LearningRoad

Call For Code: Education Innovation Case Competition

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11 November 2021

Contents

1 The problem and the solution

Ethnic minorities are present on all continents. Whether they are indigenous or migrants, they are a total of three hundred millions and are scattered in seventy countries around the world.

A central aspect of the prevailing ideology is the search for *uniformity* and any minority (may it be characterized by a different ethnicity, gender or disability) risks of not being able to continue living as such: uniformity means *simplification*, even at the level of mental schemes, and this can open the way to new prejudices and discrimination.

Education is a right for everybody and our project aims to promote accessible and equitable quality education among minorities: our reflection starts from considering the difficulties encountered by children, secondary school, high-school and university students during the pandemic. Following lectures from home is an advantage only if there is no need to move to another city to attend lectures but it could be counterproductive if no device is available to efficiently study and actively participate to those lectures with schoolmates and colleagues.

Taking up the best practices of effective education models, with the objective of contributing to the improvement of students' literacy, math skills and social development, our project is intended to lead to significant effects in the school career, allowing people to live a daily school life where they do not feel excluded and can interface with teachers and classmates without feeling part of a parallel world, without highlighting differences for ethnicity, gender or disabilities in general.

With *LearningRoad* we aim to develop a worldwide available platform with study groups (that let users study together a chosen subject) and a score and review-based Tutor system, able to provide equitable and accessible quality education for a vast range of users. The main purpose of the platform is to let students socialize and create a strong network between them, crucial aspect for a personal and educational growth.

In the next sections we dig into the five main steps of Design Thinking to efficiently put our idea into practice, showing the ideal Persona that is interested in this platform, the main features and the advantages deriving from its use, product concepts to let future customers understand the design of *LearningRoad* and all the IBM technologies needed for a complete working platform.

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2 *Design Thinking & features* of the project

Design Thinking is the approach we used to tackle design problems by understanding users' needs and developing insights to solve them: in this way a better product can be designed. It can be considered as a *mindset* and a *process*.

Design thinking is a human-centered approach to *innovation* that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology and the requirements for business success. This approach brings together what is desirable from a human point of view with what is technologically feasible and economically viable.
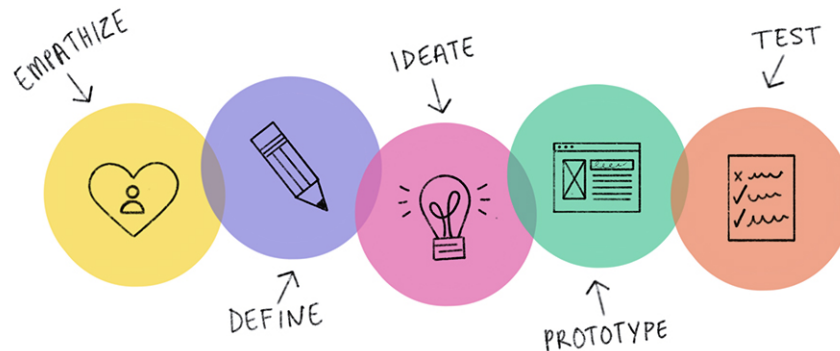

Figure 1: The five steps of *Design Thinking*.

2.1 Step 1 - *Empathize*

The first step needs us to **Empathize** with the users. The objective is to learn everything about the market segment for whom we are designing. We decided, for this reason, to focus our attention on minorities' needs in order to deliver a product that everyone could access to.

The first thing we are going to do is to get in touch with student associations, workers unions, schools and university campuses asking students and workers to help us better understand their problems with education and life-long learning. Then, we will use them as initial users during the testing phase (described in *Step 5*). Mailing lists, online advertisement, university career services and hackathons will, then, be used to expand our range of users in later stages.

2.2 Step 2 - *Define*

The second step, called **Define**, deals with the construction of a point of view that is based on user needs and insights gained from the previous step.

Let's now focus on the end users' profile: we have to deeply understand how to settle things up, in the beginning, in order not to fail with this project. *What is our users' age range? Is it a platform for everyone? Do we have to consider different functionalities for different ages?* Our product is for everyone: we will not introduce any geographical, educational, sexual or age restriction. We will have to deal with people that do not work or that do not have high incomes and, for this reason, the platform will be freely accessible. The following *Persona* is an example of our target user.

