BEYOND GRADES

Building and Evaluating Soft Skills With AI

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# 1 Introduction

## 1.1 The Problem Domain

Education systems strive to anticipate the future challenges that people will have to contend with and prepare them accordingly. educational systems globally are increasingly recognizing the importance of fostering **soft skills** alongside academic knowledge.

**What are soft skills?**

Soft skills called also as “people skills” are a set of non-technical skills which can help in personal and professional life and are not unique to one specific subject. soft skills are acquired by interacting with their environment .

soft skills defined by the Israeli education ministry as follows: General proficiency acquired through learning and training, supporting and guiding thinking, learning, and development independently of the type of knowledge. It is transferable across knowledge domains and enables efficient and appropriate utilization of knowledge, experience, and values in a wide range of contexts.

soft skills can be categorized into several key areas: Linguistic literacy, Mathematical literacy, scientific literacy, critical thinking, Creative thinking, digital literacy, information skills, Self-awareness, Self-direction, Social awareness, social conduct, Global Literacy, Adult physical-health literacy .

**Why are soft skills important?**

Soft skills are important because they go beyond specific job tasks. These interpersonal and communication abilities, such as teamwork, adaptability, and positive attitude, are essential for effectively navigating challenges in both professional and everyday life. They make individuals more flexible and capable of thriving in a world that is constantly changing.

The OECD ‘'Future of Education and Skills 2030’' report released in 2019 highlighted the growing importance of soft skills in education due to trends such as globalization and rapid advancements in technology and artificial intelligence, which demand changes of the labor market and the skills future workers require in order to succeed. It says, "to remain competitive, workers will need to acquire new skills continually, which requires flexibility, a positive attitude towards lifelong learning and curiosity".

**How soft skills can be procured?**

The development of soft skills is much more difficult than the development of hard skills because it requires actively interacting with others on an ongoing basis and being willing to accept behavioral feedback. While hard skills can be learned by studying from a book or from individual training, soft skills need a combination of environment and other people to be mastered. For this reason, learning doesn't depend solely on the person, but it is influenced by different factors that make the education harder and unpredictable.

In Israel, efforts may be made to incorporate these skills into the curriculum through various means:

* Curriculum Design: Incorporating activities that promote teamwork, communication, and problem-solving.
* Encouraging project-based learning that requires collaboration and critical thinking.
* Teacher Training: Providing teachers with training on how to incorporate soft skills development into their lessons.
* Creating professional development opportunities focused on enhancing teaching methods that nurture soft skills.
* Extracurricular Activities: Supporting extracurricular programs that emphasize teamwork, leadership, and creativity.
* Encouraging participation in activities that require students to interact with peers and develop social skills.
* Parental Involvement: Engaging parents in the importance of soft skills and encouraging them to reinforce these skills at home.
* Assessment Methods: Evaluating students not only based on academic achievements but also on their ability to demonstrate soft skills.

## 1.2 Vision

Our software project intended to improve the assessment process of the soft skills , so that educators can track student progress and can help them improve their soft skills .

Our software project seeks to create an innovative educational environment through an EdTech platform powered by AI. This platform aims to strategically cultivate and enhance soft skills essential for students' success in the 21st century.

By systematically assessing these skills within the school setting, we aim to identify areas for improvement, tailor educational interventions, and provide students with a well-rounded foundation for future success.

The software system aims to provide a fun and interactive learning experience, motivating students to engage in their studies.

Additionally, it assists teachers in efficiently creating high-quality tests that can check student’s level in various soft skills and offers various monitoring tools to track their students' progress within these tests.

## 1.3 Stakeholders

* The professional instructor (Customer) - mindCet company:

mindCet is a company that connects entrepreneurship and learning by connecting startups, educators, researchers, learners, leaders in the high-tech industry, investors and policy makers - in order to offer relevant alternative solutions to the learner and the world of education in the digital age.

The company provides the main requirements of the project, in addition to that it helps in finding solutions to the challenges we defined in the project

* The instructor of the seminar - Kobi Gal:

Lecturer in the department, accompanies the project from the point of view of software engineering.

