contents.com

Innovation Project

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Executive Summary

Education has always been a fundamental process for all human beings.

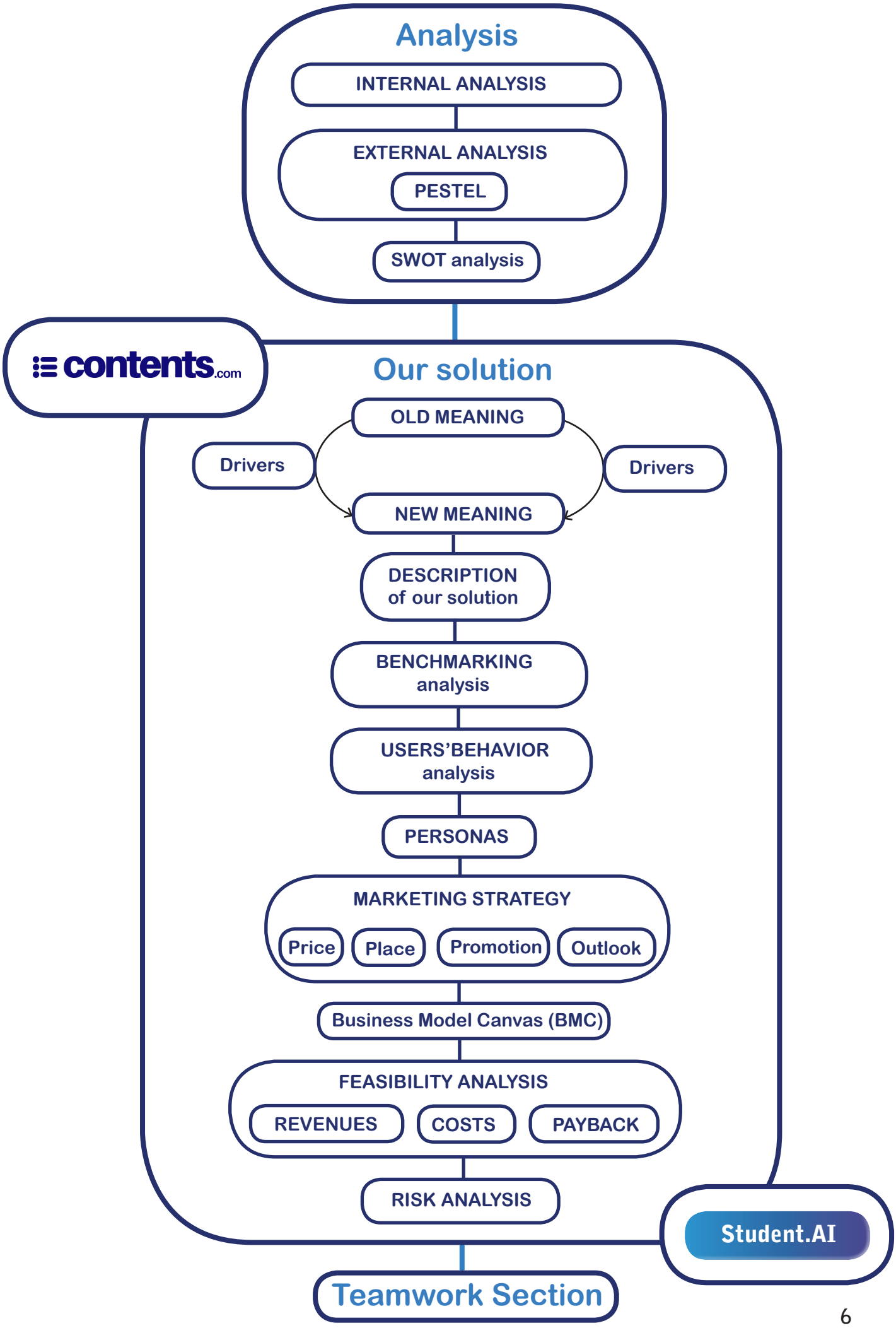
The mere act of learning, the acquisition of knowledge, skills, values, and personal development are core to make the next generations of leaders grow. Governments, companies, and educational institutions, indeed, invest more and more resources to achieve this goal.

This report introduces **Student.AI**, a software aimed at innovating the aforementioned field by exploiting some of the already existing tools in Content's product portfolio as well as by creating new ones.

First, by analyzing the **context**, new technological trends have been identified. For instance, a higher digitalization of teaching and learning resulting from Covid-19 spread or the use of Intelligent Tutoring Systems (ITS) for tailored learning experience.

The second section, instead, focuses on pointing out the **solution**, based on the concept of creating an environment where students can engage more with professors and learn in a more effective way. In-fact, we aim to change the meaning of being a student, shifting from a knowledge-based educational system to a student-based one. Student.AI, specifically, is built on two key features: customizable notes, a functionality allowing students to receive AI-made and modifiable notes, and study support, which helps students to prepare for the final exams based on quizzes, studying schedules, and so on.

Eventually, an analysis of the **teamwork's dynamics** is provided. We used the Tuckman model to disentangle the stages our team went through, and the Whole brain Model and Debiasing in a team Model to point out the personalities and traits of each team member.


Analysis
INTERNAL ANALYSIS
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Our solution
OLD MEANING
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Teamwork Section

1. Analysis

contents.com

Contents is a marketing technology startup operating in the content creation industry. The company has been founded in Milan in 2016 by Massimiliano Squillace, and it is currently operational also in London, Paris, Madrid, and Las Vegas with a team of fewer than 50 people.

1.1 Internal Analysis

The Milanese company owes its credibility to a **proprietary software platform** that uses not only data analysis and machine learning algorithms, but also Natural Language Processing modules to generate digital content on various topics automatically, quickly, and with high quality in several languages. All for the benefit of publishers, companies, and e-commerce sites.

Specifically, Contents helps content teams **do more in less time**, allowing them to focus on what makes them uniquely human: their creativity, empathy, sector expertise, powers of intuition, and deep understanding of their audience.

However, according to Contents' vision, Artificial Intelligence (AI) is not a substitute for the human factor but rather an aid. Many of their **products** are created by AI and then checked by an expert team of editors and translators. AI is indeed exploited to facilitate human activities by taking over the boring and repetitive actions. Here are some products they offer:

- Brainstorm: text generator according to keywords provided
- Translation.
- Two-way text/audio conversions
- Brief a writer: text generator according to guidelines provided

Our analysis focuses on exploiting some of those tools, such as audio-text conversions and brief a writer, to innovate the **educational system**. We decided, indeed, to focus our attention on this field since it's very close to us and it's a field that has been changing and growing exponentially in the last decade due to the advance of technology.

1.2 External Analysis

The Covid-19 pandemic has transformed the education landscape all over the world, having, as a result, a higher **digitalization** of teaching and learning.

To face the challenges that arose during the pandemic, many countries started developing the digital infrastructure of schools and universities and consequently has emerged a significant need for support to adjust to new virtual modes of teaching and learning. The **advance of AI** is also part of this process of digitalization of education.

However, according to a Stanford University research, schools and universities have been slow in adopting AI technologies, primarily due to a **lack of funds** and solid evidence supporting their positive impact on students and their learning objectives. Over the next fifteen years, the implementation of intelligent tutors and other AI technologies to assist teachers in the classroom is likely to occur significantly.

1.2.1 PESTEL Framework

To better understand the external environment where Contents operates and identify the relevant factors that could influence our business idea, we decided to implement the PESTEL framework.

Political

- **Recovery fund:** European states are planning on how to use the funds from the recovery fund and a part of them is already fixed for universities. In Italy for instance, the government has allocated 15 billion from its pandemic recovery plan to universities.
- **Brain drain:** currently, Italy spends 15% less than the major European economies on education. This inattention to Italian education favors the phenomenon of brain drain and school dropout, for every graduate fleeing, the Italian system loses a total of 138,000 euros of the amount spent on training.

Economic

- **Increased adoption of AI:** Investments in AI are also set to go up over the coming years.
  - Research launched by consulting company Accenture forecasts that by 2035, AI could double annual global economic growth rates.
  - A study by PwC estimates that global GDP may increase by up to 14 % by 2030 because of the accelerating development and take-up of AI.
  - The McKinsey Global Institute expects that around 70 % of companies would adopt at least one type of AI technology by 2030, while less than half of large companies would deploy the full range.

Social

- **Quality education:** Access to quality education is the 4th pillar of the 17 UN Sustainable Development Goals and the higher digitalization of teaching and learning will help move towards achieving this goal by improving firstly the inclusiveness of schools. AI can indeed support students with Special Educational Needs (BSE) and Specific Learning Disorders (SLD).

- **Schools and AI:** in the “Libro Bianco” for Artificial Intelligence at the service of the citizen by the Agency for Digital Italy, among the examples of how the school could benefit from the adoption of AI solutions, we can find:

    - automatic tools for evaluation
    - personalization of the didactic material
    - automated tutoring, by means of recommendation tools to keep attention alive
    - suggestions regarding personalized variations to be introduced in the school curriculum
    - extraction of predictive indicators of the risk of school dropout

Technological

- **Online education:** The major impact of COVID-19 on teaching and learning is the massive shift to online education that has made the entire system leap into the future and towards the development of the EdTech field.
- **Personalization of the learning experience**: A Stanford University study on AI and Life in 2030 shows how interactive tutors can be matched to students for a more focused and personalized learning experience. This will lead to a human-machine collaboration, resulting in a powerful combination of skills.
- **Intelligent Tutoring Systems** (ITS): ITS have been developed for training students in many disciplines. Cognitive tutors use software to mimic the role of a good human tutor by, for example, providing hints when a student gets stuck on a math problem and offering specific feedback.

Enviromental

- **Pollution and carbon footprint:** AI algorithms require large amounts of electricity and consequently a great quantity of C02 is generated. New research (March 2022) by scientists of the University of California, Berkeley, and Google shows that the climate impact of AI can be mitigated through the right choice of the design of the algorithm, the type of computer hardware used to train it, and the nature of electricity generation where that training takes place

Legal

- **Artificial Intelligence Act:** The Artificial Intelligence Act proposed by the European Commission sets out the rules for the development and the use of AI and those rules differ according to a risk-based approach. The Act states that AI is required to be legally, ethically, and technically robust, while respecting democratic values, human rights, and the rule of law. rights, and the rule of law.

1.3 SWOT Analysis

Strengths

- **One-stop-shop**: solutions for every stage of the content creation and management process
- Natural language generation: AI software for generating content from data.
- Natural language processing: AI software for replicating the human language
- Advanced translation tool
- **Proprietary algorithms**
- Partnership with **OpenAI**
- **International presence**
- Collaboration with tech giants: Google, IBM, Amazon, Microsoft
- **Virtual newsroom**: can manage premium plans from strategy to publication
- Human in the loop
- **Boutique model**: ability to offer customized projects for corporate clients

Weaknesses

- Not the same resources of tech-giant to train ML models
- **Low diversification:** works only on online content creation market
- Offer solutions only for digital customers

Opportunities

- **Embracing the cutting-edge technology on the market:** need of new services that exploit AI benefits.
- **Growth in the technology sector caused by COVID-19:** this growth is inevitably affecting the educational system and it is making it shift to the digitalization of education.
- **Recovery fund and governments support:** many European states are planning to use part of the funds to support universities and their technological improvement.
- Increased adoption of AI: COVID-19 impacted many aspects of how people conduct business, and with it the accelerated adoption and utilization of AI overall.

Threats

- **Job-stealing:** AI can take over human activities, especially repetitive and boring tasks, ending up being often perceived as job-stealer.
- **Economical inequities:** COVID-19 is widening inequities between and within countries, even on the technology aspect with high-income countries better able to be up-to-date and have opportunities.
- **Competition:** competitors in this market are big tech giants.
- **Carbon footprint:** AI algorithms require large amounts of electricity, leading many to worry about the carbon footprint of these systems.

2. Solution

2.1 Old Meaning

The educational system is predominantly **knowledge-based** and focused on stressing theoretical concepts rather than fostering their practical mastery during lectures.

According to the paper "Reforms in Teaching-learning Environment towards Greater Interactivity - New roles of facilitators and learners" (Ramakrishnan, 2006), due to the high importance that such system attributes to **notions**, students tend to focus on writing down each single piece of information the professor teaches without neither elaborating on it nor interacting with the class. As a result, this kind of approach does not foster both creativity and engagement.

Teaching in a **passive environment,** indeed, may decrease students' and professors' motivation, while research affirms that exposing students to dialogues, debates, and discussions among them and with professors, could improve their inventiveness and problem-solving skills.

