course organization and content and briefly about teachers. It consists of mainly open-ended questions and often takes more than 15 minutes to fill in properly. For instance, Figure 1, taken from an existing UT survey, contains three open questions with a maximum of 200 words. The time to write, on average, 75 words per question already exceeds 10 minutes and students, in general, do not participate if the time required to take a survey is more than 4-5 minutes. As a result, participation often does not reach even 15% of all enrolled students.

Moreover, this type of course evaluation survey usually collects mainly negative reviews. According to a new study (Lubag, 2023), people are more inclined to write negative feedback than positive due to the heightened emotional response and the fact that negative experiences last longer.

lease grade the course altogether:								
very good	0	0	0	0	0	0	failed	O abst.
lease give us your feedback as well as suggestions for improvement about	the cou	irse Ge	ometry	in Arct	nitecture	e. (ma	ximum 200 cha	aracters)
ease give us your feedback as well as suggestions for improvement about	the cou	irso Lin	oar Alg	obra fo	or Static	s Calc	culations. (max	imum 200 characte
ease give us your feedback as well as suggestions for improvement about	the cou	irso Lin	oar Alg	obra fo	or Static	s Calc	culations. (max	imum 200 characto

Figure 1. A part of an existing University of Twente module evaluation survey (EvaSys, 2022)

#### The solution

In conclusion, even though the existing feedback approaches are well established, they have the following drawbacks of being time-consuming, negative-driven, imposing low student participation and often too generalized. As a result, our mission was to design a tool based on positive-driven feedback to assess teachers' qualities and make an honest ranking of the best teachers while valuing their hard work and effort. We aimed to create an easy-to-use and time-efficient product, both for teachers and students, with an interesting and interactive design which will attract more students to participate.

In Table 1 below, we made a comparison between the drawbacks of the existing approaches and the solutions proposed by our design. In the next section, we will discuss in more detail why our application will solve those problems and how.

Existing approaches' disadvantages	Design proposal
<ul> <li>often time-consuming</li> </ul>	<ul> <li>easy-to-use and time-efficient</li> </ul>
<ul> <li>negative-driven</li> </ul>	<ul> <li>positive-driven</li> </ul>
<ul> <li>impose low participation</li> </ul>	<ul> <li>improve student participation</li> </ul>
<ul> <li>are too generalized</li> </ul>	<ul> <li>focus on different teacher qualities and course aspects</li> </ul>

Table 1. Comparison between the existing approaches and proposed solution

# 2. Project proposal

We propose an application that allows teachers to create questionnaires only for the topics and qualities they are interested in. The personal qualities as well as course questions are combined into different domains. Each domain contains questions only about the specific quality/topic. Moreover, each domain contains only scientifically validated survey questions. That is, we as developers, do not come up with the questions nor do the teachers themselves. They are specifically designed to measure every aspect of the domain. This approach not only **saves teachers time** in writing their own surveys but it also ensures that the questionnaires will measure what it was intended to measure.

Additionally, since most course evaluations are negative-driven, we wanted to focus on the positive aspects in this product. That is why, we gamified the process of feedback collection by introducing a teacher ranking system and badges collection. We believe that this approach will motivate teachers to use the application more often without the negative aspects of ranking. Moreover, teachers can choose whether or not to be included in the ranking.

After teachers create a survey, a QR code will be generated which can be easily shown on the board in real time to the students. The process of survey creation and QR code sharing takes no more than 3-4 minutes. Students can take their phone and scan the code in real life. They do not need to login or create an account, surveys are completely anonymous. The only thing that needs to be done is entering their student identification, that is student number or an email, depending on the institution. Additionally, answering all the questions in a survey does not take much time as there are no open questions.

### 2.2 State of the Art

After extensive research we found another similar application called RateMyProfessor. Figure 2 below, shows a picture of a dashboard from the professor David John. There are a lot of similarities with our application and a lot of differences too.

#### Similarities

As you can see from the Figures 2 and 3 below, the teacher has an overall rating of 3.6, there are some statistics shown on the right about the rating distribution. Additionally, there are top tags like *Tough Grader* and *So Many Papers*. These top tags a bit resemble our badge system. However, the badge system is a positive-driven one which intends to gamify the application and motivate teachers to

use the application while these tags are probably assigned by students instead of earned as a reward.

#### Differences

We also have a rating inside the leadership board but it is not so visible. The idea is not so much to rate the qualities and point at good and bad teachers but rather to positively grade teachers' qualities in a fun and interactive way. Another difference is in the statistics. RateMyProfessor only gives a distribution while our statistics are based on validated surveys and different qualities and course aspects. Moreover, the other application does not ask for any feedback except a score rating from 1 to 5. Even though this dashboard is pretty self-explanatory, it looks a bit boring. Our goal was to make it fun, interactive, easy to use in order to increase participation and motivate teachers to use it. At the end of the day, no one really wants to see their negative grading or tags but rather a positive competition between colleagues, funny interesting badges and



Figure 2. A teacher dashboard taken from the website RateMyProfessor



DashBoard										
Profile Overview				Recent Survey	Results					
	Name:	Avgerinos Demosthenous	ß	Survey Name	Date Created	Status	Total Students	Students Answered	Students Pending	QR Code
	Email:	avgerinos.demosthenous( om	@gmail.c	123	2023-11-12 09:24:02	active	6	0	6	00
Profile Badges										
	යි	යි	යි							
	Ċ	Ċ	Ŀ							
My Score				LeaderBoards						
				Show 10 v	entries			Search:		
				Rank		Name		♦ Score		÷
				1		Avgerinos	Demosthenou	171.25		
				2		Ramish B		64		

Figure 3. The dashboard page from our application

25.5

1.11

# 3. Requirements elicitation

Table 2 below, contains the requirements elicited during the first few meetings with the client in the form of user stories while Table 3 contains the system requirements. We decided to apply the MoSCoW analysis which stands for Must have, Should have, Could have and Won't have.

Requirement	MoSCoW
Sign up and Login	
As a teacher, I want to be able to create an account	Must
As a teacher, I want to be able to login with my email address and password	Must
Main page	
As a user, I want to be able to read user reviews and comments about the application	Could
Create survey	
As a teacher, I want to select 1 or more quality domains when creating a survey	Must
As a teacher, I want to see all questions inside a survey domain when I click on it	Must
As a teacher, I want to be able to share a QR code when a survey is created	Must
As a teacher, I want to be able to share a link when a survey is created	Must
As a teacher, I want all the surveys to be scientifically validated	Must
As a teacher, I want to upload a file with all available students that can participate in the survey	Must
Survey submission	
As a teacher, I want to be able to know how many people have responded to the survey	Must
As I teacher, I want to be able to see history of all surveys I created	Should
Results Calculation	
As a teacher, I want to be able to see the statistics of every questions	Must

As a user, I want to be able to see the ranking of the teachers	Should
Dashboard page	
As a teacher, I want to be able to see what badges I have obtained	Should
As a teacher, I want to be able to decide whether to participate in the ranking or not	Must

Table 2. User stories

Requirement	MoSCoW
Sign up and Login	
When a new teacher is creating an account, the system must be able to validate that there does not exist another user with the same email address	Must
When a new account is created, a confirmation is sent to the provided email	Must
If the email or the password are incorrect upon logging in, the system should output an error message	Must
Main page	
The main page should have a description of the application so users can have an idea of what is it used for	Could
Survey creation	-
The order of the questions inside a validated survey must never change	Must
All questions must be validated and their wording must be preserved	Must
Survey submission	
When the student enters student identifier, the system checks if it is part of the file provided by the teacher	Must
If the student's identifier is contained in the students file, a new page with the corresponding survey is opened	Must
If the student's identifier is not contained in the file, no survey is shown and an error message appears	Should
If all questions are answered the student can click <i>Submit</i> and submit a survey	Must
Results calculation	
When a student submits a survey, the mean value of every question is updated	Must

When the mean value is updated for every question, a new mean value for the domain is recalculated	Must
The mean values for every domain is shown on the dashboard	Should

Table 3. System requirements

24

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### 2. Deliverables

#### **Project Proposal**

After receiving the project our first job was to update the proposal with new requirements and a new plan. This worked as an agreement between the team and the supervisor on what is the expected deliverables and when do we have to deliver them.