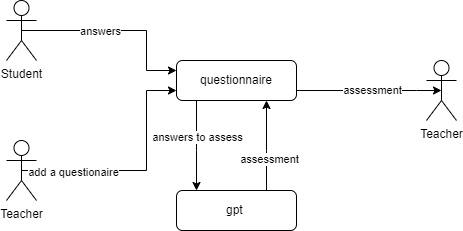
* Users of the system - Teachers, Students:

1. Teachers: will use the system to write and upload questions that we will use as a set of questions to test soft skills and guide students through a monitoring system that is provided to them.
2. Students: will enter the system to answer the test’s questions.

The system will enter their answers into an AI tool that is going to give a verbal assessment according to the skill being tested and an overall score.

## 1.4 Software Context

The software system will offer tests, enabling students to answer questions. Teachers can create new tests and monitor their students' progress. The system automatically analyzes student answers using a language model technology, providing assessments of their soft skills. The assessment will be provided to the teacher.



## 

# 2 usage Scenarios

## 

## 2.1 User Profiles - The Actors

**Teachers**

* Responsible for creating and assigning soft skills tests to students.

## Need to easily distribute tests via shareable links.

## Should be able to track student completion status.

## Accessing submitted responses and scoring via a web-app.

## Prefer simple interfaces and workflows that are non-technical.

## 

## 

## Students

## Recipients of shared tests links from teachers.

## Expected to attempt and submit responses on time.

## Need a user-friendly display of questions and inputs.

## Require their responses to be stored accurately.

## Prefer assessment interactions integrated within platforms they use daily like Discord.

## 

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## Discord Bot/Landbot

## A non-human actor that facilitates test distribution.

## Creates shareable links, and sends reminders via chat.

## Securely stores response payloads.

## Syncs data with teacher dashboards.

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## 2.2 Use-cases

### 

**2.2.1 Upload Studying Material**

Actors: Teacher

Preconditions: The system is operational.

Postconditions: Studying material is successfully uploaded to the system.

Parameters: Title, file.

Actions:

1. The teacher accesses the option to upload studying material.
2. The teacher provides the title and uploads the file.
3. The system processes and saves the uploaded material.

Alternative Flow (If there are errors in the provided details): The system prompts the teacher to correct any errors.

**2.2.2. Choose Soft Skill to Test**

Actors: Teacher

Preconditions: The system is operational.

Postconditions: Soft skill for testing is selected.

Parameters: Selected soft skill.

Actions:

1. The teacher navigates to the option to choose a soft skill for testing.
2. The teacher selects the desired soft skill from the available options.
3. The system records the chosen soft skill for assessment.

Alternative Flow (If there are errors in the provided details): The system prompts the teacher to correct any errors.

**2.2.3. Generate Questions Using a Language Model**

Actors: Teacher

Preconditions: The system is operational and a soft skill for testing is already selected.

Postconditions: Questions are successfully generated for the chosen soft skill.

Parameters: Soft skill for reference and studying material.

Actions:

1. The teacher accesses the option to generate questions.
2. The system uses a language model to create a question related to the chosen soft skill.
3. The teacher reviews the generated question.

Alternative Flow (If there are errors in the provided details): The system prompts the teacher to correct any errors.

**2.2.4. View Questions Before Sending**

Actors: Teacher

Preconditions: The system is operational, questions are generated for the selected soft skill.

Postconditions: Questions are reviewed and approved for distribution.

Parameters: Generated questions.

Actions:

1. The teacher accesses the option to view generated questions.
2. The teacher reviews each question to ensure accuracy and relevance.
3. The teacher approves the questions for distribution.

Alternative Flow (If there are errors in the provided details): The system prompts the teacher to correct any errors.

**2.2.5. Send Students Link to Questions**

Actors: Teacher

Preconditions: The system is operational, questions are approved for distribution.

Postconditions: Students receive a link to access the questions.

Parameters: Generated questions, Student details for distribution.

Actions:

1. The teacher selects the option to send questions to students.
2. The system generates the link.
3. The teacher distributes the links to the students.

Alternative Flow (If there are errors in the provided details): The system prompts the teacher to correct any errors.