Furthermore, the study of "Harvard Initiative for Learning and Teaching" (Friedman, 2014) highlights that due to the limited capacity of working memory, the balance between comprehension and production makes the process particularly difficult. In particular, the student must perform simultaneously several t**asks**:

- Pay attention to the instructor
- Understand the material
- Identify what is important to write down in his/her notes
- Coordinate the activities with the physical writing or typing of the notes
- Keep up with the high rate at which the professor might speak

Alternatively, a student may opt to **abandon notetaking** entirely, and divert his mental resources exclusively to comprehending the lecture. However, this type of strategy may be successful for an immediate test, on the other hand, the student would lack notes to review for a test that occurs several days or weeks later. Without notes, they would not have the opportunity to strengthen the connections between concepts during a review session.

Clearly, this scenario has drawbacks for the professors too, since they can't be sure that students will understand completely the topics covered. Without **elaboration of the notions**, students won't be able to formulate detailed questions about such topics and, hence, clarify their doubts. Indeed, the professors often receive questions just a few weeks before the test, during students' individual preparation for the exam. Due to these constraints, students often struggle to balance the trade-off between understanding and notes production during a lecture.

Eventually, notetaking relies on cognitive functions that can be impacted by conditions such as ADHD (attention deficit hyperactivity disorder), dyslexia, and other **learning disabilities**.
Research (Boyle, Forchelli, & Cariss, 2013) shows that students with disabilities have even more notetaking difficulties during lectures. For this reason, they either do not take notes, relying on other students' work, or get **assistance** from support teachers with the lecture materials after the class. It's therefore important to search for new ways of making the note-taking process more accessible to all learners, and this is where our solution comes in.



2.2 Drivers: student's issues and trends

In this framework, we identified three main issues and trends regarding students' tendencies and new educational trends that will lead the change from the old meaning to the new one.

1) **Taking notes.** Past research shows that the human brain tends to remember things better if written down. In a study conducted at Princeton University (Mueller & Oppenheimer, 2013), researchers showed how notes taken with pen and paper can activate cognitive processes in our brain that improve the understanding and memorization of what is heard.

However, according to the paper "Intentional forgetting: Note-taking as a naturalistic example" (Eskritt & Ma, 2014), in educational environments, students who are passive during lectures, mostly focused on taking notes, experience a lack of permanent learning. The research showed that the human brain is more inclined to not store information that has been written down since it is considered "safe" and doesn't need to be remembered. The brain intentionally forgets it to free up room. According to the authors, the best way to help the brain withhold information is to be actively engaged, thinking critically about the topics explained and participating in discussions.

2) **Loss of attention.** Research showed that attention lapses varied at different points during a one-hour lecture. After an initial "settling in" period, observers noted breaks in attention at 10-18 minutes into the lecture. By the end, breaks were more frequent, occurring every 3-4 minutes. Therefore, the risk is that the student is going to lose a key concept during the lecture thus compromising the comprehension of the lesson and the quality of the notes.

According to the paper "How Long Can Students Pay Attention in Class? A Study of Student Attention Decline Using Clickers" (Bunce, Flens, & Neiles, 2010) there is a link between interactive learning styles and the length of a student's attention span. Indeed, researchers surveyed students and the results showed that fewer breaks occurred during discussions and demonstrations than during lecture periods.

While many teachers believe that new technologies have created an easily distracted generation of students with short attention spans, technology is still seen as a positive tool in the education sector.

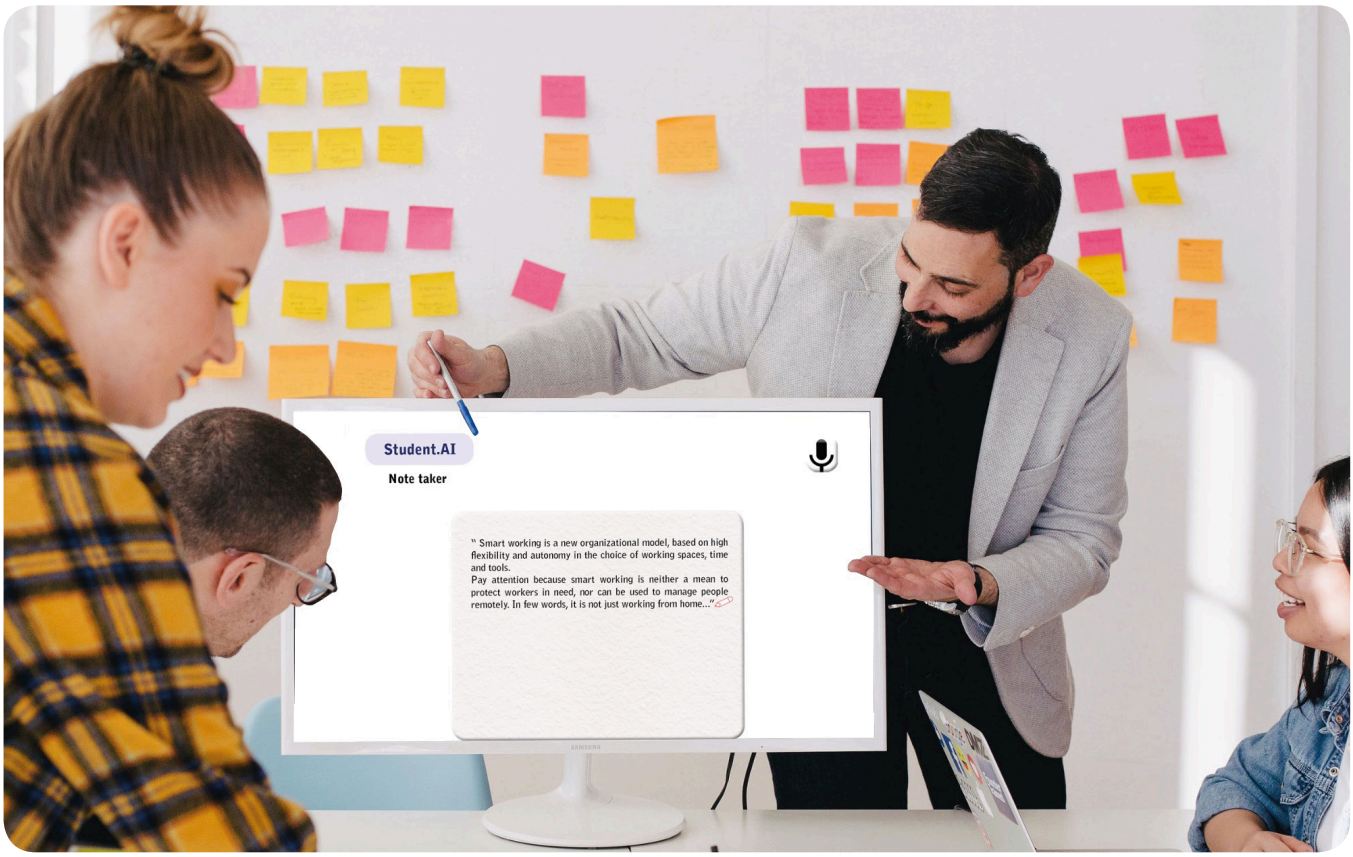
3) **Innovative teaching approaches.** In the last few years with constant technological innovations, interactive learning has made its way to classrooms and more importantly has proven to be effective. It is a teaching method that encourages social interactions between the professor and the student and that forces a change in the dynamics inside classrooms. Professors who use innovative methods are proven to reach out better to the minds of the students.
Here some examples of interactive learning methodologies:

- **Project-Based Learning** (PBL): it consists of using real-world scenarios, challenges, and problems to engage students in critical thinking, problem-solving, teamwork, and self-management. PBL helps develop deeper learning competencies.

- **Thinking Based Learning** (TBL): it is an active methodology that teaches students to think, reason, and make decisions. The objective, therefore, is to learn how to convert information into knowledge and develop critical thinking and problem solving.

- **Gamification of learning**: it is an approach that seeks to motivate students by using video games and game elements in learning environments. This method helps reinforce knowledge maximizing enjoyment, engagement, and attention by capturing the interest of learners.

- **Flipped classroom:** it is a type of blended learning where students are introduced to contents at home and then come to school armed with questions and background knowledge. The main objective is to optimize time in class by developing projects, working on specific tasks, discussing with peers, and doing presentations.



2.3 New meaning

The teaching sector has always been able to understand the changes in society, reflecting and expressing them in an amplified way. **Universities**, particularly those in the STEM field, have always played a leading role in spreading new tools making young students the drivers of this technological evolution.

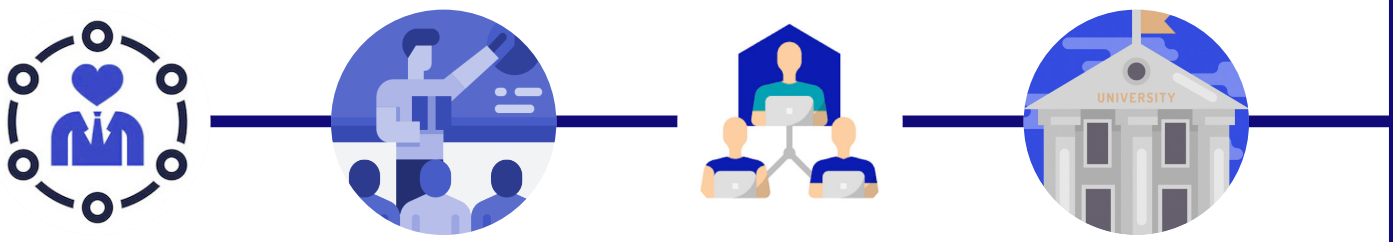
With the technology available today (online platforms, apps), professors can increase their engagement with the students, even in crowded classrooms stimulating their attention with activities. In this way, the informational flow becomes bidirectional: from professor to students and then, from students to the professor.
Especially at the university level, where students have the maturity to acquire the notions on their own, they could use the time in class to collaborate with other colleagues, addressing real-life-based case studies. During the **lecture time**, the students would be expected to:

- Identify the key factors during information exchange
- Elaborate possible solutions to the professor's questions, mentally and in real-time
- Interact with colleagues and professors

Therefore, it will be a **student-centred system**: the student is at the centre of the interactions in the phase of knowledge transmission during lecture. Supported by different tools, students will no longer perform the monotonous tasks that can be delegated to a machine, such as taking notes. They will be able to follow the professors more actively than they are used to.

Moreover, technology is changing the needs of companies, and Universities have the purpose of training young people to respond to these new demands. In the coming years, people will give more importance than they do nowadays to soft skills and not only to hard ones. Most companies, indeed, look for two main soft skills: real-time problem solving and co-operation in every kind of teamwork.

Young students can train these **soft skills** by focusing more on practical activities and on the live interactions, instead of spending time on notions acquisition. Following these changes, the new generation of students will be able to face challenges with shorter response times.

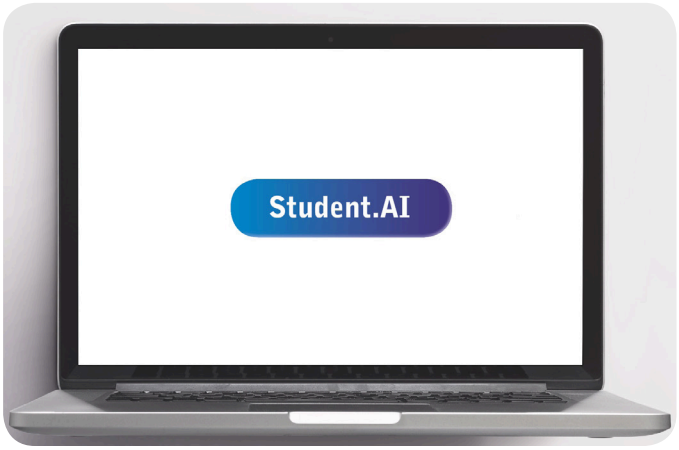


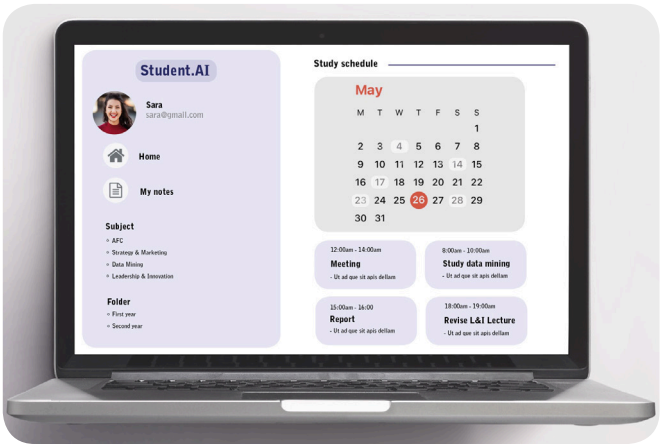
2.4 Description of our solution

We want to innovate students' habits by providing them a **digital tutor supported by AI systems**. This software will support the student throughout the university journey, helping him in the development of the necessary materials, in the organization of work, and finally in testing his knowledge. In this way, students can focus on classroom activities, stimulating critical thinking and real-time problem-solving skills.