Nirmala Minang

I'm a 25-year-old student that lives with her daugther in a mountain town pretty distant from University.
I'm looking for a platform that will help me follow the lectures, letting me participate to them, meeting new people, without having to be physically present in class.
I do not want to leave my daughter alone at home and I do not want to renounce to a University education.

"I'm looking for an application that will help me study from home in a more effective way."

AGE: 25
University Student
FAMILY: Single, 1 child
LOCATION: Montebelluna, Italy

Organized   Practical
Protective   Hardworking

Personality

Introvert ——————— Extrovert
Analytical ——————— Creative
Loyal ——————— Fickle
Passive ——————— Active

Preferred Channels

Chrome
Mobile

2.3 Step 3 - *Ideate*

The **Ideate** step corresponds to brainstorming with the team members in order to come up with creative and innovative solutions able to address the problem. We defined a set of features able to provide an idea of the services we would like to offer with our *LearningRoad* platform. The services we identified are the following:

- **Join meetings** - Opportunity, for all users, to freely join meetings to study together and meet people from all over the world (the maximum number of people in the same meeting is limited to 20 members to avoid crowding). These meetings will be, on the one hand, dedicated to study in groups a particular subject (that will be selected by a dedicated menu and suggested with a recommendation system to the user), and on the other hosted by a tutor (**Tutor levels** will be explained below).

- ***Volunteering* service** - One of the most effective ways to ask someone's help is to select a particular problem or subject from the "*Volunteering*" section: if a user is struggling with a particular situation (e.g., a difficult math problem or a hard philosophical concept to grasp), she/he can directly ask a peer for help. The request will be sent to a peer or upper level account and the request will be accepted or rejected. If the request is instantly accepted a meeting will be ready to be hosted, otherwise a schedule will be available for both accounts to let the users choose the best timing to organize a meeting. The introduction of the *matchmaking* function lets students study in groups. Each student will select the desired subject in which she/he wants to be more prepared and will have the chance to join other students to exchange ideas and solve problems together.

- **Tutor levels** - During the subscription phase each user will be asked to select the account type by choosing *Student account* in order to follow lectures and join meetings or *Tutor account* to host meetings and to teach different subjects (this choice will be modifiable at any time). A user of this second type starts from `Level 1` and can help others through ***Volunteering***: scores and reviews will be assigned (independently of the taught subject). If the score is high enough the account will reach `Level 2` and the possibility to teach in private lessons will be unlocked. The same reasoning seen for scores and reviews is applied and a `Level 3` Tutor will be able to host group meetings (with the already discussed maximum number of participants equal to 20). Individual and group tuitions to other users correspond to a paid service through Paypal with a fee equal to 15% of the price of the lectures for platform maintenance.

- ***My Notes*** - Lecture notes (voted by other students through a score system) will be freely available (both online and offline), downloadable on PCs, smartphones and tablets, and recommended to users with a recommendation system (in this way they will be voted by the community of users that evaluate the quality of the provided material). A **Scanner** feature will be available for both `Android` and `iOS` versions of *LearningRoad* in order to let our users upload documents or images to the dedicated webpage or directly to the meeting room.