#### Minimum Viable Product

Following our agile scrum approach every week we needed to show our MVP to our supervisor to receive feedback and demonstrate the project's progress. In every iteration of the MVP, we needed to show improvements in the user interface and the back end of the system

#### **Final Product**

The final product should be a webpage it should, list all requirements of the final product

#### **Project Report**

The project report is a detailed documentation on what happened during the development of the project, explaining our procedure and choices.

#### Poster

At the end of the module a poster should be presentend showcasing the product and its design. The purpose is to make people interested in using our application

#### Presentation

At the end of the project, a presentation must be given, which demonstrates the technical aspects of the applications and the explanation of why they were used, such as the choices of the software key and functionalities. At the end the team should answer questions for supervisors and other students.

#### Roles and responsibilities:

#### Avgerinos:

Responsible for attending all the on-campus meetings to keep up the team with any updates. Helped with creating all of the presentations.

The middle man between the designing team and writing team so everyone is on the same page.

Worked on all the deliverables

Recruit students and teachers for user testing/ market research.

Contacted Market research with both students and teachers.

Contacted User-testing with both students and teachers.

Wrote a big part of the final report and general edits:

- Risk analysis
- Design: Front end back end and Security
- Market research
- User testing

Conclusion

#### Mengmeng:

Project rapid prototyping

Implement the following front-end and back-end functionality:

- Pulls data from the front-end database to display recent surveys
- Allow users to add names from the dashboard itself
- Modify surveys to show all survey history

#### Shuhang:

Create a rapid project prototype for team discussion Implement the following front-end and back-end functionality:

- Fill in the text on the frontpage (index.html)
- Modify the signup button on login modal too a link
- Update index.html with new javascript and css links to keep design uniform
- Set a uniform page logo and name for the app

#### Gratsiela:

Create the presentations for the peer reviews

Create the faculty presentation

Create the project proposal presentation

Literature review of teacher competence

Literature review and delivery of the validated surveys

Deliver and analyze the validated surveys results interpretation

Taking notes during the meetings with the client

Extensive work on the final report and making it a coherent document

- Background
- Motivation
- Introduction
- Project proposal
- Requirements elicitation
- State of Art
- Validated surveys literature review
- Future work
- Appendix A
- Appendix B

#### Jean Louis:

- Created the landing page (index.html)
  - Created the top navigation bar.
  - Created modals for login and signup.
  - Added images.
  - Added placeholder text.
  - Created an Awaiting confirmation page, after signup.
- Created the dashboard page
  - Created the top navigation bar.

- Added profile picture on the top nav bar.
- Added a dropdown menu to redirect to profile(WIP) and settings page(WIP).
- Added an forentend alert system(WIP).
- Created the survey production page
  - Created page v1 for creating a new survey.
    - Users were able to select the questions and associated categories to create a new survey.
    - Survey name input was created.
    - Student list file upload was created, along with functionality to wipe the uploaded student list and add a new one.
    - Redesigned the survey page to meet new client requirements, where questions were fixed to each category.
    - Redesigned the Survey name and file upload to meet uniform design requirements.
    - Added functionality to send a post to the backend to register the creation of a new survey.
    - Created a javascript method to check whether the survey was correctly added to the backend and if so to redirect the user to the QR code page.
- Redesigned the QR code page
- Created the survey history page
  - Imported the data tables library for better table visualization and functionality.
  - Created template data to display future data from the database
- Created the survey result page
  - Created the visualization card for each category to display the overall score for each category and the question set associated with it.
  - Added javascript functionality to change the colour of the progress bars based on the user's score relative to the validated mean for each question.
- Redesigned the error page for invalid website links
- Redesigned the student landing page
- Redesigned the poster for poster presentation
- Created the links between all the pages.
- Fixed URL routing issues between pages.

#### Christian:

- Responsible for hosting and deploying the webapp
- Responsible for GIT Management
- Created Sqlite database and design
- Created Flask Login System
- Implemented Bcrypt encryption for password hashing
- Created validation rules for login and registration
- Created Email confirmation registrations system.
- Created Backend logic for survey creation
- Created Backend logic for survey answering
- Created Backend logic for student answering validation
- Created Frontend implementation for EXCEL and CSV file student list upload
- Implemented QR code generation
- Implemented hashing of student numbers

- Created Backend logic for scoring system
- Created Backend logic for closing survey
- Created Backend logic for displaying survey results and means for each survey
  Redesigned poster for poster presentation

# 3. Risk analysis

The following risk analysis aims to identify and assess potential risks associated with the development of our product. Effectively managing these risks is vital to ensure the successful and timely launch of the web application. By identifying and addressing potential challenges proactively, we can minimize the negative impact on the project's progress and objectives.

### 3.1 Risk Identification

Risk Categories:

Risk Sources:

- Technical Risks
- Market Risks
- Operational Risks
- Financial Risks
- Security Risks

### 3.2 Risk Assessment

Likelihood:

- Technical Risks: Low
- Market Risks: High
- Operational Risks: Moderate
- Financial Risks: Low
- Security Risks: Low

- Impact:
- Technical Risks: High
- Market Risks: High
- Operational Risks: Moderate

Internal (development team, project management) External (market competition, third-party services)

- Financial Risks: Low
- Security Risks: High

*Risk Matrix*: (High = **Red**, Medium = **Yellow**, Low = **Green**)

Risk Matrix			
NSK I		Likelihood	Impact
	Technical	Low	High
	Financial	Low	Low
Risks	Security	Low	High
	Market	High	High
	Operetional	Medium	Medium

Figure 4: Risk Matrix

### 3.3 Risk Description

### 3.3.1 Technical Risks

Within the technical realm, our risk analysis has identified potential risks characterized by a low likelihood of occurrence but a high potential impact if realized. For instance, since our product is a web application if anything technical happens then there will be no application.

#### **Identified Technical Risks**

1. Critical System Failure:

Causes: Unforeseen hardware malfunction. Consequences: Extended downtime of the hosting server. Mitigation Strategies: Have a backup hosting server to be able to maintain the application always available

2. Data Breach or Security Compromise:

Causes: Exploitable vulnerabilities in the system. Consequences: Compromised user data, legal ramifications, damage to reputation. Mitigation Strategies: Regularly conduct security audits and penetration testing. Enforce strict access controls and encryption protocols.

3. Unforeseen Technology Obsolescence:

Causes: Rapid advancements or discontinuation of key technologies. Consequences: Incompatibility, and increased costs for technology upgrades.

Mitigation Strategies:

- The software team should stay up to date with new technologies
- Develop a technology roadmap with flexibility for future upgrades.

Risk Monitoring and Control:

Implement continuous monitoring systems to detect and address emerging technical issues as soon as they arise.

Conduct regular drills and simulations to test the effectiveness of risk mitigation strategies.

### 3.3.2 Financial Risks

Finance is not a problem for the project at the current state but more information can be found in the Market Research section.

### 3.3.3 Market Risks

The Market Risks are discussed in the Market Research section of this report.