The software, which is an application that will be present on personal devices, includes two main parts: the **customizable notes** functionality, which works as if the AI was a student that takes notes of what the professor is saying, and the **study support** one, which supports and helps students throughout the preparation of an exam, the software will be in both English and Italian languages. The deep learning and AI systems present allow highly innovative product customization, modifying the outputs according to the user's needs.

However, it is important to highlight the fact that some actions from the faculty side are required, such as providing the access to the camera in the classroom or the **integration** with other technologies already present in the classrooms such as computers or tablets. In particular, the audio system, since the software can exploit the microphone of the classroom to catch better what the professor is saying. Nevertheless, the user can decide to use the microphone of his own personal device.





2.4.1 Customizable notes

a. Note taker

The software listens to the professor through the microphone of the device onto which it is installed, and it writes down what the professor is saying, following the order through which the professor is explaining.

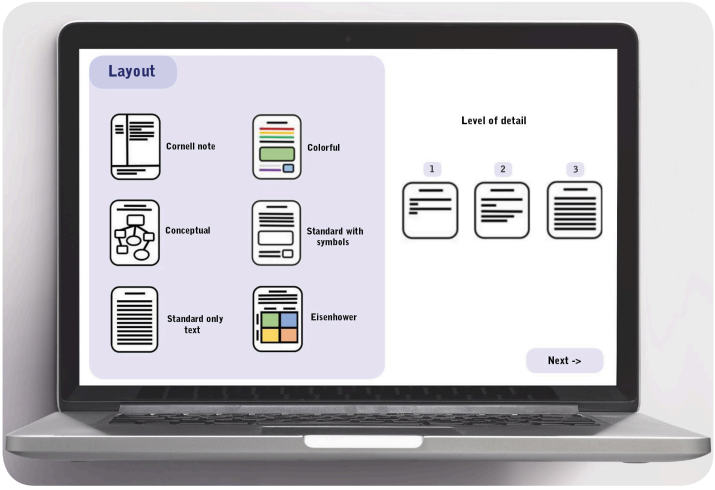
On the monitor of the personal device, the student will be able to see real-time notes generated by the software according to the chosen layout.
Later, the software can adjust the notes taken during the class by merging some parts to avoid the possible repetition of concepts and elaborating them to provide a logical flow.

Regarding graphs and formulas, the software will be able to detect them (both from the blackboard and the slides of the presentation used by the professor) and insert them in the notes paying attention to contextualizing them properly.

b. Standard Layouts

The software allows students to choose how the notes will be presented to them by the system both during the lecture and at the end, after review. Indeed, the user can select from different layouts the one that is most suited for him/her and for the specific lesson and the AI will provide notes in such format.
Examples of layouts are Cornell Notes, Conceptual map, Eisenhower matrix, Classic Notes, etc.

Furthermore, it avoids students losing time on details and secondary concepts. Indeed, the AI organizes concepts by importance so that the software can provide different levels of details of the notes: main concepts, main and secondary concepts, and all concepts plus minus details.



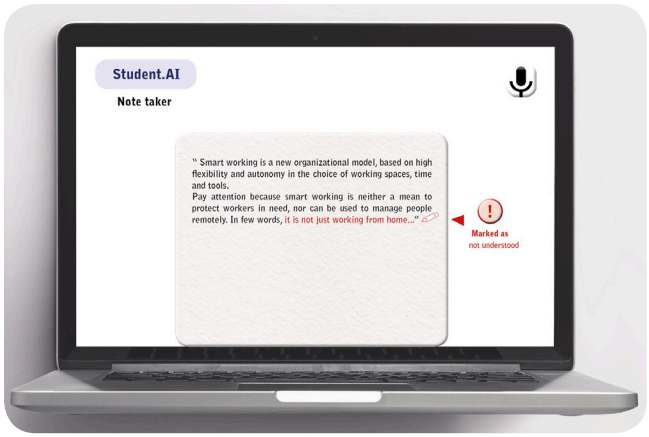
c. Preferences on taking notes

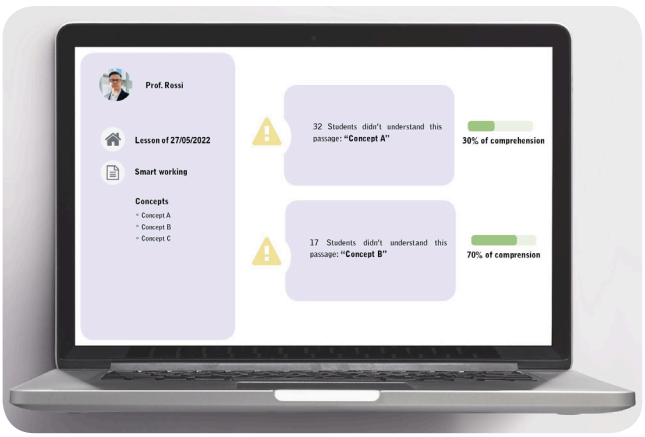
The AI can learn the preferences of the user and provide them automatically when students are using the software. For example, if a user prefers to take schematized notes, or maybe use some symbols or colors, the AI will provide the notes accordingly.

This feature will be available only after some usages of the software from the user or in case the user uploads some past notes, otherwise the student will be able only to choose between standard layouts.

d. Immediate feedback for professor

If the professor also uses the software, he can interact quicker with the students. When a student doesn't understand a particular topic, he can mark such part on the notes on his device and send feedback to the professor. If above a certain threshold of students didn't understand such part, then the professor is notified, and he can explain again that specific topic by using a different approach to make it more understandable by all students.

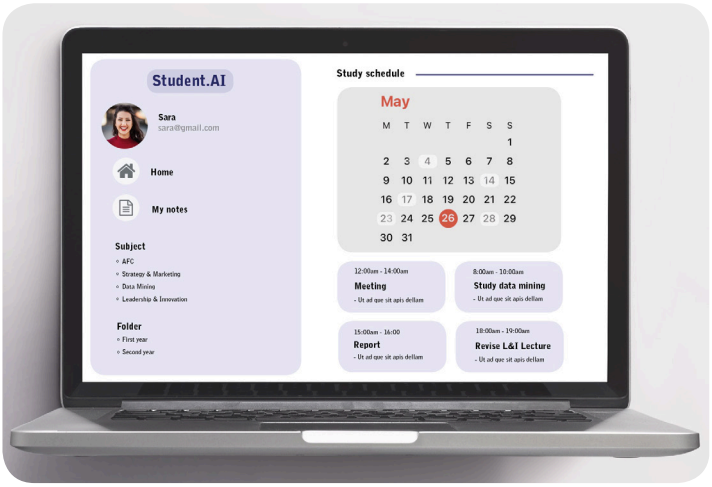




2.4.2 Study support

e. Study scheduler

The software can estimate the amount of time required by the student to study such content. This is related to the length of the note and the history of the user's time needed to study, initially you'll have to insert it manually, after some usages the software will be able to calculate it for you. Based on this, the software can do a schedule, such as a classical calendar, and fix the study goals accordingly to the timetable of the lectures, of course the user will be able to insert personal commitments and deadlines so that the software can manage also other constraints.



f. Test your knowledge

The software gives the possibility to test the student preparation through some activities. These activities can be also scheduled into the calendar provided by the AI according to the "Study scheduling feature".
These activities are based on the content acquired by the AI and can be traditional questions that could be asked at exams, such as:

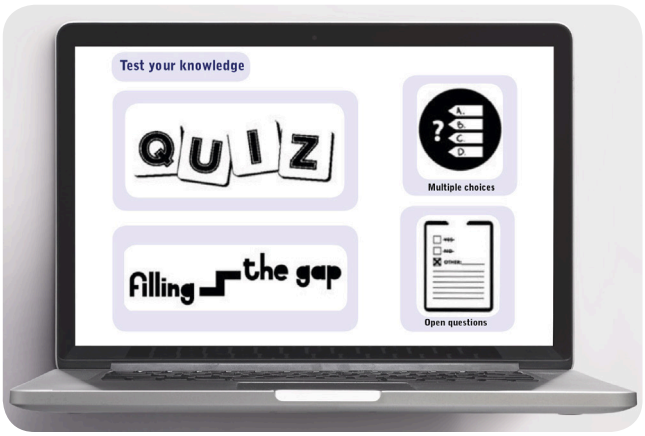
- Multiple-choice questions
- Quizzes
- Open questions
- Filling the gaps

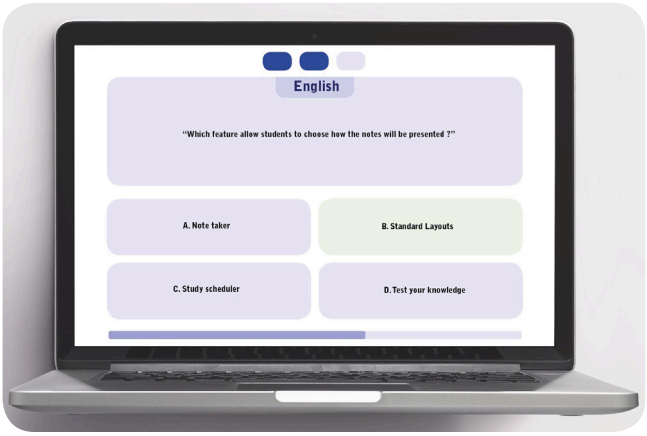
Or also, methods to memorize things such as: flashcards.

The software adapts the difficulty of the questions based on how the student answers them, so that he can achieve a deeper knowledge and ability to manage this new information acquired.

g. Repeating listener

The software can test the student's knowledge also through speaking. If the student is used to speak aloud while repeating, he can take advantage of the software since it is able to listen and give feedback on whether what he is saying is correct.





This feature is integrated with the previous two, so if the student says something wrong, the software is going to recommend him to revise such topic maybe inserting an activity in the schedule provided in the previous features.

This table highlights the problems addressed, how they will be solved by our solution and who will gain advantage from the solution

Problem	Solution	Customer
Trade-off taking notes or actively listening	Automatic note taker	Student
Low interaction with the class	Don't focus on taking notes	Student & professor
Low instantaneous elaboration of the info	Focus on the lecture and the activities	Student & professor (knows what is not understood by students, more effective lectures)
Difficult to find the right layout and re-organize the notes when you are at home	Done automatically and large amount of already utilizable layouts	Student
Difficult scheduling for the exam	Scheduler software	Student
Though preparation for the exam	Oral Checker and knowledge tester	Student

2.5 Benchmarking: analisys of existing solutions

Contents is not the only player on the market and, looking for other AI platforms which aim at real-time transcribing notes while providing inclusively post-class support to students, some competitors can be found.

Specifically, Otter.ai, Colibri.ai, Evernote and Trivie are the main competitors in the market. To find those competitors, we compared their offerings with ours, explicitly stating which are the overlapping features that they also provide.