2.4   Step 4 - *Prototype*

The ideas we have described in the previous step need a **Prototype**: for this reason a couple of product concepts are shown below. We chose light blue and blue because they are colors that stimulate creativity, support learning ability by reducing hyperactivity and help logical intelligence.
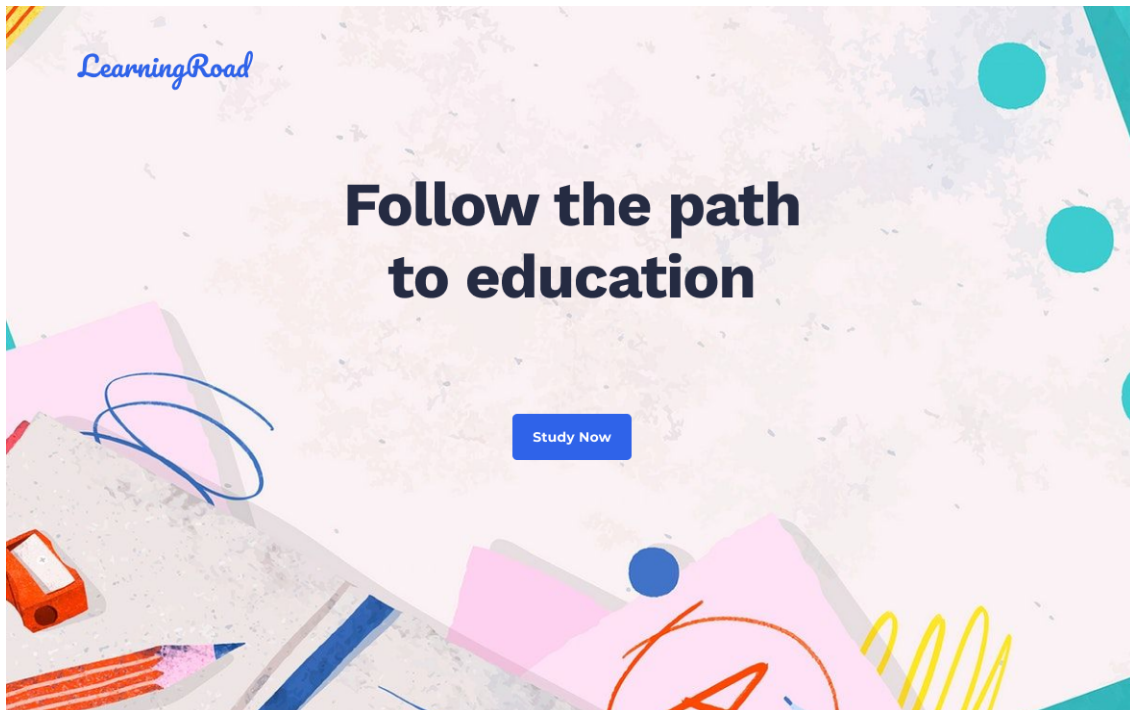
Figure 2: *Product Concept - Landing page.*

Figure 3: *Product Concept - Home page.*

LearningRoad

Home   Groups   Notes   Tutors   Volunteering   Support

Search   Category

Study groups


Group: 3 members

Calculus 1

Limits, series, Sandwich theorem, Weierstrass theorem

Join
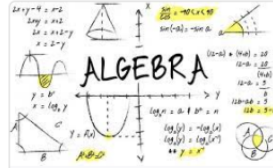

Group: 4 members

Physics

Exercises on Gauss' Law

Join

Group: 2 members
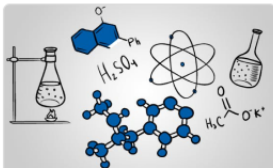
Linear Algebra

Theory and exercises on Eigenvectors

Join

See all the groups

Teaching groups

● 12 Oct 2021 - 16:30

Tutor: Tahlia Hess

Chemistry

Organic Chemistry

Price: €8.99

8 /10   Join

● 15 Oct 2021 - 12:30
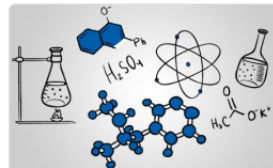
Tutor: Yousaf Dalton

Calculus 1

Limits: Theory and Exercises

Price: €3.99

6 /25   Join

Tutor: Tahlia Hess

Chemistry

Exercises

Price: Free

9 /--   Join

See all the groups

Figure 4: *Product Concept - Courses.*

Figure 5: *Product Concept - Tutors.*

2.5 Step 5 - *Test*

In this final step we test the prototype on real users/customers to get feedback and, consequently, make necessary adjustments (e.g., on the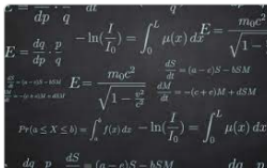 product itself, on features we would like to implement, on distribution channels and market segments) to reach a *Minimum Viable Product* (MVP) or to discard ideas if the tests fail. In particular, we are going to perform several *A/B tests* on the users collected during *Step 1* (e.g., we will provide to different age ranges and locations of users a different set of functionalities to decide which ones are the best).