### 3.3.4 Operational Risk

Operational risks play a significant role in the success of our project. In this analysis, we have identified operational risks with a medium likelihood and medium impact. These risks, while not exceptionally high, require careful consideration and proactive management to maintain the project's overall effectiveness.

1. Resource Constraints:

Causes: Unexpected shortages of human resources. Consequences: Increased workload and potential delays. Mitigation Strategies: Cross-train team members to mitigate the impact of resource shortages.

2. Regulatory Changes:

Causes: Governmental regulations. Consequences: Potential legal challenges. Mitigation Strategies: Stay informed about relevant regulations and anticipate changes.

# 4. Validated surveys literature review

In this section, we will investigate what is a validated survey and why it is important for our application. Afterwards, we will discuss some of the design choices such as why we chose validated surveys instead of creating our own or letting users create theirs. Additionally, we are going to investigate the surveys we had chosen and discuss why they are suitable for this application as well as some of the surveys that did not end up as part of the final product. At the end, we will close the section with results interpretation and possible improvements of the specified approach.

### 4.1 What is a validated survey?

According to the National University Library (NCU, n.d.), a validated survey is an instrument that measures what it was intended to measure. The validation of the instrument is the process of assessing the survey questions for their dependability and reliability. This type of questionnaire goes through an extensive statistical analysis and contains questions which cover all aspects of the thing we want to measure. Typically, validity is established after the survey has been reviewed by two different parties – the experts on the given topic and methodologists who check the questions for confusion and accuracy (WorkTango, 2023). Moreover, the order and flow of questions, the wording, how long it takes to complete as well as the points of rating (5-scale, 10-scale etc.) are some of the factors that impact validity and data reliability (WorkTango, 2023).

### 4.2 The importance of validated surveys for our product

If a survey goes through all of the above, then it has been proven to realistically measure the right thing. Ensuring reliability, dependability and validity contributes to the quality and rectitude of a product. Moreover, researchers and, in our case, educators can have confidence in the accuracy of the results. By including validated surveys in our application, we can establish a product that is dependable, and trustworthy and all the results will capture precisely what we intend to measure.

### 4.3 Design choices

In the following section, we will look closely at the validated surveys we chose and aim to answer the following design questions.

#### Why did we decide to choose validated surveys instead of creating our own? Why did we decide to choose validated surveys instead of letting teachers create their own?

The first and most important reason was because of the **client requirements**. During the requirements elicitation period, we were asked to include only scientifically validated surveys. The task of survey discovery and its literature review turned out to be a very strenuous and time-consuming process. As a result, the client reduced the requirements to using non-validated surveys if we could not find any appropriate validated ones for the time

given. Even though we were allowed to use non-validated questionnaires, we managed to find two suitable, reliable and trustworthy surveys at the latest stage of implementation.

Additionally, choosing validated questionnaires would tremendously **increase the accuracy of the results which would capture precisely what we want to measure and make the product trustworthy and reliable**. The developers of this application are confident in their technical skills but are highly inexperienced in creating appropriate surveys. Researchers spent years to create and validate a survey and we can take the opportunity to use their work to create a product that is reliable and innovative. Creating our own questionnaires will most certainly not capture all the aspects of the given competence the teacher wants to measure. Even though the requirements were reduced at a later stage of the development, we stuck to the design choices of the client and successfully found, reviewed and implemented into the application validate questionnaires.

Moreover, one of the goals of this application was to be user-friendly, easy to use and **save teachers' time and effort**. Letting them create their own surveys will not make as big a difference as the module evaluation surveys of UT or other universities. Before creating a survey, users are allowed to read all the questions and decide if they want to ask their students or not. With only one click of the mouse the teachers have numerous questions at hand and a complete valid, reliable and professional survey ready to be distributed among their students. The process was intended to be extremely **easy, effortless and time efficient.** 

### 4.4 Literature review

In this section we will look closely at the two validated surveys used in our application. We will discuss their domains, the questions in the corresponding domains, the applied measurement scale and the descriptive statistics such as mean value, standard deviation and item correlation. Moreover, we will investigate why exactly the survey is validated and how.

### 4.4.1 Terminology

Before diving into the validated surveys, let first discuss some of the terminology used to help the reader understand easily the motivation behind these surveys.

Termin	Description
Domain	It contains all the questions that cover all aspects of the thing we want to measure. For example, the domain <i>Appropriate Workload</i> contains 4 different questions which intend to measure whether the study workload was appropriately distributed across the course. In case the study was not validated, we could have simply asked the student to assess the workload from the scale 1

	to 5, for example. However, how can teachers be sure that this question accurately measures the study workload? The validity of the domain already ensures that the questions cover all aspects of whether the workload was appropriate or not.
Measurement scale	All questions inside a domain have the same measurement scale. For example, the domain <i>Appropriate assessment</i> has a measurement scale 1 to 3. This means that all questions can be answered with values 1 to 3, namely 1 - Completely disagree, 2 - Not agree, neither disagree or 3 - Completely agree. Therefore, the student has to answer with the values 1, 2 or 3 for every question inside the domain. This scale is already defined by the validated survey and cannot be changed. Any such changes will invalidate the survey.
Descriptive statistics	Every question inside a domain is thoughtfully analyzed by the people validating the survey. When publishing the questionnaire, they also publish the descriptive statistics, namely the mean value, the standard deviation and the item-total correlation. They measure what is the norm for every given question.
Item-total correlation	It is a test performed to measure if any question inside a domain is inconsistent with the average behavior of the other questions and if it needs to be removed. In other words it measures the dependency between questions. Its value is between 0 and 1, where anything below 0.19 is considered poor and above 0.4 very good.

Table 4. Possibly unknown terminus and their description

### 4.4.2 Validated survey 1

Table 5 below, summarizes all the domains from Survey 1. Additionally, all questions inside the domains can be found in Appendix A at the end of this report, including the corresponding descriptive statistics per question. For instance, as you can see from the table, Domain 2 contains 6 questions that measure all aspects of the teacher quality *Teaching mindfulness*.

Nº	Domain name	Number of questions	Mean	Standard deviation	Range
1	Planning, organization and curriculum coverage	10	2.10	0.61	1-3
2	Teaching mindfulness	6	1.67	0.60	1-3
3	Guiding mindfulness practices	6	1.78	1.78	1-3

4	Management of the learning	6	1.92	1.92	1-3
	environment				

Table 5. Domain level descriptive statistics of Survey 1

Therefore, if the teacher selects one of the domains as part of their custom validated survey, all the questions belonging to the domain will be added to the survey with a range of 1 to 3.

#### Results interpretation

After every submission of the teacher's survey a new mean value is calculated for every question inside a domain. For example, the question *Teacher uses class time effectively*, taken from Domain 1, has a mean value of 0 at the beginning of the survey. After the first submissions of the questionnaire a student X gives a mark of 2 for the following question and a student Y gives 3. The new mean value for this question becomes 2.50. Therefore, every new submission changes the mean value of the corresponding question.

Moreover, the domain mean value is calculated as the average of all mean values of the questions inside the domain. For example, Domain 2 which has six questions with mean values 1.60, 1.66, 1.80, 1.20, 1.67, 2.00 will receive an average of

$$mean = \frac{1.60 + 1.66 + 1.80 + 1.20 + 1.67 + 2.00}{6} = 1.66$$

By looking at the table above, we compare the newly calculated mean of 1.66 with the validated mean for domain 2 which is 1.67. Therefore, the received results for the sub-questionnaire *Teaching mindfulness* falls at the average for the teacher. Figure 5, below shows the average interval of [*mean* - *stdDev*; *mean* + *stdDev*]. Every value inside this interval is considered average for the teacher's performance or course evaluation. Values above the interval rank the thing we want to measure as very good performance and values beneath as below the average.