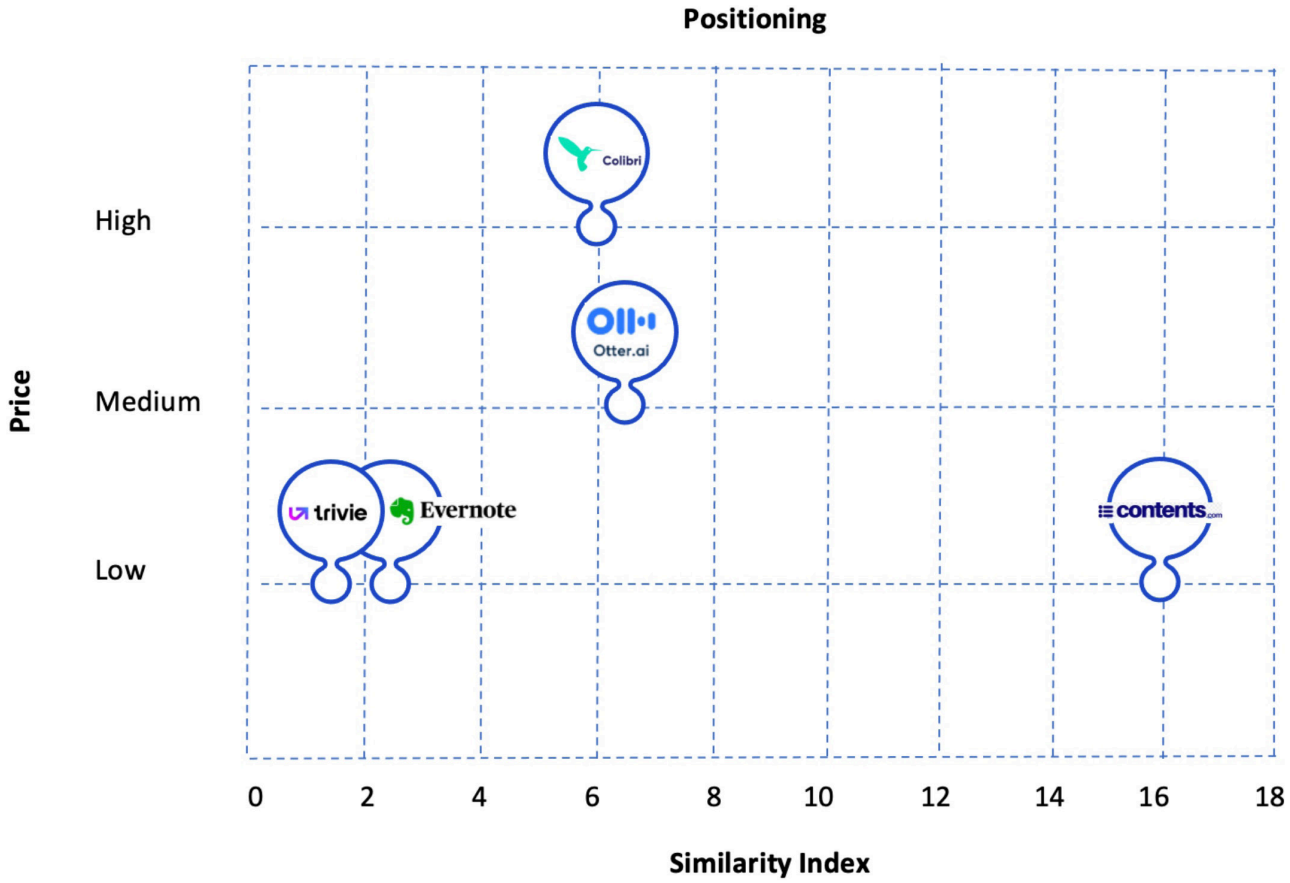
- **Otter.ai** and Colibri.ai have been chosen because they empower students with the ability of real-time transcribing, highlighting, and making summary keywords, but suffer the fact of not supporting the student in the journey towards the exam, which is their main purpose.
- **Evernote** lacks in terms of summary and student support, which may lead the costumer to choose a more inclusive pack of features.
- **Trivie** has been selected as a competitor even if is just supporting the student for exam preparation, enhancing knowledge through pre-test assessments, post-training reinforcement and surveys based on the uploaded notes.

Competitor	Layout	Taking notes	Summary	Study planner	Exam support
Otter.ai		✓	✓		
Colibri		✓	✓		
Evernote	✓	✓			
trivie					✓

With respect to the competitors, our proposal is a **one-stop solution** which offers a comprehensive range of features that guide students from the beginning of the course until the exam moment, supporting them in all the activities that are usually performed when attending a course: taking notes, adjusting them, planning the study, and studying the material.

While the offerings already existing in the market simply offers individual features: there's no competitor in the market that offers a one-stop solution for all the journey of the exam preparation.

However, to better understand the spot Contents would occupy in the market with respect to the aforementioned competitors, we decided to implement the **similarity matrix**.



From this graph, it can be noticed that **Student.AI** differs a lot from the other competitors in terms of integration of the various features.

2.6 Users' behavior analysis

To better understand the behavior of our consumers and develop a solution that can really improve the everyday life of a student, we ran a **survey**, and, in this section, we analyze its results.

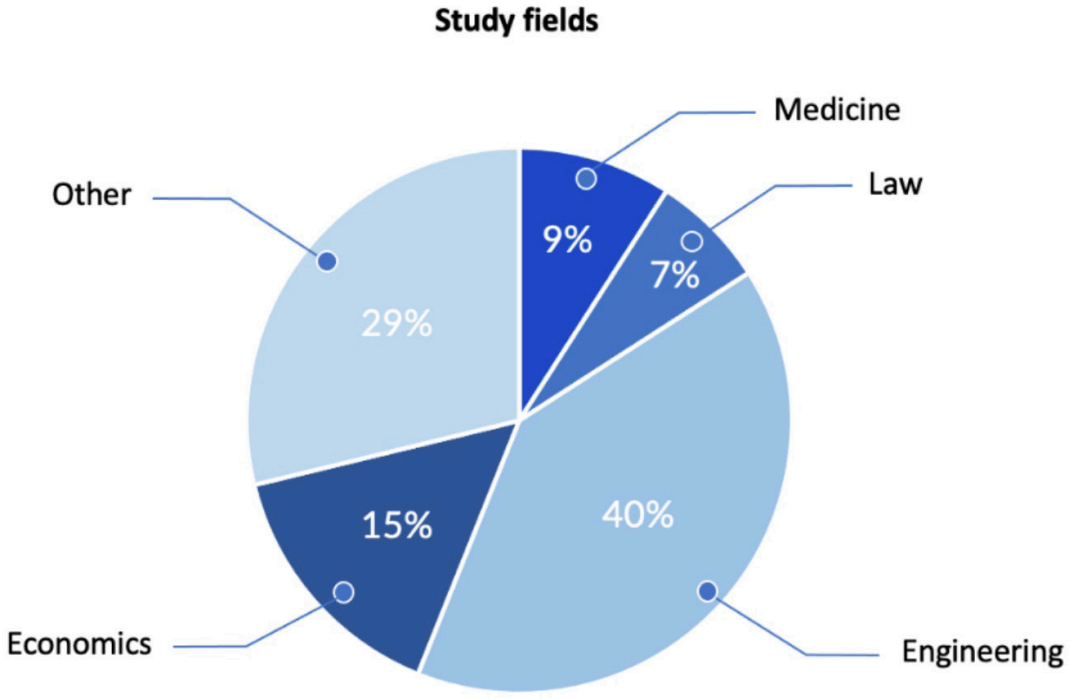
Specifically, the survey had two main objectives:

1. Become more aware of current students' habits
2. Comprehend students' level of confidence in AI systems

2.6.1 Sample Presentation

The sample is composed of 132 students. 80% of them are between 22-24 years old and attend different study fields. Specifically, **40%** of this sample comes from several **engineering** branches, whereas the rest of it is from courses such as economics, communication, and medicine.

We found out that 93% of engineering students think that notes are mandatory to pass exams and, according to it, they claim to take notes very often during a lecture. Concurrently, the survey shows that 82% of those who belong to this study field are not used to repeating the contents orally but have shown confidence in testing their skills with AI systems before an exam.



Another important finding from the survey is about a small range of the sample, which has shown low confidence in AI Systems as support tools for study. The range identifies law students' classes that probably are less informed about the evolution that deep learning and data analysis have done during the last years. However, **70%** of them expressed the desire to have **more interactions** between colleagues and professors and the new tools could help in improving this aspect.

2.6.2 Students' habits

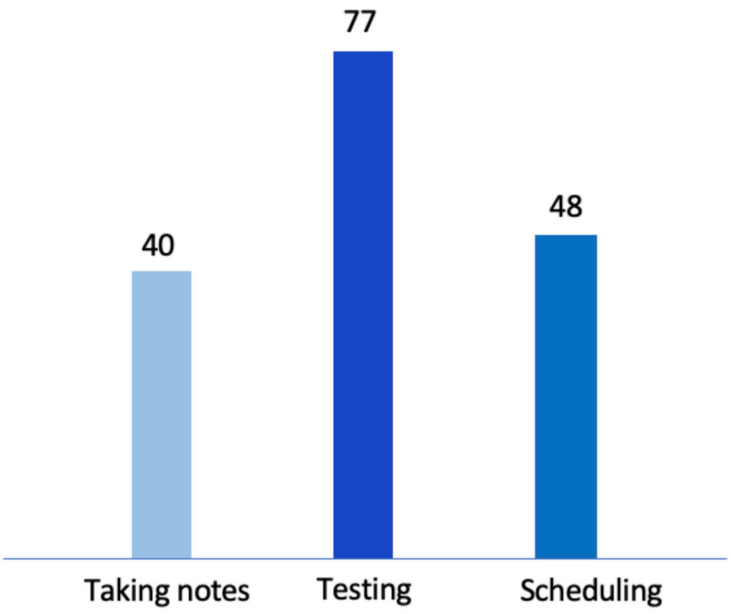
To better understand which are the most implemented methodologies in Italian universities, we tried to infer the habits of our sample. We pointed out that the percentage of contents grasped during a live lecture, the importance of taking notes, and the way students manage their work are the most relevant ones.

Right from the start, the analysis shows how the activity of taking notes is still very ingrained in the current generation, as 64% of them claimed to perform this task with high frequency. 83% of them believe that having complete notes is one of the necessary conditions to pass the exams.

Despite the small size, 20% of the sample said they had difficulties in planning and managing work. To overcome this critical issue, more than **50%** of them say they are **willing to use an AI system** to support this activity.

2.6.3 Consumers' confidence in AI

We asked our sample to reveal their own opinions about these new technologies and the level of confidence that they currently have.



The learning control function (testing), which helps students verify the contents learned during the lecture, is the most appreciated. Subsequently, **36%** of the sample claim they **appreciate the use of AI** for work management, information consistent with the number of platforms available today that deal exclusively with this activity. Note-taking is the least popular of the platforms' features available today and it is also the one that inspires the least confidence in the sample of students considered.

Perhaps periods of experimentation in some courses of study and the development of scientific data to support the benefits of technology in this activity can improve the level of confidence in these new systems.

2.7 Personas

Name: Mario Medio
Profession: Student
Age: 22
Location: Milan
Mother tongue: Italian

Note-taking tools: tablet and smart pencil

Specific traits

- Early-adopter of technology
- Level of confidence in AI
- Willingness to use innovative learning methods

Personality:

- Tech-savvy
- Extrovert
- Open-minded
- Curiosity

Biography

He is a *student* of Management Engineering at Politecnico di Milano. He is in constant search for *new stimuli* and experiences that makes him feel *active*, and he is passionate about *football*. He loves parties and hang out with *friends*.

Needs

Sometimes he *gets distracted* during lectures, and he is not able to retrieve the last-mentioned concepts when needed, thus losing the focus. Furthermore, he is *not too good in taking notes* and he often needs classmates' help to make them well.

Name: Francesco Bisogno
Profession: Student
Age: 24
Location: Milan
Mother tongue: Italian

Note-taking tools: tablet and smart pencil

Specific traits

- Early-adopter of technology
- Level of confidence in AI
- Willingness to use innovative learning methods

Personality:

- Tech-savvy
- Extrovert
- Open-minded
- Curiosity

Biography

He is a *student* of Civil Engineering at Politecnico di Milano. He likes to work at his *own pace* and hates to rush. From a young age, he presented symptoms of *dysgraphia*. Moreover, he's been diagnosed with *ADHD* a few years ago because he had a hard time focusing during lectures.

Needs

He is a *smart guy*, but he needs a bit of help to keep up with his peers. Since he is a *hyperactive* student, he needs to be *stimulated* during lectures rather than just listening passively and taking notes, which gets him distracted easily.

Name: Malena Istruita
Profession: Professor
Age: 45
Location: Milan
Mother tongue: Italian

Note-taking tools: none.

Specific traits

- ●●●●● Early-adopter of technology
- ●●●●○ Level of confidence in AI
- ●●●●● Willingness to use innovative learning methods

Personality:

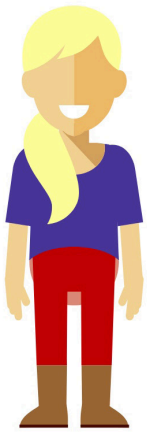
- ●●●●○ Tech-savvy
- ●●●●○ Extrovert
- ●●●●● Open-minded
- ●●●●● Curiosity

Biography

She is a *professor* at Politecnico di Milano. She really likes talking in classroom, *interacting* with students, and trying to provide knowledge through *innovative methods*. She is also a *continuous learner* indeed, who loves to keep improving herself in her job, trying to keep up with all the new teaching methodologies and tools. .