**2.2.6. View Students Assessments on Soft Skills by a Language Model**

Actors: Teacher

Preconditions: The system is operational, students have completed assessments.

Postconditions: Teacher has access to student's assessments on soft skills.

Parameters: Soft skill assessments.

Actions:

1. The teacher accesses the option to view students' assessments.
2. The system retrieves and displays assessments related to the chosen soft skill.
3. The teacher reviews and analyzes individual student performances.

Alternative Flow (If there are errors in the provided details): The system prompts the teacher to correct any errors.

**2.2.7. Get a Link with Questions**

Actors: Student

Preconditions: The student has a valid link.

Postconditions: The student has access to the questions for assessment.

Parameters: Unique link.

Actions:

1. The student receives a link provided by the teacher.
2. The student clicks on the link to access the questions for assessment.

Alternative Flow (If there are errors in the provided details): The student will receive an error message.

**2.2.8. Answer Questions and Submit**

Actors: Student

Preconditions: The student has a valid link to access questions.

Postconditions: Student responses are submitted for evaluation.

Parameters: Questions for assessment, student responses.

Actions:

1. The student accesses the provided link to access the questions.
2. An external system will present the questions.
3. The student answers each question.
4. The student reviews and confirms their responses.
5. The student submits their answers for evaluation.

Alternative Flow (If there are errors in the provided details): The system prompts the student to review and correct any incomplete or erroneous answers before submission.

# 

# 3 Functional Requirements

| **Id** | **Module** | **Description** | **Priority** | **Risk** | **Status** | **Implementation** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Teacher | Upload Studying Material | Nice to have | Medium | Pending | To be Implemented |
| 2 | Teacher | Choose Soft Skill to Test | Must have | High | Pending | To be Implemented |
| 3 | Teacher | Generate Question Using a Language Model | Nice to have | Medium | Pending | To be Implemented |
| 4 | Teacher | View Questions Before Sending | Must have | Medium | Pending | To be Implemented |
| 5 | Teacher | Send Students Link to Questions | Must have | High | Pending | To be Implemented |
| 6 | Teacher | View Students Assessments on Soft Skills by a Model | Must have | High | Pending | To be Implemented |
| 7 | Student | Get a Link with Questions | Must have | High | Pending | To be Implemented |
| 8 | Student | Answer Questions and Submit | Must have | High | Pending | To be Implemented |
| 9 | System | Students answers should be saved in the system | Must have | Medium | Pending | To be Implemented |
| 10 | System | Soft skill assessments should be saved in the system | Must have | Medium | Pending | To be Implemented |
| 11 | Teacher | Received notification in dashboard when student submits the test | Nice to have | High | Pending | To be Implemented |

note: The current version of the functional requirements describes the initial design of the system. Some of the requirements may be changed/removed during the development.

## 

## 4 Non-functional Requirements

**4.1 Implementation constraints**

### 4.1.1 Performance

#### 4.1.1.1 Response Time

* + Ensure that the system responds to user requests within 2 seconds under normal operating conditions.

### 4.1.2 Security

#### 4.1.2.1 Authentication

* + Implement secure user authentication with passwords stored using industry-standard encryption algorithms.

#### 4.1.2.2 Authorization

* + Restrict access to sensitive information and functionalities based on user roles and permissions.

### 4.1.3 Reliability

#### 4.1.3.1 System Uptime

* + Maintain system availability at 99.9%, excluding scheduled maintenance.

### 4.1.4 Usability

#### 4.1.4.1 User Interface

* + Design an intuitive and user-friendly interface.

### 4.1.5 Scalability

#### 4.1.5.1 Number of Users

* + Ensure that the system supports a minimum of 500 simultaneous users without performance degradation.

### 4.1.6 Maintenance

#### 4.1.6.1 System Logs

* + Maintain system logs for at least one year for audit and troubleshooting purposes.