Figure 5. Normal distribution  $\pm$  1 stdDev

Moreover, according to the researchers from this validated survey teachers receive a rating of **Beginner** (average scores of 1-1.6) for a particular domain if "inadequacy in performance is noted on most or all of the key features (i.e., scores of 1), thus

implying the need for further skill development as well as possible close supervision." Teachers who receive average scores in the range of 1.7–2.3 may earn a rating of **Competent**. "There may be a few inconsistencies in the performance of teachers rated as competent, but their teaching reflects definite skill in the domain overall." A domain score between 2.4 and 3 is considered **Proficient**. Essentially, "Proficient teachers demonstrate skillful confidence and flexibility in lesson delivery while maintaining the integrity of the program. These teachers present lessons in a smooth, flexible, and responsive manner, indicating a deep, implicit understanding of the program."

Unfortunately, at the end we did not have the time to include the domains of validated survey 1 into the application. However, the information stated above is applied to Survey 2 such as the results interpretation, the interval selection (Figure 5).

### 4.4.3 Validated survey 2

Table 6 below, summarizes all the domains from Survey 2. Additionally, all questions inside the domains can be found in Appendix B at the end of this report, including the corresponding descriptive statistics per question.

N⁰	Domain name	Number of questions	Mean	Standard deviation	Range
1	Good teaching	6	13	52	1-5
2	Clear Goals & Standards	4	21	49	1-5
3	Appropriate Workload	4	6	52	1-5
4	Appropriate Assessment	3	30	53	1-5
5	Generic Skills	6	34	50	1-5

Table 6. Domain level descriptive statistics of Survey 2

The measurement scale is the following:

- 1 Strongly disagree
- 2 Disagree
- 3 Neither agree, not disagree
- 4 Agree
- 5 Strongly agree

Results interpretation:

The mean values are calculated after each response where

- 1 is assigned to -100
- 2 is assigned to -50

3 is assigned to 0 4 is assigned to 50 5 is assigned to 100

The following interpretation is used in the validated survey and that is why we also apply it in our design. This is also the reason why the mean value and the standard deviation have a value between 0 and 100 instead of 1 to 5. Apart from that, we used the same method as for the first survey above. We calculate a new mean after every submission and compare it with the validated mean for the corresponding domain.

Additionally, this survey also makes use of reversed questions which means that the measurement scale is also reversed. They are marked with \* in the Appendix B. The purpose of adding this methodology in a questionnaire is to prevent response bias, that is minimizing the bias in case the student simply responds with the same score for every question.

# 5. Future work

In the following section, we will investigate some of the possible improvements that we can make based on the received feedback and the results of the user testing. First, we will look at the possibility of including customized surveys, including their advantages and limitations and then, we will discuss how to make the application more inclusive and available for a wide range of educational institutions (schools, high schools, universities, training departments etc.).

#### **Customized questionnaires**

Based on the received feedback from the UT teachers and the faculty presentation, some users would like to be able to create their own custom surveys. Even though they will not be validated, users would want to be able to ask their students specific questions about topics they are interested in. For instance, in the future, we can add a "Customize questionnaire" button next to the validate surveys, where teachers can add the questions they want inside a domain (e.g. Teaching practices). They would have the option to select the scale (5-scale, 10-scale, etc.) for every question, the name of the domain, as well as the possibility to combine domains from their custom surveys and validated surveys. Since the ordering and the questions inside a domain are preserved, the validated questions will remain validated. The advantage of this approach is that teachers can use all of the validated questionnaires they like, plus some custom questions that were not asked in the premade surveys. Another advantage of this is the possibility of self-assessment. Users will be able to ask for feedback on whatever competence/quality they think is necessary.

Unfortunately, this approach will have some limitations, namely the interpretation of the results. Since the questions are not validated, there is no tested mean value and standard deviation. Therefore, it is up to the user to interpret the results. The application will calculate a new mean value and standard deviation after every submitted survey by a student to update the results but the actual interpretation will be inaccurate. This approach, however, brings up another limitation. Since the results are unclear and probably not trustworthy, when it comes to interpretation, the ranking will also be untrustworthy and inaccurate. Moreover, since the survey is customized, there will be no other teachers using the same questionnaire, so there will be no point in ranking. As a solution, we propose that if a user wants to create a customized survey, it will not be a part of the final ranking (only validated domains). However, results will still be calculated and displayed for the sake of the teachers and will be left up to them to interpret. \

#### More validated surveys

Additionally, we would like to add more validated surveys covering more general teacher competencies in the future. Currently, we have questionnaires about the course organization and structure and the teaching practices and mindfulness. However, we would like to expand this further including additional pre-made questionnaires about teacher qualities.

Another limitation of the current approach is the inclusivity. At the moment, all validated surveys we used are intended for university evaluations. The idea of the application was to be more inclusive and adaptive, therefore, we would also like to add pre-high school and

high school level validated questionnaires as well. Thus, the application will become more generalized and usable for a wide range of users.

Unfortunately, we did not manage to implement Survey 1 into the application, therefore, for the future we will definitely include it as an additional validated survey.

# 6. Design: Front end - back end and Security

#### Front end:

#### Bootstrap

For our project's front end, we made the deliberate choice to use the Bootstrap framework for several compelling reasons. First and foremost, our primary objective was to create a user-friendly application that offers an intuitive and seamless experience for our users. Bootstrap's well-designed and responsive components, including buttons, modals, and various UI elements, perfectly aligned with our vision to enhance user interaction and simplify navigation. Moreover, as can be seen from Figures 6 and 7 Bootstrap's inherent flexibility and compatibility with different browsers allowed us to build a dynamic and responsive application that allowed our users to have the same experience regardless of the device used, which is crucial in today's ever-evolving digital landscape. Additionally, Bootstrap's widespread popularity and extensive community support made it an ideal choice, as it ensures ongoing updates, compatibility, and a wealth of resources for troubleshooting and customization. In sum, our decision to use Bootstrap was driven by our commitment to delivering a user-centric, visually appealing, and technically robust application.

ofile Overview	а, т.			Recent Survey F	Results				
Nam	e: A								
		vgerinos Demosthenous	C	Survey Name	Date Created	Status	Total Students	Students Answered	Students Pending
Emai	: a o	vgerinos.demosthenous@ m	@gmail.c	123	2023-11-12 09:24:02	active	6	0	6
īle Badges									
	3	යි	යි						
	U	U	Ū						
icore				LeaderBoards					
				Show 10 V	entries			Search:	
				Rank		Name		Score	
				1		Avgerinos [	Demosthenous	171.25	

Figure 6: Computer browser screen



Figure 7: Phone screen

Landing page:

The design for the landing page follows a minimalist approach, providing users with easy access to information about the platform, a sign-up option, and a login functionality Figure 8. The sign-up and login processes are facilitated through a pop-up modal Figures 9 and 10, allowing users to conveniently input their credentials.

A critical consideration in the design was to ensure broad accessibility for teachers. To achieve this, the application employs its own login system rather than relying on external services like Microsoft login. This decision was motivated by the recognition that not all teachers may possess a Microsoft account, whereas nearly everyone has an email address that can be used for authentication. This approach enhances inclusivity, catering to a wider audience of potential users.

### Empower your teaching

Empower your teaching by gathering valuable feedback from your students. Create fast scientifically validated surveys and improve your teaching performance.



#### About Us

A quick glance at how we can help improve your teaching abilities!



EDU QR is designed to provide high-quality feedback, allowing students to directly provide feedback to professors.

This will help enhance the quality of teaching and promote interaction between teachers and students.