Needs

She would like her *students to be more active* in class and to *engage more* with them. She would like to provide knowledge through innovative methods.



Name: Marie Aide
Profession: Student
Age: 21
Location: Milan
Mother tongue: French

Note-taking tools: pc

Specific traits

- ●●●○○ Early-adopter of technology
- ●●●●○ Level of confidence in AI
- ●●●●○ Willingness to use innovative learning methods

Personality:

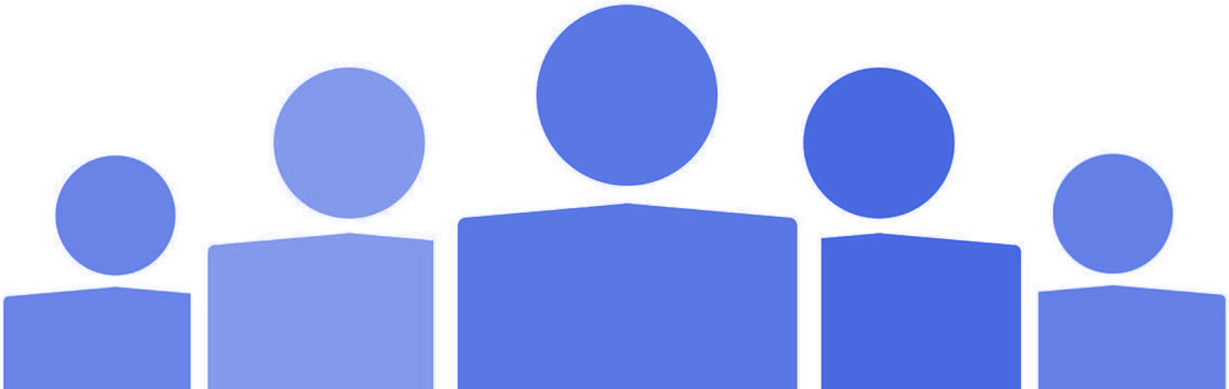
- ●●●●● Tech-savvy
- ●○○○○ Extrovert
- ●●●●○ Open-minded
- ●●●○○ Curiosity

Biography

She is an *international student* from Engineering school of Ecole Centrale Paris. She is currently doing a Master in Management as a *double degree*. She's quite *shy* and very *smart* but does *not* have a *good memory*.

Needs

She is not used to learn things by heart in her home university but rather to *reasoning* a lot. Thus, she doesn't know how to effectively remember notions and she needs a way to practice learning by heart, perhaps a *support* that tells her whether she memorized correctly.



2.8 Marketing strategy

According to our plan, the customer is the university while the consumer is the student. However, while we've already highlighted the value we're going to deliver to the latter, now we're going to focus on the value of **Student.AI** for the university, since this is the target of our revenue streams.

The main objective is to provide an effective and efficient education method to students. Consequently, the best performers in this field would achieve optimal positions in the **QS World University Rankings**. Specifically, such rankings are based on several parameters, but the most relevant one, which impacts the final grade by 40%, is the **"Academic reputation"** parameter. With our solution, we're going to significantly influence this aspect, providing value at the real customer and not only to direct consumers.

But why universities?

- It's a sector **open to innovation**
- According to what emerged from the survey, the students who attend **engineering** are the ones who most review the notes and believe it is an important part of a successful exam
- There are **European funds** available for technological innovation
- Willingness to innovate the education system

Particularly, we'd like to start by targeting Politecnico di Milano as first customer since there is already a collaboration with Contents and it is the most innovative university in Italy.

Furthermore, the MIUR due to the **recovery plan** formulated by the Government, will provide to the education system 2.1 billion of euros for the project "School 4.0", which aims at innovating the universities with the use of technology and accelerating the digital transition.

Nevertheless, from the Politecnico of Milano's balance sheet, MIUR's contribution in 2021 has been 3.655.000€, with an increase of 10,5% with respect to the previous year. Therefore, it seems reasonable to us that this increase will be maintained as well as in the next year.

On the other hand, still looking at the balance sheet, it is possible to see how Politecnico di Milano increased the expense for the license of use for the softwares, 3.392.743,17€ in 2021 against 2.537.297,44€ in 2020. This highlights a tendence and willingness of the university to invest on this asset to provide and improve the services offered to its students.

2.8.1 Price

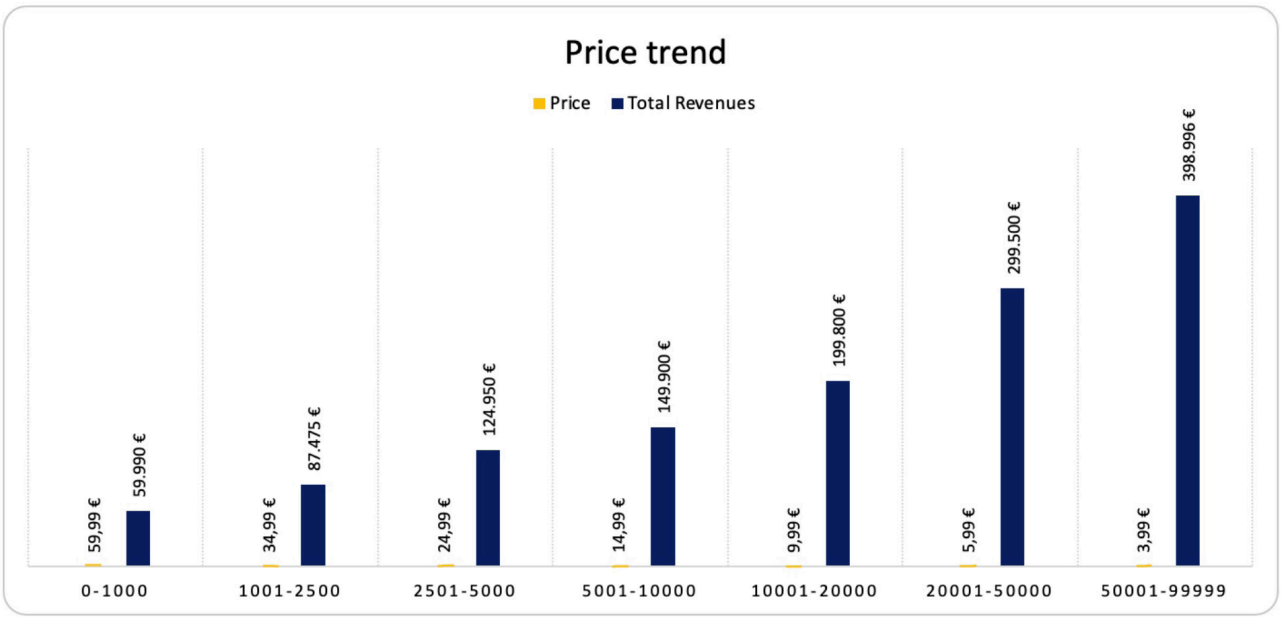
To determine the right price for our solution, research on the market to analysis the prices of our competitors has been conducted to evaluate and decide an acceptable and competitive price for the software. Afterward, another analysis has be done to discover the average discount applied to the software sold to universities.

Competitors	Details	Cost
Otter.AI	• Taking notes • Summary	• *Basic:* free • *Pro*: 7.90€/user*month • *Business:* 18,96€/user*month
3Evernote	• Layout • Taking notes	*Professional*: 8.99€/user*month
Trivie	• Exam support	• *Up to 100 users*: 4.73€/user*month • *101-250 users*: 3.03€/user*month • *251-500 users*: 1.89€/user*month
Contents	• Layout • Taking notes • Summary • *Study planner* • Exam support	*Average*: 10€/user*month

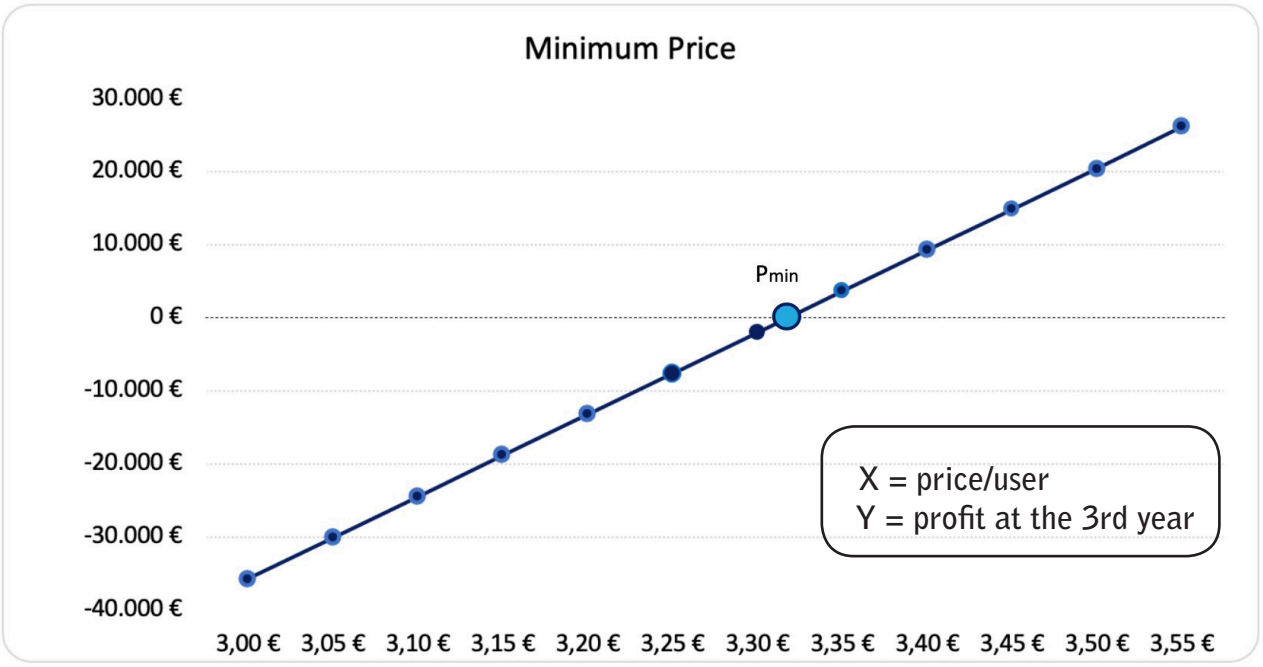
PoliMi products	Description	Business cost	University cost	Discount
Adobe Acrobat Pro DC	Create and edit PDF documents	19,15 €/user*month	18,29 €/user*month	4,5%
MATLAB Student	Language and interactive environment for numerical computation, data analysis and visualization and programming.	66,67€/user *month	35€/user	47,5%
Office 365 A3	Suite Office	6,70€/user*month	2,45€/user*month	63,4%
Adobe Creative Cloud	Creative Cloud offers access to the entire collection of creative tools (graphics, photos, web ...)	73,49 €/user*month	34,99 €/user*month	52,3%
Average				53%

Therefore, we obtained a price of 10€ per month per each user, and consequently the discount, the price decline to 4,99€. Therefore, an annual subscription for a university would cost 59,99€ per each student. However, taking as reference the model of selling of **Trivie**, the price will be sold per each user until 1000 users, then it will be sold for packets, and each packet will be discounts of 35% more or less (the same value of Trivie), respect the previous one.

# users	Price	Total Revenues
0-1000	59,99 €	59.990 €
1001-2500	34,99 €	87.475 €
2501-5000	24,99 €	124.950 €
5001-10000	14,99 €	149.900 €
10001-20000	9,99 €	199.800 €
20001-50000	5,99 €	299.500 €
50001-99999	3,99 €	398.996 €



However, keeping in mind a minimum price of 3,32€/user taking in consideration the goal to have a positive profit at least at the beginning of the third year.



This price strategy will help contents to **attract more customers**, especially the biggest universities which can use economies of scale to buy the software for much less than its actual price. This approach will support the spread of the software among a wide range of students.
Moreover, the universities which buy the Contents' solution, will obtain an **additional 20% discount** for the first year to evaluate if the software is useful for them.

2.8.2 Place

For the first year, the software will be provided just to **Politecnico di Milano** and, more specifically, to the master students. In the second year, instead, when our solution will be consolidated and tested, the university will provide it to all the students.