It is crucial to test the product on real people because sometimes people would say that they would like to use a product if it exists, but then in practice they will

never use or buy it. Sometimes market researches are not conducted properly or not conducted at all and therefore we might do not know of the existence of a particular market segment. Furthermore, some insights can be only discovered by testing the product on real users, so we may find opportunities we did not even think of at first.

2.6 *Funding*, *Scaling* and *Exit* strategies

If the *Test Phase* will reach a positive outcome, we will meet investors with a working *Minimum Viable Product* (MVP) and data showing that our project is able to solve the market needs. In this way we could raise investments that will allow us to properly scale the platform to a global market and hire the best people. The two main ways to get more users will be by word of mouth and targeted advertising (e.g. influencer marketing on YouTube, ads on social platforms such as Facebook, Instagram, TikTok, Twitter and LinkedIn).

During this phase we are also going to individuate possible exit strategies for this project, either through an IPO or a M&A operation.

An *Entrepreneurial Idea Feasibility* and a *Business Model Analysis* are conducted in the following pages in order to understand the real applicability of our product, showing that the project we are describing is not just good for theory but it can be practically developed.

3   *Entrepreneurial Idea Feasibility*: Technical Feasibility & TRL

With regards to the technical feasibility of *LearningRoad*, the first question that we asked ourselves has been "*how many core components will be included in our system?*" We answered by making a short list of what we need:

- The server hardware needed to process a huge amount of data coming from the users;
- Software that runs on the servers;
- Software that runs on web browsers and smartphone applications.

What about the types of technologies needed for the system? Again, we answered providing a short list:

- *LearningRoad* will use IBM's cloud services;
- For the second core component, the development of sophisticated *machine learning* algorithms capable of processing transactions is required: these algorithms should be able to detect anomalies in order to prevent fraudulent behaviours.
- For the third core component *LearningRoad* requires, again, the development of software built for a variety of platforms (i.e., the web, mobile and desktop OSs).

Our educated guess claims that we are at *Technology Readiness Level* (TRL) 9 (i.e., full commercial application, see ***Figure 6***). First of all, servers are already available and they do not need to be rented. Both server-side and client-side software can be developed quickly to a working prototype; this early version could, therefore, already be considered at TRL 9 but in reality a lot of development is required to finalize the product that we want for our users.

The following are the main IBM technologies that we want to use:

- ***IBM Kubernetes*** will be implemented in order to develop a scalable and horizontal platform when the number of users grows. *Kubernetes* is an open-source tool for automatic deployment, scaling and management of containerized applications: in this context it will be able to deploy and orchestrate containers for the application over different servers (as a higher-cost alternative *Code Engine* can substitute *Kubernetes'* services and it has the advantage of not having a server, or cluster, to be manually maintained).

TECHNOLOGY READINESS LEVEL (TRL)

Figure 6: *Technology Readiness Level* table with all possible levels, from 1 to 9.

- **IBM App ID** will be implemented for secure authentication: users will be able to log into the platform using their Facebook or Google accounts.

- **IBM Cloud Databases** will be exploited for data persistence (in particular, *NoSQL Databases* will be considered for different data types and data structures that evolve over time, making *SQL databases* not suitable for these particular type of tasks).

- **Redis** *database* is used for caching: it should not be considered as a substitution for a classical database; its objective is to cache the data on RAMs stored in normal databases in order to reduce the time that is needed to access the data. It is widely used for large scale applications.

- **DNS Services** are fundamental to map a server's IP address to a domain name (**Cloudflare** is commonly used in practice and due to the fact that IBM provides this service, we can use it for our project).

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- **File Storage** is useful for efficiently storing files (e.g., videos, images and documents).

- **Language Translator** is able to translate text from one language to another: it could be useful for foreign students that do not know English or for translating study material from other languages.

- **IBM Watson** can be used as a support chat-bot and it's *Natural Language Understanding* can be leveraged for taking fast notes during a lecture: this particular Artificial Intelligence service can understand important concepts, relations and opinions from voices and, for this reason, *Speech to text* can be implemented to transcribe what a student or a teacher is saying (e.g., during a private lesson).