Paducad Tima Invastment

 $\sim$ 



Figure 8: Landing page preview

Login	$\times$
Email*	
Email	
Password*	
Password	
Login	
Not a member yet, <mark>Sign Up</mark>	

Figure 9: Login pop-up modal

1.15

Sign Up	×
Email	
Email	
Password	
Password	
Register	

Figure 10: Sign Up pop-up modal

#### Dashboard

The dashboard, depicted in Figure 11, serves as the central hub for gathering crucial information and stands as the primary page of the application, where the user can change their name, see their badges, active surveys and their leaderboard score. The key objective was to present a substantial amount of information without overcrowding the screen, ensuring an optimal user experience.

Throughout the design process, the dashboard remained consistent, with the only variation being in an earlier version where the application displayed eight elements instead of four. However, the design team ultimately decided that a layout featuring four elements was aesthetically more pleasing. Unfortunately, time constraints prevented us from conducting user testing to ascertain if this change had any impact on user experience.

#### Survey: Create New Survey

The development of the create new survey page, as depicted in Figure 11, every survey requires a name, a student list, and the selection of one or more competencies for creation. The necessity of assigning a name to the survey is evident as it facilitates storage and future reference for teachers.

Regarding the "Upload a student list" functionality, initially, the system exclusively accepted CSV files due to the ease of implementation and testing with Python libraries. However, after discussions with our supervisor, we have expanded the system's capabilities to accept both

CSV and Excel file formats. This adjustment aims to accommodate older teachers who may not be familiar with CSV or platforms that allow the extraction of student lists in either format.

Moving on to the Competencies section, in a previous iteration of the system, competencies were centrally positioned, sharing the same colour. The final design, as shown in Figure 12, adopts a right-centric layout, with questions displayed on the left. Notably, the colour scheme has been modified, becoming slightly darker when competency is selected. The changes happened after again discussing with our supervisor and some user testing.

ate A New Validated Survey		
vey Name	Upload A Student List	
lease Enter a Survey Name	Choose file No file chosen	🧃 Clear File Upload
estions		Competencies
		Please select a competency below, and the associated questions will be displayed on the left.
		Appropriate Assessment
		Appropriate Workload
		Clear Goals & Standards
		Generic Skills
		Good Teaching
		Overall Satisfaction
		Finished creating your survey, use the button below.
		Submit

Figure 11: Create a new survey page before selecting a competency

Irvey Name Upload A Student	t List
Please Enter a Survey Name Choose file No 1	file chosen
uestions	Competencies
Appropriate Assessment	Please select a competency below, and the associated questions will be displayed on the left.
<ul> <li>To do well in this course all you really needed was a good memory</li> <li>The staff seemed more interested in testing what I had memorised than what I had understood</li> <li>Too many staff asked me questions just about facts</li> </ul>	Appropriate Assessment
	Appropriate Workload
Appropriate Workload	Clear Goals & Standards
, Marahuara , raurana	Generic Skills
<ul> <li>The workload was too heavy</li> <li>I was generally given enough time to understand the things I had to learn</li> </ul>	Good Teaching
<ul> <li>There was a lot of pressure on me to do well in this course</li> <li>The sheer volume of work to be got through in this course meant it couldn't all be thoroughly comprehended</li> </ul>	Overall Satisfaction
	Finished creating your survey, use the button below.
	Submit

Figure 12: Create a new survey page before selecting a competency

#### Survey: Survey Overview

The primary function of this page(Figure 13) is to empower teachers by providing a comprehensive overview of their surveys' status. Teachers can easily access information on the number of students who have responded, and those with pending responses, view survey results (Figure 14), and navigate to the QR code page (Figure 15) as necessary. Additionally, teachers can deactivate surveys directly from this page. This feature was a fundamental requirement for the application, contributing to the consistent stability of the page's design throughout the entire application development process.

rvey Overview						
urvey History						
how 10 🕈 entries						Search:
Survey Name	Date Created	Survey Status	Total Students	Students Answered	Students Pending	QR Code 11 Results
123	2023-11-12 09:24:02	active	6	0	6	
wing 1 to 1 of 1 entries						Previous 1 Nex

#### Figure 13: Survey overview

Key
Green: Above Average Yellow: Average Red: Below Average
Category name: Appropriate Assessment Score: 2
Question: To do well in this course all you really needed was a good memory 4
Question: The staff seemed more interested in testing what I had memorised than what I had understood
Question: Too many staff asked me questions just about facts

Figure 14: Example of survey result page.



Figure 15: Example of QR code page

Survey access:

To facilitate student access to the survey, a QR code (Figure 15) serves as the entry point. Once students input their student numbers (Figure 16), they are seamlessly redirected to the survey page (Figure 17). The adoption of QR codes aims to enhance the survey's accessibility and expedite the process, encouraging increased student participation.

An important design choice in this process was the evolution of the Survey page (Figure 17). Initially featuring a slider, user feedback prompted a redesign, resulting in the current layout with radio buttons and numbers. This modification prioritizes ease of use, boosting overall usability, readability, and accessibility—especially crucial since users are expected to complete the surveys on mobile devices. The use of buttons further streamlines the survey-filling experience for users on smartphones.



Figure 16: Survey access page for students

Appropriate Assessment	
To do well in this course all you really needed was a good memory	
	$\bigcirc 1 \bigcirc 2 \bigcirc 3 \bigcirc 4 \bigcirc 5$
The staff seemed more interested in testing what I had memorised than what I had understood	
	0 1 0 2 0 3 0 4 0 5
Too many staff asked me questions just about facts	
	$\bigcirc 1 \bigcirc 2 \bigcirc 3 \bigcirc 4 \bigcirc 5$

Figure 17: Survey page

#### Back end:

#### Flask:

We opted for Flask as our backend framework in our project for a multitude of compelling reasons. The first reason would be that Flask's minimalist and micro-framework nature aligns with our goal of building a streamlined, efficient, and lightweight backend. This choice allows us to maintain full control over our project's structure and scalability while avoiding unnecessary bloat and complexity. Also, Flask's simplicity ensures rapid development and easy maintenance, which is vital for our project's lifecycle.

Moreover, Flask's flexibility and extensibility make it an ideal choice for crafting customized and tailored solutions to meet our unique project requirements. The framework's rich ecosystem of extensions and libraries further empowers us to seamlessly integrate additional functionality, such as authentication, database management, and API development, saving us time and effort.

Flask's Python-based architecture is another significant advantage, as it enables us to leverage Python's vast ecosystem of libraries and tools, simplifying the development process and fostering code reusability.

Furthermore, Flask's active and supportive community provides a wealth of resources, tutorials, and plugins, offering invaluable assistance in troubleshooting and development. It also ensures that Flask remains up-to-date and secure, aligning with our commitment to delivering a reliable and robust backend.

In conclusion, we chose Flask as our backend framework to harness its lightweight, flexible, and Python-powered capabilities, all of which contribute to the efficiency, scalability, and maintainability of our project.

#### SQL lite:

Pairing Flask with SQLite as our backend database was a strategic decision in our project, driven by several compelling factors. As can be seen from our class diagram(figure 18), the application has four small classes, which only makes sense to use SQLite for the size of our

database. This choice was made with the goal of keeping the application as simple and efficient as possible. SQLite's lightweight and serverless architecture seamlessly complements Flask's minimalist design, aligning perfectly with our objective. This combination ensures rapid development and easy deployment, making it an ideal choice for smaller to mid-sized applications.