To address new universities, Contents will **directly contact** them and will foster the needs for and the benefits of Student.AI, since this software is completely new and cannot be sold through a typical public contest, i.e., usual purchase method used by universities for these types of solutions.
Specifically, during the contacting phase, some **KPIs** will be shown, such as students and professor satisfaction and subsequent rise of the grades. Naturally, gathering this data will require administering surveys both to students and professors.

Furthermore, Contents will show how the impact of the indicator "academic reputation" will support them to improve their university's ranking. Eventually, because of the growth of the number of students, the universities will be able to exploit **economies of scale** to decline expenses not only for Student.AI but also for other investments.

2.8.3 Promotion

The survey highlighted a medium-low confidence toward the use of AI in note taking, especially by the students of not scientific domain. Consequently, their neutral view could be managed through the deployment of an advertising campaign based on rational appeals (USP). The company will deploy:

1) **AI innovation video**: explain to students the progress made in the field of machine learning and artificial intelligence since as part of the students' distrust derives from this
2) **Tutorial**: Create video tutorials where the program features are explained and how to use them

3) Create an example: edit a video on a mock lesson where a teacher explains a lesson and then the result produced by the software is represented, showing:

- Complete and error-free transcript of what the professor said
- An effective summary of the lesson
- Possible questions related to the topics that make logical sense

2.8.4 Outlook

As we have said at the beginning, we will address just the **Politecnico di Milano**.

However after the third year, it's expected an **exponential growth** of users due to the high value the product can bring to the students. Initially, **reaching the most important and innovative European universities, (innovators)**, such as Swiss Federal Institute of Technology Zurich (ETH), Technische Universität München (TUM), Catholic University of Leuven (KU) and then, all the other ones when the solution will be consolidated in the market.

2.9 Business Model Canvas (BMC)

Key partners

- *OpenAI*: support in the development of ML models.

Key activities

- *Software development.*
- *Marketing:* entice universities to purchase the software.
- *Customer experience:* students shall be educated regarding such novelty to appreciate it and seize it as an opportunity to change their modus operandi.

Key resources

- *Human*: R&D engineers, data scientists and developers.
- *Technological*: AI and ML models, audio to text conversion.

Value proposition

1) For students

- Student-centred le system.
- Increased interacti between students professors.
- Automatization of repetitive actions.
- Personalization of learning activities.

2) *For universities*

- Increased reputati (evidence based o collection and KPI

Customer relationships

- Close monitoring of feedback from universities.
- *Direct feedback* from Software's *users* (both students and professors) through satisfaction survey.

Channels

- Provide *tutorial videos and mockups* to demonstrate the quality of the product.
- *Online channel* for purchase and customer relationship.

Customer segments

- Universities already in relationship with Contents and, more specifically, *Politecnico di Milano* (from year 1 on).
- Other *top European universities* (after year 3).

Cost structure

- *Primary costs* related to software development and maintenance.
- *Secondary costs*: non manufacturing overhead (i.e., IT infrastructure, marketing), and period costs (i.e., wages).

Revenue streams

- Universities paying se to use the software (price depending on the number of users).

2.10 Feasibility analysis

2.10.1 Technical feasibility

The technical feasibility of this new solution is guaranteed by one main factor: the integration between the several technologies that are already available in the current offer of "Contents" and the features to be developed from scratch based on such technologies.
However, to better grasp the affordability of **Student.AI**, the next table provides a detailed analysis on all the features required by such software.

		Services already provided by Contents			
Software's features	Technical description	Audio -Text	Brainstorm	Brief a writer	Description of what is needed
Note taker	turning an audio into a text in real time and recognize graphs and formulas.	✓			The feature that allows to turn an audio into a text is already offered by Contents. What needs to be developed is: • *Real-time conversion*: instead of uploading a file all at once and wait, the software must generate text in real time • *Recognizer of Graphs and Formulas:* the software must be able to recognize them and insert into the notes.
Note generator	Generate the notes based on the text provided by the "Note taker" feature.			✓	This feature is the key one and is what Contents already offers with their "Brief a writer" service, so there is no need to develop it. The only difference is that the guidelines for the generation of the notes are based on personal preferences inferred by the software.
Standard Layouts	Allow to choose between already offered layouts and generate notes with different levels of detail.			✓	This feature allowing to choose between different proposed layouts needs to be developed from scratch since Contents is not providing anything similar. On the other hand, the possibility to obtain notes with different levels of detail is what the "Brief a writer" service can do, so there's no need to develop it.
Preferences on note taking	An AI able to learn the preferences, on note taking from the user usage of the software.			✓	This feature is what define the guidelines needed by the "Note generator" feature to create the notes, since this AI should learn based on user's personal usage of the software there's need to develop it.
Study schedule	Estimates amount of time required to study some notes				This feature is totally new with respect to Contents offer, so it needs to be developed completely from scratch.

	based on personal past times and based on this, can create an effective study schedule.				
Test your knowledge	Creates some activities/quizzes to test the knowledge.		✓		This feature automatically generate text based on the notes generated. The text generated is in form of games and questions that allows to test the preparation on such topics: Multiple-choice question, Open question, fill the gaps, Flash-cards generator. This feature is feasible since Contents is already providing something similar such as "Brainstorm" but there's need to develop this furtherly to create these quizzes.
Repeating listener	Recognizes what has been said and make checks on it	✓			This feature detects what the user said and can check whether was right or not. This feature is feasible since Contents is already providing something similar such as "Audio-Text" but there's need to develop this furtherly to implement the real-time recognizer and checker.
Immediate feedback for professor	Allows to put a flag in the notes while are generated to advise the professor to repeat that point.				This feature allows to notify in real time the professor that a certain number of students didn't understand a certain topic. This feature is completely new, so it needs to be fully developed.

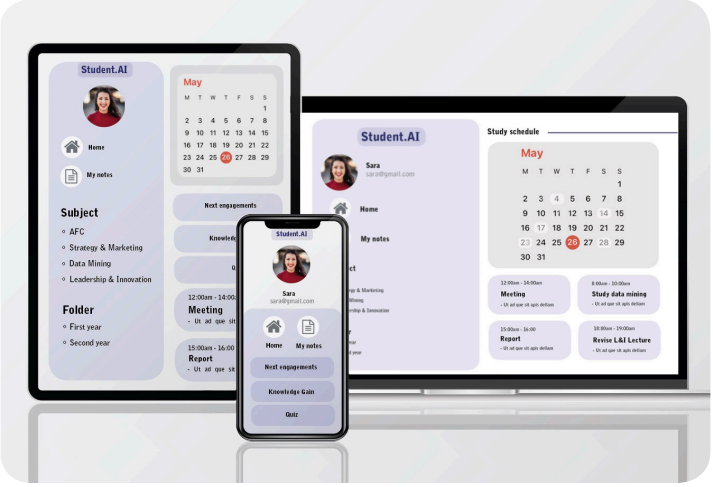
From this analysis emerged the fact that there's no need to develop the entire software from scratch but rather there are some features that can exploit existing ones from other products. This permits to reduce the costs related to the development of the software and the time required to do so.

The features that need to be developed, will be developed with the support of **OpenAI**, since Contents already collaborates with them and there's need to have some Machine Learning models.

- **Real time conversion**: quite challenging, due to the number of tests to train the model to have a working "Speech recognition in Real-Time" algorithm; hindered criticalities affect the quality of the final product.
- **Recognizer of Graphs and Formulas**: time expensive for the training of the "image recognition" algorithm
- **Standard layouts**: already partially developed, it doesn't require any machine learning system. The integration of layouts with the "note taker" feature is the only criticality.
- **Preferences on note taking**: important since gives the degree of customization that the software can provide. It requires the development of a Machine learning model and the data collection to train it.

- **Study scheduler**: no specific criticality, but quite big since contains a lot of constraints and functionalities that needs to be integrated to operate smoothly.
- **Test your knowledge**: quite big, since contains many different functionalities and constraints; it has also some hindered criticalities such as integrating it with the study scheduler or creating effective quizzes.
- **Repeating listener**: like the "real time conversion" but requires some other constraints andchecks.
- **Immediate feedback for professor**: low complexity since requires just to integrate the software with other technologies and developing a communication channel between them.

The software will be developed initially for desktop usage (both for MacOS and Windows) and only later for mobile devices (both for iOS and Android systems), but at the end will be available for all kind of Operative Systems, this part is comprehensive also of all the graphical interfaces.



2.10.2 Time estimation

As a result of the previous section, we anticipate an overall 12-month development timeframe. The first mock-up is expected within 5 months. We then anticipate 3 months of testing and integration of all the functionalities. The remaining time, approximately 4 months, will be dedicated to the development of the versions of the software for all the Operative systems.

2.10.3 Roles and responsibilities

To identify the costs needed to be covered to develop the software we need first to identify the personnel required.

The professional profiles, with their monthly (30 days) costs for a full-time (8 hours/day), needed are:

- **Junior developer**: developer with basic programming skills, 2000€/month.
- **Senior developer**: developer with advanced programming skills, 2500€/month.
- **Subject matter expert**: professional figure with competences and knowledge in specific domains, in this project: data engineers, data scientists and machine leaning engineers, 3000€/month.
- **Project manager**: professional figure that must evaluate the requirements, identify, and evaluate the risks and prepare a contingency plan. Besides, must manage the team controlling whether the project is progressing, resolve conflicts and help putting together the different modules developed by the various members of the team, 2700€/month.

Then, the total cost to develop the entirely all the software versions is: 156.350€. (The procedure through which this cost has been calculated is in the annexes).

2.10.4 IT infrastructure costs

For what concerns the IT infrastructure, we opted for a **managed cloud infrastructure** such as Amazon Web Service, for training, deploying, and hosting the Machine Learning models needed in our software, this has a cost of around 500€/month, so a cost of 6000€ since the software developments requires 12 months.
We have also to cover the cost for data collection, this is a cost that permits to collect the data that will be used to train the Machine Learning models needed, we anticipate a cost of 3000€

2.10.5 Other costs

Other costs are related to the **HR figures** involved in complementary activities for our product and the maintenance of it.

First, we decided to train professors and students, through some video tutorials, to use our software. These video tutorials need to be produced, so we estimated a budget of 2000€.

Then we have identified a professional figure in charge of managing the relationship between Contents and the Politecnico of Milano. Since this person can also deal with other clients and is internal to the company, we assumed that this cost can be omitted.

2.10.6 Maintenance costs

These refer to the costs related to the maintenance of the software, derived from the changes made to software after it has been delivered to the end user. Since the Machine Learning model needs to be trained only at the beginning, and then the model obtained will operate autonomously, we can consider this expense in the costs related to the development, so remain only the costs related to the mere maintenance of the code.

Maintenance costs of the code include:

- Corrective maintenance: costs to correct issues discovered after initial deployment, we assume a 20% of the total cost
- Adaptive maintenance: costs to modifying the software to allow it to remain effective in a chan ging business environment, we assume a 25% of the total cost
- Perfective maintenance: costs to improve overall performance of our software, we assume 5% of software cost.

So, we estimate that the cost of the maintenance will be around 50% of the total cost and will be an annual cost.