# 4.2 Platform constraints

1. Integration with Discord or Landbot has to use their provided APIs and bot development frameworks.
2. Scalability and performance reliant on Discord/Landbot’s infrastructure capacities.
3. Dependence on third-party platforms' uptime and reliability to ensure uninterrupted student assessments.
4. Feature enhancements are limited to the extent of exposed APIs and roadmaps for these external tools.
5. Potential limitations on the number of bot interactions per day/month based on Discord/Landbot plans and policies.

**4.2.1 SE Project constraints:**

1. With guidance from our project supervisor and MindCET, we can work with a small set of actual students for testing conversations and tests. This reduces the need to simulate data completely.
2. Our department has budget constraints so we can explore only free or open-source developer tools for building the system instead of expensive commercial platforms.
3. As the project timelines depend on college semester terms, if initial requirements change substantially halfway, we may not be able to deliver too many extra features within the remaining months.
4. We will not get permission to install bots and store data within actual school networks, servers, and messaging platforms due to policy restrictions. We have to develop using simple tools on local laptops instead.
5. Team collaboration mechanisms dictated by the institution's preferred platforms.
6. Requirement for documentation formats as mandated by department standards.
7. Need for advisor inputs and change approval as per research guidelines.

**4.3 Special restrictions & limitations**

**4.3.1 Special restrictions:**

1. Access to educational institutions' private Discord servers is required early for integration.
2. Evaluation limited to tool-specific analytics and metrics vs. custom analyses needs.

**4.3.2 Limitations**:

1. Feature enhancements rely on the APIs/tool maturity of Discord and Landbot.
2. Adapting emergent conversational assessment needs is restricted by platform evolution cadence.
3. Backup mechanisms restricted for student response data stored externally.

# 4 Risk assessment & Plan for the proof of concept

# **Risk Assessments:**

**how to plugin Claude to our system?**

Anthropic provides a REST API that allows you to send text prompts to Claude and get back responses. You can make API calls from your code to have conversations with Claude.

**Risks with using AI:**

The AI could give wrong or inappropriate answers. To prevent this, we will test the AI a lot first and have humans check its answers.

First, we will create different discussion room subjects to assess students' soft skills in more than one way, and we will compare student’s several assessments and check if they are compatible.

Second, we will share the results with students’ teachers, and they can be a good reference to check if the results are accurate and reflect student’s daily behavior.

The AI could be biased. We will analyze its data and programs.

**Formulating the questions for the language model:**

Formulating good questions for a language model is key to getting the most helpful and informative responses.

We will formulate clear and precise questions, and use a mix of open-ended and closed-ended questions. Open-ended questions encourage the language model to provide more detailed and informative answers, while closed-ended questions can be helpful for getting quick, factual answers.

**Risks that we do not properly evaluate the system:**

Our testing may not reflect real usage. We will have actual students and teachers use the system and give feedback.

We could focus too much on quantitative metrics. We will also include qualitative feedback from users.

Issues may arise late. We will test a Demo version with users before launch.

testing our platform on a group of students, that we have information about their soft skills background, and we will compare the results and get an evaluation percentage.

**Data privacy and security risks:**

Settings could allow data access when they should not. We will check the settings to verify data is protected.

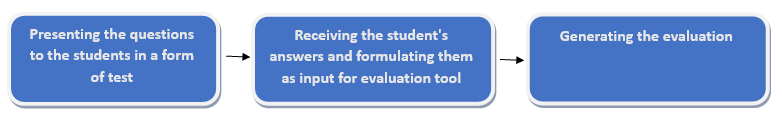
**System usage risks:**

Many users at once could overload and crash our system.

We will scale up system resources to handle spikes in traffic.

**Proof of concept**

In this chapter, we will present the main technical problem in the project and a plan on how to solve it. The main stages in the project are:

****

The main technical problem is at the stage after we received the final evaluation and is reflected in how accurate and reliable the assessment is.

In order to know how much the assessment we received reflects the skills of the student who answered the test, we will use prompt engineering.

* **Prompt engineering:**

Prompt engineering involves crafting input prompts in a way that elicits the desired information, style, or response from the model. This process requires an understanding of how the model interprets and responds to different types of input. It often involves experimenting with variations of prompts to optimize performance.

Prompt engineering can be crucial for obtaining accurate and relevant results.