		User User		
	_	id PK INT		
Question		username VARCHAR		
Id PK INT		password VARCHAR		
category VARCHAR		is confirmes BOOLEA		
text VARCHAR		confirmed_on DATE		
		scores VARCHAR		
		1*		
		1		
		Survey		
		id PK INT		
Response		name VARCHAR		
studentNumber PK INT	0 *	date DATE		
surveyId FK INT		userid FK INT		
text VARCHAR		questions VARCHAR		
complete BOOLEAN		servey_result_VARCH		
		studentlist \/ABCHAB		

Figure 18: Class diagram

The integration of SQLite with Flask is remarkably straightforward, offering a hassle-free way to manage data storage without the need for complex setup or maintenance. This simplicity significantly reduces the development overhead and allows us to focus on creating the core functionality of our application.

Additionally, SQLite's strong compatibility with Flask and Python simplifies the development process, enabling seamless interactions with the database. The ease of data manipulation, retrieval, and management provided by SQLite further streamlines our development efforts.

In summary, the combination of Flask and SQLite as our backend database is a strategic choice that aligns with our goal of building an efficient, lightweight, and user-friendly application. This pairing empowers us to deliver a reliable, maintainable, and straightforward solution while efficiently managing our data storage needs.

#### Security:

#### Bcrypt

To ensure robust security for our application, we have implemented the Bcrypt hashing algorithm for password protection. Bcrypt is renowned for its exceptional security features, making it the ideal choice for safeguarding sensitive user information. This algorithm utilizes a salted hashing approach, which adds a layer of complexity to the hash, making it exceedingly resistant to common cryptographic attacks like rainbow table attacks and brute-force attempts. Moreover, Bcrypt automatically handles the generation of cryptographically secure salts, further enhancing the security of stored passwords.

By incorporating Bcrypt into our application, we prioritize the protection of user credentials and ensure that their information remains confidential and immune to malicious attacks. The scalability and efficiency of Bcrypt make it a compelling choice for our project, as it enables us to securely manage user passwords without compromising system performance. In conclusion, our use of Bcrypt for password hashing underscores our unwavering commitment to data security and user privacy within our application.

#### CSRF:

In our application, we've implemented CSRF (Cross-Site Request Forgery) tokens as a fundamental security measure to prevent unauthorized parties from making invalid posts and safeguard our users' data. CSRF attacks can pose a significant threat to the integrity of web applications, and by incorporating CSRF tokens, we've fortified our defences against this type of malicious activity.

CSRF tokens work by generating a unique, random token for each user session. This token is then included in forms and requests sent by the client. When a form submission or request is made, our server checks that the token matches the one expected for that session. If they don't match, the request is deemed invalid, and the server rejects it.

By integrating CSRF tokens into our application, we guarantee that only authenticated and authorized users can interact with our system, effectively preventing potential attackers from manipulating or making unauthorized requests. This measure helps us maintain the integrity of user data, protect against malicious actions, and ensure that our application remains a safe and secure environment for our users.

# 7. Market research:

#### Market Overview:

Collecting feedback from students is challenging at the University of Twente. The end-of-module service consumes significant time, discouraging student participation. Consequently, those who do provide feedback are often disgruntled or dissatisfied, resulting in biased and unhelpful data for teachers.

#### Market Size and Growth:

According to data from <u>Seaworthy</u>, subscription prices for similar services range from \$24 per month, providing one user with 100 responses, unlimited type forms, and questions and it can go up to \$1,000 per year. This range caters to various user needs and budgets.

#### **Target Audience:**

Our primary target audience is teachers who can benefit from this application as a tool for efficiently collecting feedback to assess the quality of education they provide to students.

#### Market Trends:

Efficient data collection is vital in the age of information. Staying updated with technological advancements and catering to evolving consumer behaviour is essential for success and improvement in this market.

#### **Competitor Analysis:**

Our main competitor, Evasys, offers fully automated surveys for online, paper, and hybrid use. While we lack access to their survey templates, Evasys emphasizes automation in survey creation and the collection of high-quality feedback. They also have a similar education section which allows course evaluation surveys. They need to have information on whether their surveys are validated or not. If they do not have validated surveys that is our advantage over them.

#### SWOT Analysis:



**EXTERNAL** 

Figure 19: SWOT analysis

#### **Customer Needs and Pain Points:**

Our research with 25 teachers revealed that they appreciate the idea of a validated questionnaire, desire a quicker survey process, and prefer restricting open-ended questions for students.

#### **Market Pricing:**

We will need a server to host the application: Based on <u>WebsiteBuilderExpert</u>, hosting on our server can cost from \$99.97 to \$149.98 per month

Need a registered domain name: Again from WebsiteBuilderExpert, it would take from 10 to 20 dollars.

Registrar	.com	.org	.us	.me
NameCheap	\$8.88/year	\$11.98/year	\$3.88/year	\$3.88/year
GoDaddy	\$0.99/year	\$10.17/year	\$7.99/year	\$3.49/year
HostGator	\$12.95/year	\$12.95/year	\$5.95/year	\$15.00/year

Figure 20: Top-level domain prices for one year

The prices of the picture are introductory, meaning after a year the amount of money needed to keep our domain will increase.

Need to pay to be a company: Based on  $\underline{KVK}$  there is a one-time fee of 75 euros(79,31 dollars).

Profit: We need to also make some money out of this application, some additional money will be added here at some point.

# 8. User testing:

The user testing process was conducted in two stages due to the project's timing constraints. The first stage involved gathering feedback from students, while the second stage involved teachers. The primary goal was to assess the usability and satisfaction of the application through a combination of questionnaires using Google Sheets and hands-on testing using the Think-Aloud Testing method, this allowed us to understand our application weaknesses in real time.

#### Part 1: Student Feedback

In this stage, 21 students from random backgrounds were invited to participate in the testing process, the students were picked randomly to include people from as many studies as possible. They were presented with our application questionnaire and asked to complete a Google Form questionnaire to provide their feedback on the application. The Google Form questionnaire included the following 10 questions:

- 1) On a scale of 1 to 5, how clear were the questions in the questionnaire?
  - 1 (Not Clear)
  - 2 (Slightly Clear)
  - 3 (Moderately Clear)
  - 4 (Very Clear)
  - 5 (Extremely Clear)
- 2) How easy was it to understand the instructions provided with the questionnaire?
  - 1 (Very Difficult)
  - 2 (Somewhat Difficult)
  - 3 (Neither Difficult nor Easy)
  - 4 (Somewhat Easy)
  - 5 (Very Easy)

- 3) Please rate the overall organization of the questionnaire.
  - 1 (Poor)
  - 2 (Fair)
  - 3 (Good)
  - 4 (Very Good)
  - 5 (Excellent)
- 4) Were there any questions in the questionnaire that you found particularly unclear or confusing? If so, please specify.
- On a scale of 1 to 5, how user-friendly was the format of the questionnaire?
   1 (Not User-Friendly)
  - 2 (Slightly User-Friendly)
  - 3 (Moderately User-Friendly)
  - 4 (Very User-Friendly)
  - 5 (Extremely User-Friendly)
- 6) Did you encounter any technical issues while filling out the questionnaire (e.g., problems with the online platform or submission process)? Please describe any issues.
- 7) How would you rate the length of the questionnaire in terms of being easy to complete?
  - 1 (Too Short)
  - 2 (Slightly Short)
  - 3 (Just Right)
  - 4 (Slightly Long)
  - 5 (Too Long)
- 8) Did you feel motivated to complete the questionnaire? Why or why not?
- 9) How would you rate the overall experience of filling out the questionnaire?

- 1 (Very Dissatisfying)
- 2 (Somewhat Dissatisfying)
- 3 (Neutral)
- 4 (Somewhat Satisfying)
- 5 (Very Satisfying)

Additional questions were asked like, would you prefer to add your student number or email address at the beginning of the survey and if they care that they would receive a thank you email at the end of the survey?