2.10.7 Total costs

The costs to be covered are split between the initial investments, which comprehend those costs that need to be covered to develop the application and the complementary parts, and the costs for maintenance, that are costs that we forecasted that will occur after the delivery of the software.
Initial investments:

- Cost to develop: 156.350
- Cost to produce video tutorial: 2.000
- Cost of IT infrastructure: 9.000
- Cost of maintenance: 78.175

2.10.8 Revenues projection

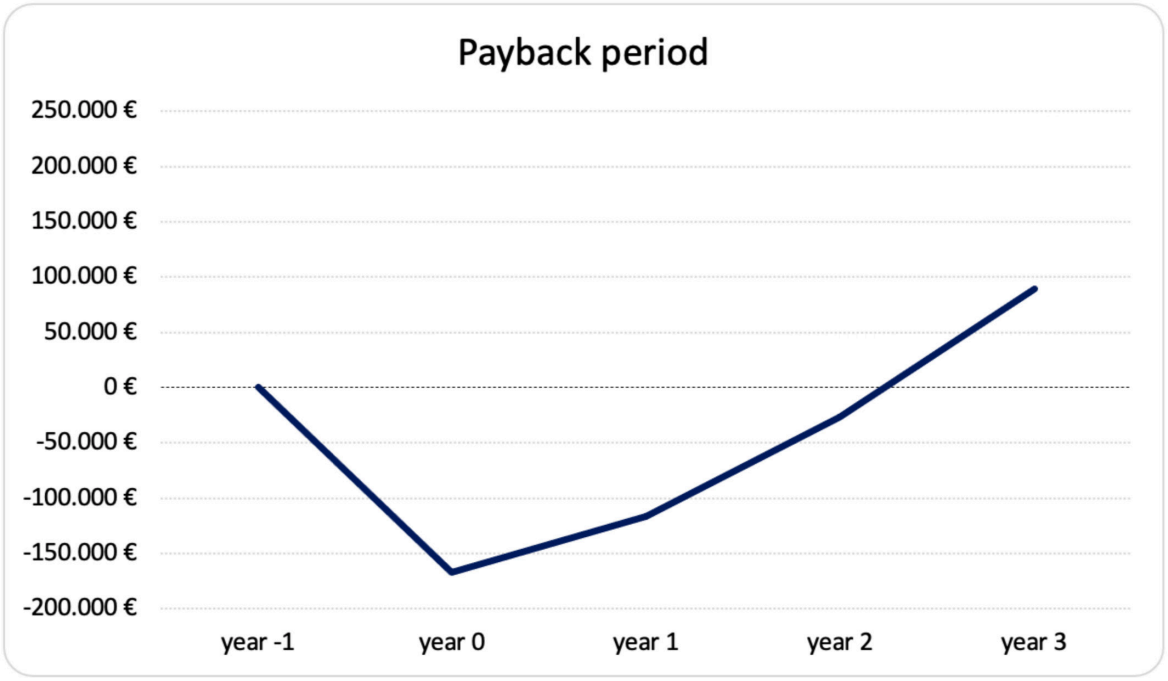
According to the marketing strategy the revenues for Contents in the first three years, addressing just Politecnico di Milano, will be the followings:

	Year 1 Politecnico's Master students	Year 2 Politecnico's students	Year 3 Politecnico's students
Price per student [€/user*year]	9,99 €	5,99 €	5,99 €
Total discount	20%	20%	0%
# of students	19427	46420	46420
Total [€]	155.260,58 €	222.444,64 €	278.055,80 €

2.10.9 Economic feasibility

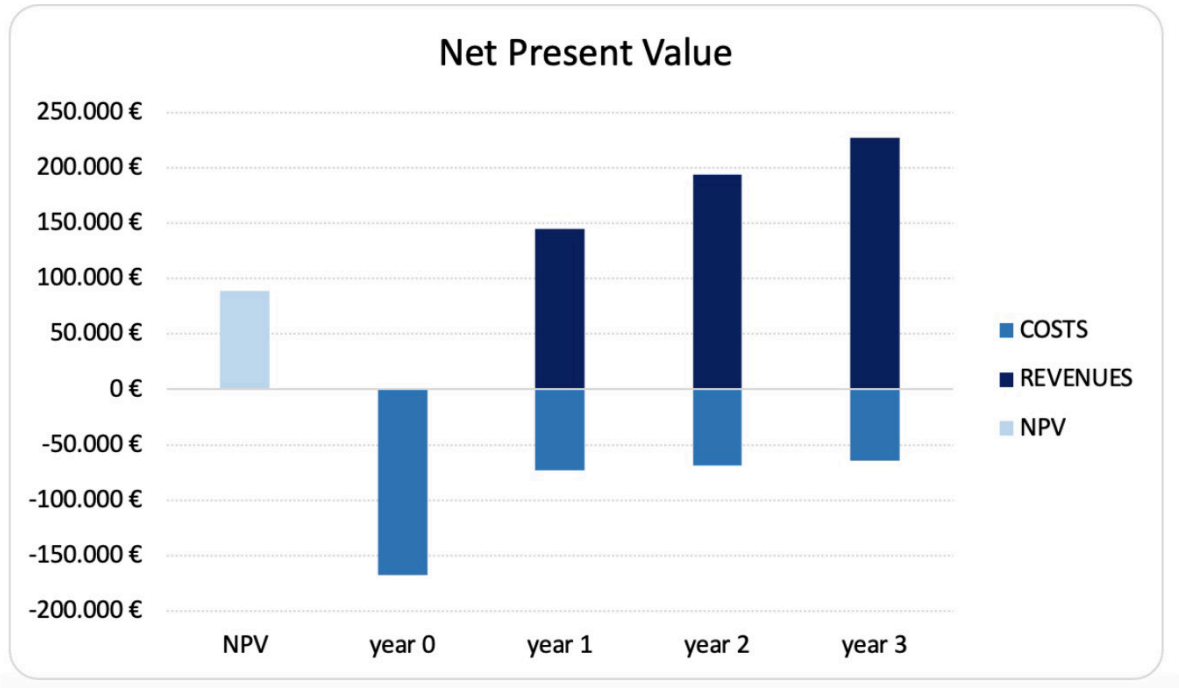
To access the **Net Present Value**, we used the cash flows derived by the difference of gross profit (Revenues – costs) and the taxes (tax rate of 29%). Then we discounted them with a constant cost of capital of 7%.

In year 0, we will have only a cash flow since we need an initial investment to develop Student.AI and the complementary annexes. In year 1, there will be the first profits due to the sale of the software to Politecnico di Milano.



The **payback** will occur slightly before the third year, when the profits will cover all the costs of the initial investment and the ones for maintenance. Therefore, from that year onwards, the company will be able to sustain positive profits even without addressing new universities.

It is resulted that in a 3-year time horizon the company has a NVP of 89113,05 €.

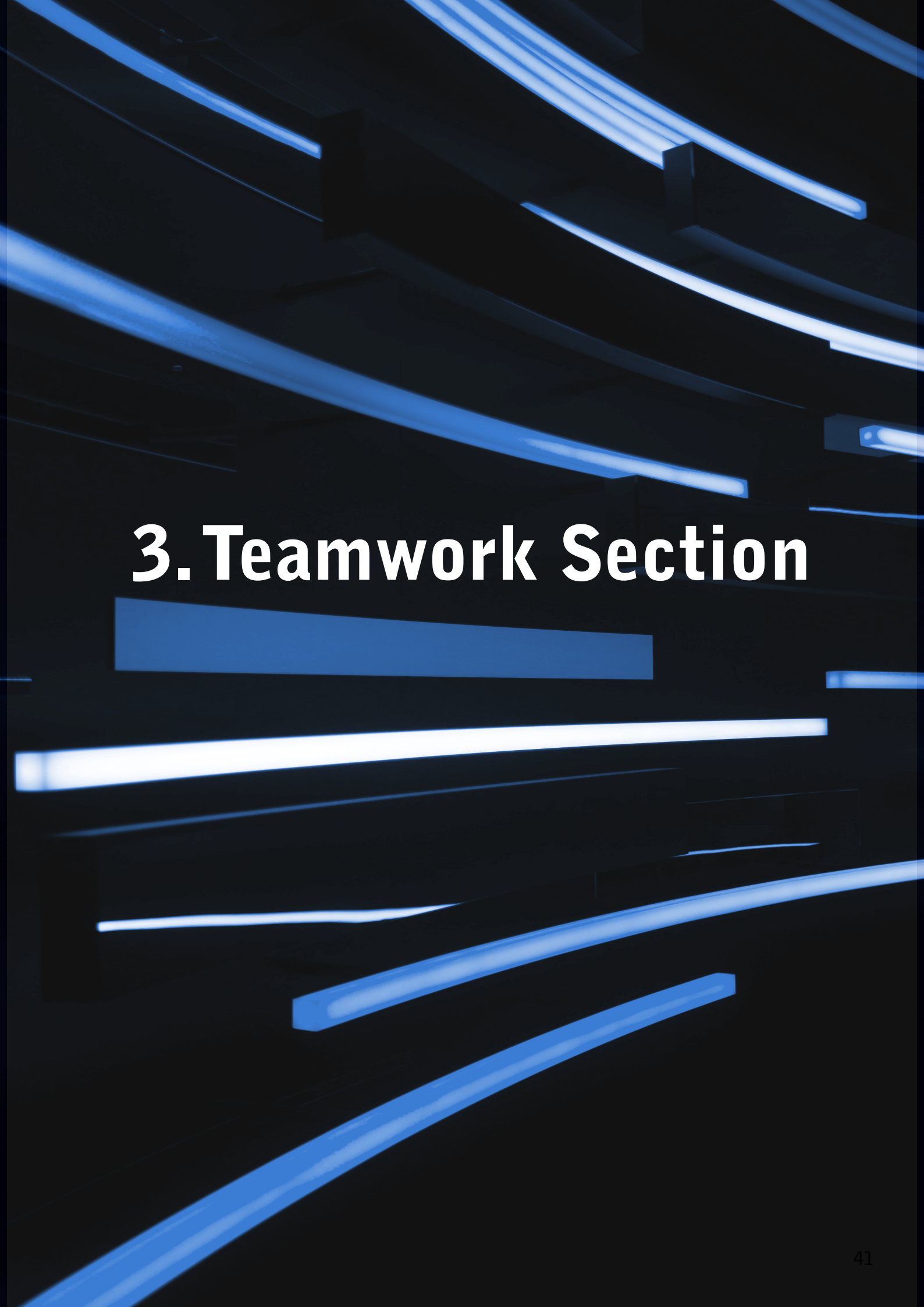


2.11 Risk analysis

This section points out all the risk factors that can impact the robustness of our innovation.
For each factor, we underlined the qualitative impact and some alternatives to mitigate the risk.

	Risks	Mitigation activity
Product	Design or manufacturing costs in excess of estimates	*Preventive*: perform realistic and complete costs analysis. *Corrective*: keep close attention to costs and cut all sources of waste.
	Product development schedules not met	*Preventive*: perform realistic and complete project management schedules *Corrective*: adapt the plan to unexpected events.
	Product is not meeting user's expectations	*Preventive*: continuously assess users' satisfaction surveys *Corrective*: deploy resources and fund to provide a good product
Market	Sales projections not achieved	*Preventive*: sensitivity analysis.
	Low participation by universities	*Preventive*: analyze all the possible channels of distributions of our product to reach the maximum spread. *Corrective*: focus marketing efforts on direct channels towards professors.
	Competition: entry on the market of a competitor providing a very competitive product	*Preventive*: continuous improvement of Student.AI though and benchmarking. *Corrective*: increase communication and advertising activities, adjust price/product to remain competitive and keep control on owned market shares.

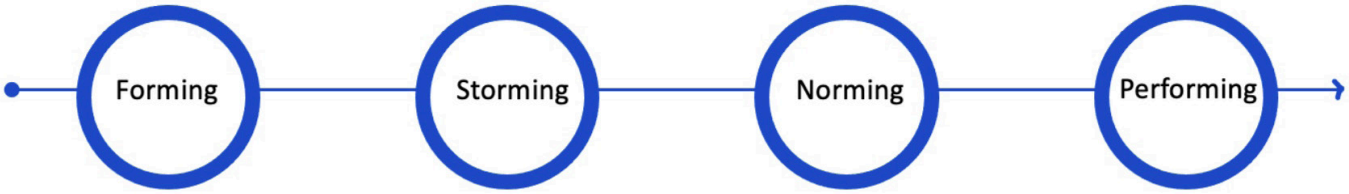
In the following **risk table**, we've classified the risk factors according to their probability of occurrence and potential impact:



3. Teamwork Section

3.1 Teamwork flow description

To analyze the dynamics of the team and how we moved along the project development, we decided to use the **Tuckman's Stages Model.**



1. Forming

As soon as the group's composition was communicated, we created the WhatsApp group to communicate quickly and effectively.