Results from students:

On a scale of 1 to 5, how clear were the questions in the questionnaire? 1 (Not Clear) 2 (Slightly Clear) 3 (Moderately Clear) 4 (Very Clear) 5 (Extremely Clear) 21 απαντήσεις



Figure 21: Results for the question "On a scale of 1 to 5, how clear were the questions in the questionnaire?"

How easy was it to understand the instructions provided with the questionnaire? 1 (Very Difficult) 2 (Somewhat Difficult) 3 (Neither Difficult nor Easy) 4 (Somewhat Easy) 5 (Very Easy) 21 απαντήσεις



Figure 22: Results for the question "How easy was it to understand the instructions provided with the questionnaire?"

Please rate the overall organization of the questionnaire. 1 (Poor) 2 (Fair) 3 (Good) 4 (Very Good) 5 (Excellent) 21 απαντήσεις



Figure 23: Results for the question "Please rate the overall organization of the questionnaire"

Were there any questions in the questionnaire that you found particularly unclear or confusing? If so, please specify:

From the nine people who answered this question, the only person who did not say no, found only one unclear question "Too many staff asked me questions about facts..."

On a scale of 1 to 5, how user-friendly was the format of the questionnaire? 1 (Not User-Friendly) 2 (Slightly User-Friendly) 3 (Moder...4 (Very User-Friendly) 5 (Extremely User-Friendly) 21 απαντήσεις



Figure 24: Results for the question "How user-friendly was the format of the questionnaire?"

Did you encounter any technical issues while filling out the questionnaire (e.g., problems with the online platform or submission process)? Please describe any issues:

Here there was confusion with a student who tried inserting their actual student number so the comment "The only thing was with the 403 Forbidden Error" makes sense, the rest of the students did not have any issues.

How would you rate the length of the questionnaire in terms of being easy to complete? 1 (Too Short) 2 (Slightly Short) 3 (Just Right) 4 (Slightly Long) 5 (Too Long) 21 απαντήσεις



Figure 25: Results for the question "How would you rate the length of the questionnaire in terms of being easy to complete?"

Did you feel motivated to complete the questionnaire? Why or why not?

- It was interesting
- Not really but it wasn't going to take long so i didn't mind
- no? any questionnaire from uni that does not get me free chocolate milk does not get me motivated.
- Yes, I like giving feedback
- not really
- Yes, because feedback is important for improvement
- Yes, because it helped the TA
- Not necessarily, I would get a thank you but no chocolate :(
- If I was in the last lecture of the module, I probably would not want to fill it in. I suggest doing it after the break of the lecture.
- The TA asked us to complete it, it wasn't difficult so we did it
- Yes
- im not motivated as i dont care at all about doing it or not doing it, so i might as well
- Yes, because of the ranking system and because its short
- Reasonably motivated
- Yes, I like filling out questionnaires as long as they are not too lengthy and I am given the time to do so.
- I was motivated because I like to do questionnaires
- Yes, because the questions were engaging
- Yes because it's exam period and I wanted to express or somehow share my feeling

How would you rate the overall experience of filling out the questionnaire? 1 (Very Dissatisfying) 2 (Somewhat Dissatisfying) 3 (Neutral) 4 (Somewhat Satisfying) 5 (Very Satisfying) 21 απαντήσεις



Figure 26: Results for the question "How would you rate the overall experience of filling out the questionnaire?"

#### Conducting User Testing with Teachers:

In the next phase, the application was subjected to testing by teachers. They were tasked with a series of actions, accompanied by the "Think-Aloud" method, encouraging them to vocalize their thoughts during the process.

#### Task 1: Registration and Email Verification

Teachers embarked on their user testing journey by initiating the registration process. They were instructed to register and subsequently verify their email addresses to complete the registration.

#### Task 2: Logging In and Changing Username

After successful registration, the teachers continued by logging into their newly created accounts. The task required them to change their usernames, with a focus on ease of use and clarity.

#### Task 3: Survey Creation with Dependencies

With the profile setup completed, the teachers advanced to create a new survey. They had the freedom to add dependencies as needed and were tasked with generating a sample CSV file to simulate a real student list for survey testing.

#### Task 4: Simulated Student Interaction with QR Code

A pivotal moment arrived with the creation of a QR code for the survey. Here, both the teacher undergoing user testing and the facilitating individual assumed roles, with the teacher acting as a student. They jointly scanned the questionnaire, interacted with it, and completed the survey, all the while vocalizing their thoughts.

#### Task 5: Closing the Survey and Analyzing Results

Post-survey completion, the teacher returned to their administrative role, closing the survey and exploring the results section. This task served to evaluate the application's functionality and user experience in managing and accessing collected data.

#### Task 6: Profile Update Assessment

To wrap up the testing, teachers were tasked with visiting their profiles and assessing how well the profile information was updated, taking into account any changes made during the registration and username modification tasks.

These tasks provided a holistic evaluation of the application, encompassing usability, functionality, and user experience. The integration of the "Think-Aloud" method allowed us to gain valuable insights into teachers' thought processes and experiences throughout the testing process, shedding light on any challenges or positive experiences encountered during each task.

#### **Results from teachers:**

6/10 teachers said that they want to use the applications

2/10 teachers said with some improvements they can see themselves using the application

1/10 teachers said will not use the application

1/10 teachers said they worried that the application is not good enough

#### General comments from teachers:

Extra information should be added when adding the CSV file to import the student list, like the type of the file and how the CSV file should be structured to work with the application.

A teacher would like to know if a student filled out the survey but not what the student answered. They like to reward students who fill out the surveys.

The system should have more notifications when something does not go as expected.

Have information on what the scores mean and how they are calculated.

The app's current questions do not cover everything that the teachers want.

We should have an alternative login option that would be login by institution, this will help people that can use this type of login.

For older academics having the option to download the QR is very useful since they might not think/ do not know how to take a screenshot of the QR to share it.

Dark mode!

Change the colours of the categories to checkboxes

Most of the website is left-sided but when choosing categories it right-sided.

#### Discussion

Even with the limited dataset used to test our application, the results indicate that both teachers found it very appealing. They described it as user-friendly and intuitive.

Starting with the students, they believe our surveys take a reasonable amount of time to complete, and most of them were motivated to fill them out. However, a small concern arose from two students who mentioned they wouldn't feel inclined to participate without a reward. The team aimed to avoid this, as offering incentives can introduce bias in survey responses.

Moving on to the teachers, six out of ten expressed their intent to use our application. This is a significant finding, considering that more than half of the testers expressed interest in utilizing it. However, some teachers noted that the current set of questions may not cover everything they want to know, and there were concerns about the wording of the questions. This is understandable, given that our application is in the testing stage, and we haven't had the opportunity to address all potential concerns.

Additionally, one teacher expressed a desire to ask students specific questions about their courses. In response, it was suggested that they use other tools, as our application is not designed for such detailed inquiries. Maybe in the future, there will be a part of the system with no ranking that will give teachers this functionality

#### Future work:

The final version of our application should comprehensively cover all aspects a teacher would want to know, which means the team will need to find more validated questions to add to the system for better coverage. Furthermore, the suggestions of both teachers and students will be taken into consideration and improve anything in the system that is not intuitive, for example, there will be a sample CSV file that will show the acceptable format or there will be more information on how the points are calculated for the leaderboard.

# Conclusion

In conclusion, the team successfully developed a web application that aligns with the supervisor's specified requirements. The primary objectives included the incorporation of validated questionnaires, the integration of a gamification component, and the ability to share questionnaires through QR codes.

To address the requirement of using validated surveys, the team conducted a thorough literature review, identifying and incorporating validated questionnaires into the application. The gamification aspect was realized through the implementation of a leaderboard, enabling teachers to engage in a competitive teaching ladder and track their performance. Additionally, a badge system was introduced as a motivational reward mechanism for teachers.

The QR code functionality, a key feature for questionnaire sharing, was implemented using JavaScript. This enables teachers to effortlessly provide students with access to fill out the questionnaires.

Throughout the development process, the team embraced an agile approach, conducting weekly meetings with the supervisor to report progress and showcase Minimum Viable Products (MVPs). This iterative methodology allowed for continuous improvement and ensured alignment with project goals.

In reflection, the team is confident that the delivered product meets the specified requirements and stands as a successful outcome of the collaborative effort.



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# Appendix A - Survey 1

The following section contains all questions part of the first validated survey used in the application, the domain they belong to, the measurement scale and the descriptive statistics such as mean value, standard deviation and item correlation.

Reference: https://files.eric.ed.gov/fulltext/ED586864.pdf

#### Domain 1: Planning, organization and curriculum coverage

	Mean	Range	StDev	Item-total correlation
1.1. Physical environment	2.17	1–3	0.68	0.61
1.2. Preparation	2.33	1–3	0.70	0.80
1.3. Coverage	2.22	1–3	0.73	0.84
1.4. Time usage	2.07	1–3	0.65	0.86
1.5. Information accuracy	2.00	1–3	0.84	0.88
1.6. Order of lesson	1.98	1–3	0.75	0.84
1.7. Clarity of instructions	1.96	1–3	0.79	0.83
1.8. Transitions	1.93	1–3	0.77	0.83
1.9. Appropriate examples	2.24	1–3	0.57	0.76
1.10. Avoid extraneous content	2.11	1–3	0.77	0.85

1.1 Teacher organizes the physical environment in a way that facilitates group participation.

1.2 Teacher prepares class materials in advance of the lesson.

1.3 Teacher covers all three major parts of the lesson (introduction, activities, formal practice session/tutorial).

1.4. Teacher uses class time effectively

1.5. Teacher presents information about the lesson theme that is accurate (according to curriculum).

1.6. Teacher presents the parts of the lesson in the order they are written in the curriculum.

1.7. Teacher provides clear instructions for lesson activities.

1.8. Teacher makes appropriate conceptual transitions between lesson segments that scaffold student understanding of the theme.

1.9. Teacher uses language and examples that are clear and appropriate.

1.10. Teacher avoids introducing extraneous information or activities during the lesson.

#### Domain 2: Teaching mindfulness

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	Mean	Range	StDev	Item-total correlation
2.1. Pedagogy of curiosity	1.61	1–3	0.68	0.86
2.2. Focus on present moment	1.74	1–3	0.71	0.80
2.3. Inquiry directed	1.70	1–3	0.79	0.84
2.4. Student talk time	1.37	1–3	0.57	0.57
2.5. Teacher patience	1.85	1–3	0.67	0.77
2.6. Teacher acceptance	1.76	1–3	0.79	0.80

2.1. Pedagogy of the lesson is characterized by genuine interest and facilitation of student experience

2.2. Primary focus of attention and discussion in class is on present moment experiencing as opposed to conceptualizing, remembering, comparing or analyzing content

2.3. Questioning is directed toward noticing and exploring student experience (thoughts, feelings, sensations, etc.) and making connections to real-world patterns in their lives.

2.4. Student talk time exceeds teacher talk time and interaction is focused on lesson themes.2.5. Teacher demonstrates patience with students and the unfolding of the lesson and avoids

working in a highly goal-oriented way.

2.6. Teacher demonstrates acceptance and models willingness to be present to situations as they are with compassion and without immediately needing to fix them.

#### Domain 3: Guiding mindfulness practices

Mean	Range	StDev	Item-total correlation
2.00	1–3	0.79	0.87
1.80	1–3	0.69	0.71
1.74	1–3	0.53	0.81
1.59	1–3	0.54	0.68
1.78	1–3	0.63	0.80
1.80	1–3	0.79	0.65
	Mean 2.00 1.80 1.74 1.59 1.78 1.80	Mean Range 2.00 1–3 1.80 1–3 1.74 1–3 1.59 1–3 1.78 1–3 1.80 1–3	MeanRange StDev2.001–30.791.801–30.691.741–30.531.591–30.541.781–30.631.801–30.79

3.1. Teacher creates the conditions for practice (e.g. settling class, posture instruction, seating arrangement, etc.)

3.2. Vocal tone is softened yet audible, calm and relaxed.

3.3. Guidance is clear, precise and accurate (without unnecessary added language or confusing instructions).

3.4. Guidance is smooth and well-paced, with appropriate pauses, so that participants can follow and engage in the practice.

3.5. Guidance helps students understand and practice the specific key learning(s) for each practice.

3.6. Teacher avoids concluding practice abruptly (e.g. allowing sufficient time for students to return focus to the group, etc.).

#### Domain 4: Management of the learning environment

	Mean	Range	StDev	Item-total correlation
4.1. Safe and effective environment	1.89	1–3	0.80	0.73
4.2. Engagement strategies	1.78	1–3	0.73	0.75
4.3. Encourages participation	2.07	1–3	0.77	0.87
4.4. Behavior management	1.97	1–3	0.77	0.83
4.5. Effective motivation	1.90	1–3	0.75	0.85
4.6. Effective differentiation	2.05	1–3	0.57	0.75

4.1.Teacher facilitates a safe and effective learning environment by establishing and maintaining group guidelines and includes students when possible

4.2. Teacher utilizes appropriate strategies to maintain participation and student engagement and reduce disruptive behavior.

4.3. Teacher invites participation from a range of students to encourage wide participation.

4.4 Teacher demonstrates the ability to deal effectively with challenging students.

4.5 Teacher demonstrates the ability to deal effectively (or skillfully) with unmotivated students.

4.6.Teacher maintains a focus on group process while attending to the needs of the individual students

# Appendix B - Survey 2

Reference: https://www.nagcas.org.au/documents/item/488

	Mean	Sto	Dev
Good Teaching The teaching staff of this course motivated me to do my best work	20	51	
The staff put a lot of time into commenting on my work	0	55	5
The staff made a real effort to understand difficulties I might be having with	h my w	ork	
	10	53	
The teaching staff normally gave me helpful feedback on how I was going	ļ		
	13	52	
My lecturers were extremely good at explaining things	15	49	
The teaching staff worked hard to make their subjects interesting	21	50	
Clear Goals & Standards			
It was always easy to know the standard of work expected	22	48	
I usually had a clear idea of where I was going and what was expected of	me in f	this co	urse
	26	50	
*It was often hard to discover what was expected of me in this course.	19	50	
The staff made it clear right from the start what they expected from stude	nts.		
	17	49	
Appropriate Workload			
*The workload was too heavy.	11	49	
I was generally given enough time to understand the things I had to learn	19	47	
*There was a lot of pressure on me to do well in this course	-6	55	
*The sheer volume of work to be got through in this course mean	it it cor	uldnít	all be
thoroughly comprehended.	0	56	
	·		
Appropriate Assessment	~~~		
To do well in this course all you really needed was a good memory.	32	59	
*The staff seemed more interested in testing what I had memorize	d than	what	I had
understood.	26	56	
* Too many staff asked me questions just about facts.	21	45	
Generic Skills	51	45	
The course developed my problem-solving skills.	39	47	
The course sharpened my analytic skills.	42	46	
The course helped me develop my ability to work as a team member.	16	58	
As a result of my course, I feel confident about tackling unfamiliar problem	ns. 28	48	

The course improved my skills in written communication. My course helped me to develop the ability to plan my own work.				
<b>Overall Satisfaction</b> Overall, I was satisfied with the quality of this course.	38	48		
Note: Questions marked with * are reversed.				

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Data