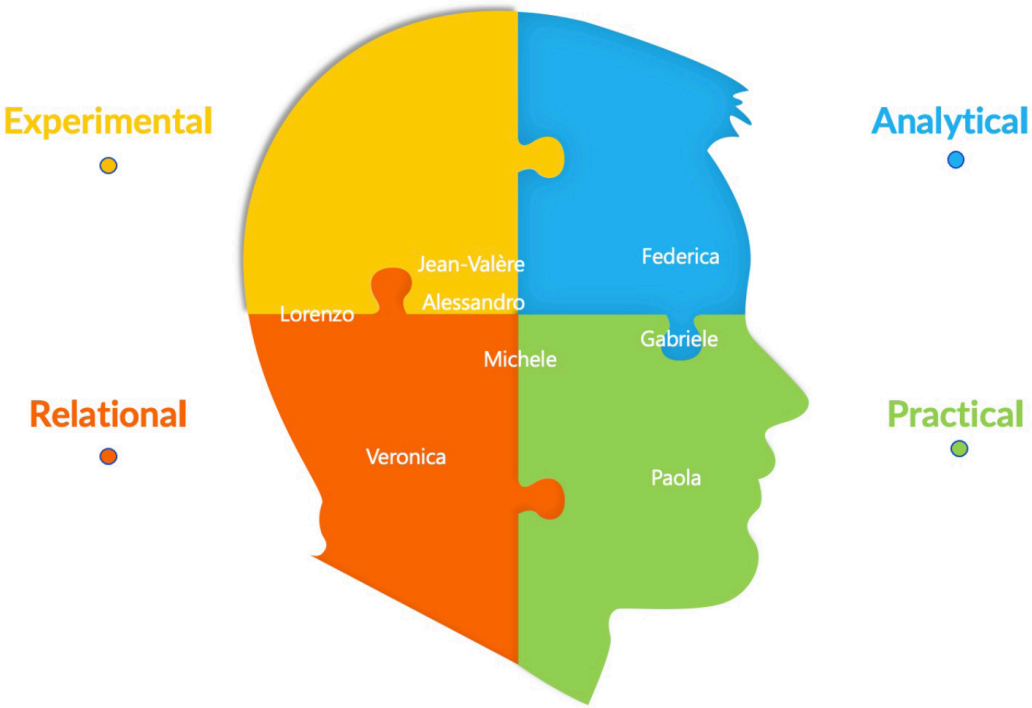
Due to the incompatibility of our schedules, the first two meetings were held online. From the very beginning, we always scheduled meetings in time slots where all the group members were available.

We met physically for the first time during the third meeting when we started getting to know each other. Compared to the two previous online meetings, the in-presence one was more interesting and productive, since all group members were more willing to share their thoughts. This allowed us to create a very friendly and effective environment.

To move to the next stage, we fostered the value of "discussing without judging" so that everyone was free to share ideas, that once taken into consideration were questioned most objectively.

2. Storming

Hermann's Whole Brain Model can properly represent the heterogeneity within our team. Each of usapproached each task from a different perspective:



Inside the group, however, there were no big issues or conflicts because we always tried to catch the specific problem and identify the most shared solution.

Despite this, we had to overcome some difficulties. From the start, since the brief assigned was our second choice, and not everyone was satisfied. Nevertheless, we managed to start thinking about possible solutions by assigning research related to personal interests.

In this phase, we made sure that individuals' values and goals were coherent and that everybody feels essential to the success of the group.

Finally, we tried to go for a horizontal leadership rather than a vertical one. This leadership approach was favored with respect to a hierarchical one, because of the great skills of every member of the group, so we always tried to make decisions based on collective wisdom, rather than hierarchical impositions. This culminated in very good results, both in terms of goal achievement and relationship creation.

3. Norming

In general, our "modus operandi" was doing informed discussions. At the end of every meeting, we used to assign tasks based on what emerged from the plenary discussion, always trying split the work by balancing the amount of work for the following meeting.

During meetings, we used to discuss and question the work done by each individual or sub-group. This approach worked well even for the shyer members. We always tried to create a comfortable and polite environment, by analyzing objectively everyone's work and trying to question everything in a friendly manner.

Of course, some tensions or arguments occurred, but we never ended up fighting because the main benefit of doing "informed discussion" is that everyone was able to present their point objectively.

Therefore, we ended up having to vote for solving conflict very few times, avoiding the "mine-sweeping" process.

This process was fostered by the great disposition of all the members to collaborate and their problem-solving mentality. Every team member learned to trust others' work and listen to others more actively.

4. Performing

Once this working dynamic was consolidated, the group was able to work as collaboratively and effectively as possible, reaching a high level of success without any other need for further coordination.

Of course, the achievement of this level of operation has been supported by individual great commitment, elasticity, and ability to adapt to the need of every team member, accepting each other's strengths and weaknesses.

Once at this phase, we started to enjoy our meetings. We were able to alternate moments of productive work with moments of free conversation, sharing passions and stories. In the end, we realized that we were not only a working team but that we created a real connection among ourselves.

3.2 Personal takeaways

1. MICHELE LEONE

Strengths: (1) Team coordination; (2) Precision

Weaknesses: (1) Rigidity during meetings; (2) Touchy

Personal takeaways:

"I believe that this innovation project gave me the possibility to explore lines of reasoning that were new to my mind. The constant search for the novelty, combined with the high individual commitment required to structure the whole work, pushed me out of my comfort-zone and made me see things from a different perspective."

2. FEDERICA NOSENZO

Strengths: (1) Analytic skills; (2) Meticulousness.

Weaknesses: (1) Low technical knowledge; (2) Inexperience in group work.

Personal takeaways:

"For the first time, I truly experienced what it means to work in a group. At first, I was a little bit scared both for the technical part, since I have another background, and the group one, since I've never made a project with unknown people. Luckily, I really enjoyed working with them even because they always managed to help me in the technical part by explaining everything to me. We worked hard and we were
able to find the right way to communicate between us and help each other by mutually compensating our weaknesses with our strengths."

3. JEAN-VALÈRE MALLEVAL

Strengths: (1) Organized; (2) Detail oriented

Weaknesses: (1) Tendency to be shy; (2) Stress management

Personal take-away:
"This project has been a challenging and stimulating experience from start to finish! Indeed, the brief we were given was not the one I would have chosen at first, which, from the very beginning, drove me and some other team members to challenge our innovative thinking. Being in a group with 7 other
students was also an organizational challenge, but we managed to organize ourselves and meet in person as much as possible. As a French student, I really enjoyed being with 7 Italian students because I discovered a way of working and thinking that was slightly different from my previous experience, yet very stimulating. This project not only gave me the opportunity to apply the concepts studied in class, but also to strengthen my soft skills and teamworking."

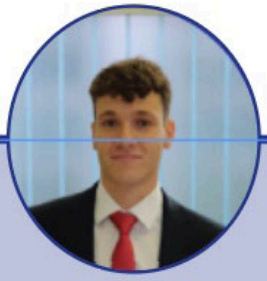
4. GABRIELE MORELLI

Strengths: (1) Result oriented; (2) Emphatic

Weaknesses: (1) Tendency to take on too much responsibility;(2) Too much focus on the details

Personal take-aways:
This was my first time that I have worked in a team with so many members, initially I was a scared of the communication overhead that this number would have created, but then I discovered that when working with a relatively big number of very skilled people, the best way to manage them, is delegating.
Trusting their abilities, regulated with a bit of control, allow to achieve great results. Besides, I discovered certain dynamics that happens only in large groups, and I really enjoyed trying to find the right compromise between creating a friendly environment and working seriously.

5. ALESSANDRO PIA

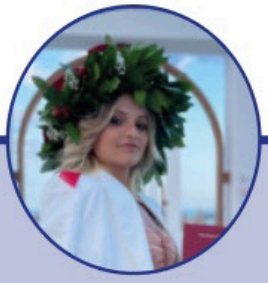


Strengths: (1) Friendly; (2) Creative

Weaknesses: (1) Sensitive; (2) Unorganized

Personal take-away:
I really liked work with this group, moreover, the presence of an international student made the experience much more interesting, providing to me different points of view of each problem. Usually, I prefer having all under control but due to this group work I've understood that sometime delegate and trust completely to others is the right choice to exploit the strengths of each member and finally reach
the desired objective.

6. VERONICA POLONI



Strenghts: (1) Willingness to learn, (2) Well-organized

Weaknesses: (1) Stress management (2) Too accurate in deadlines

Personal take-aways:
At the beginning I was scared about how to make ideas and communication to converge among 8 different minds, but then I realized that only within a bunch of complementary skills a common purpose is achievable. Furthermore, I realized that only by splitting the workload among different people within a variety of skills, brings to a successful outcome as all the team members hold mutually accountable.

7 . LORENZO NERI

Strenghts: (1) Empathetic, (2) Creative

Weaknesses: (1) Lacking confidence (2) Procrastination

Personal take-aways
It is the first time that I get along well with all the members of the group, each one has different characteristics that we have exploited for the success of the project. It is not easy to manage such a large group but by continuing to set deadlines we have done what was necessary. With time and dedication, we have found a solution for even the most complex problems, looking for a good compromise between wanting to express your own idea and listening to that of others.

8. PAOLA MACCIOCCHI

Strenghts: (1) Empathetic, (2) Creative

Weaknesses: (1) Lacking confidence (2) Procrastination

Personal take-aways
Initially I thought it would be very difficult to get the job done, given the great diversity of background within the team. During the development of the project, I understood how this diversity could be exploited in a positive way thanks to the enhancement of different ideas and points of view. I believe that this type of work is the most important part of a course of study because it reproduces the dynamics that we will face in the working environment.

Conclusive remarks

As emerged also from the personal takeaways, it's quite evident that working in a team has several advantages.

In particular, working in group helped the team to avoid cognitive biases that can modify the perception of information.

Indeed, the presence of some members that propose ideas that completely differed from the ones supported by most of the team, helped us to exit from a stalemate and then, find an effective solution. On the other hand, the presence of other members with a flexible mentality and wide view of the problem made it possible to find the optimal solution, through the integration of the various proposals. Thus, we can conclude that our team was well-balanced in terms of personalities and skills, ensuring a smooth working path throughout the project.

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ANNEXES

Benchmarking

To build the similarity matrix, we followed the following steps.

First, we attached a weight to each one of the features characterizing our solution based on the importance we believe each feature has. Second, we applied the same reasoning for competitors' ones based on how similar each feature is compared to the corresponding one in our solution. Third, we summed all the weights for each one of the features, obtaining the so-called similarity index.

Eventually, we rated the price too, between 1, 2, and 3, where 1 corresponds to "low price", 2 to "medium price" and 3 to "high price". Here's a table where all the weights are summarized:

	Layout	Notetaking	Summary	Study planner	Exam support	Price	Similarity index
Weights	2,0	5,0	3,0	2,0	4,0	y	x
Otter.AI	0,0	1,0	0,4	0,0	0,0	2,0	6,2
Colibri.AI	0,0	1,0	0,3	0,0	0,0	3,0	5,9
Evernote	1,0	0,0	0,0	0,0	0,0	1,0	2,0
Trivie	0,0	0,0	0,0	0,0	0,4	1,0	1,6
Contents	1,0	1,0	1,0	1,0	1,0	1,0	16,0

We then plotted the matrix with the similarity index on the X-axis and the price on the Y-axis.

Feasibility analysis

The table below shows for each feature the number and typology of the professional figures required, with the time, in working days, for which each of them is required.

	Project manager	Subject matter expert	Senior developer	Junior developer	Days estimated	Cost * (€/month)
Real time conversion	1	2	2		30	13.700€
Recognizer of Graphs and Formulas	1	2	1		15	5.600€
Standard Layouts	1		1	2	15	4.600€
Preferences on note taking	1	2	2	1	45	26.550€
Study scheduler	1		2	2	30	11.700€
Test your knowledge	1	1	2	2	60	29.400€
Repeating listener	1	2	2		15	5.600€

Immediate feedback for professor	1		1	1	10	2.400€
Software development	1		3	2	120	56.800€
						156.350€

*The column "Cost" has been calculated by multiplying the number of professional figures involved by the days in which is required, by their monthly cost (adjusted to the actual number of working days).

The table below represents the cash outflows divided year by year: at year zero there is the cost of the initial investment for the design and implementation of the software, subsequently the only cost to be incurred will be that relating to maintenance.

	year 0	year 1	year 2	year 3
Investment		0 €	0 €	0 €
Manteinance	0 €	78.175 €	78.175 €	78.175 €
Total	167.350 €	78.175 €	78.175 €	78.175 €

The table below represents the cash flows divided year by year: year zero is negative due to the cost of the investment, from year one, as it will enter the market, the cash flow will be positive.

	year 0	year 1	year 2	year 3
Revenues actualized		145.103 €	194.292 €	226.976 €
Costs actualized	-167.350 €	-73.061 €	-68.281 €	-63.814 €
Profit	-167.350 €	72.043 €	126.011 €	163.162 €
Cash flow actualized		51.150 €	89.468 €	115.845 €

The table below shows how long the cost of the investment is covered: as you can see, it will be between the second and third year.

	year -1	year 0	year 1	year 2	year 3
Cash flow	0 €	-167.350 €	-116.200 €	-26.732 €	89.113 €

The value of the Net Present Value over the three years is 89.113 euros, assuming a cost of capital of 7% and a taxation of 29% (Italy)

NPV	89113
Cost of capital	7%
Taxes	29%