- **SSL Certificates** provide a secure and protected connection between the website or application and the final user.

In the next page a *Solution Flow Diagram* will represent the main steps related to the access to the *LearningRoad* platform with the IBM technologies described above.
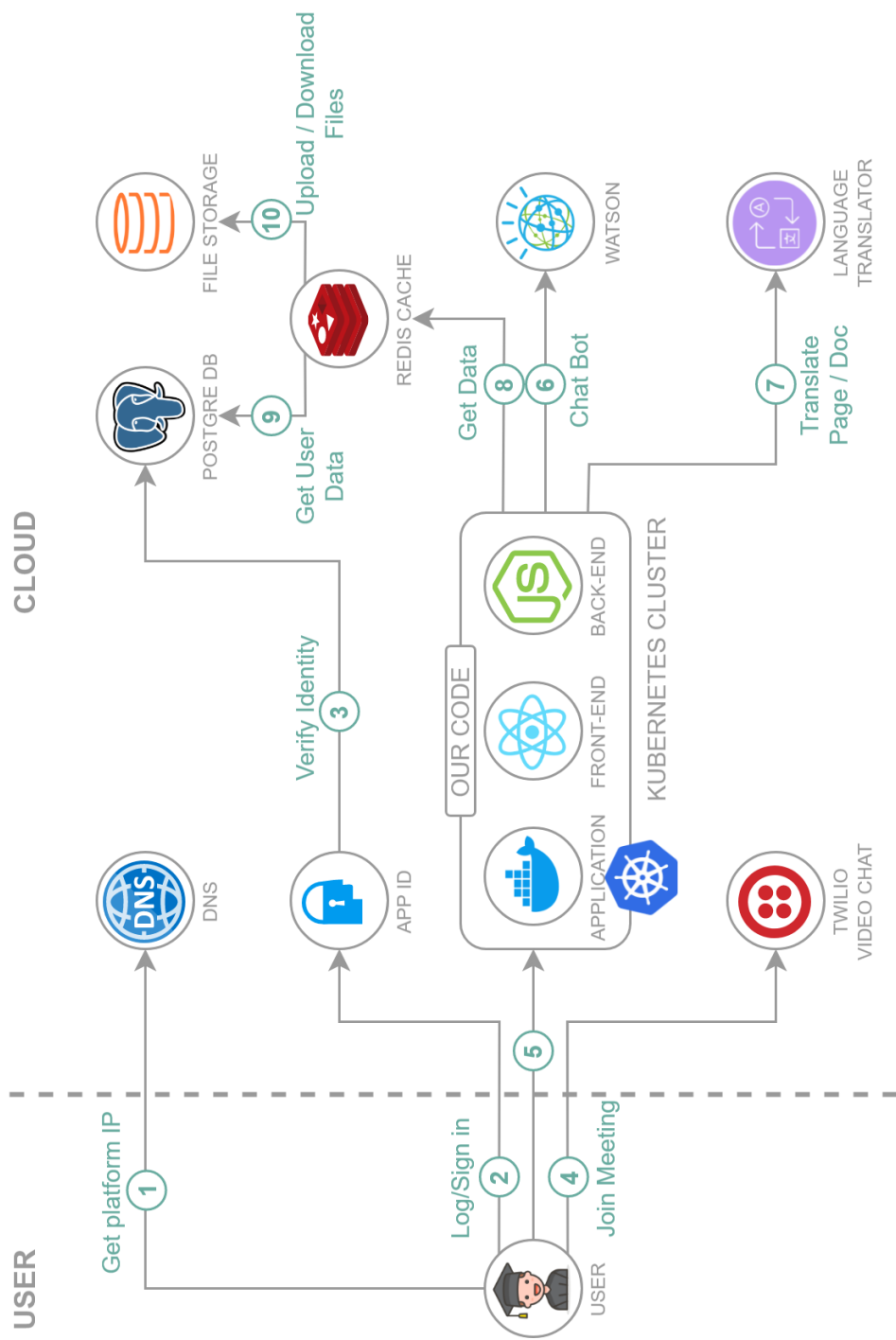
Figure 7: *Solution Flow Diagram.*

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4   Business Model

The three most relevant **problems** that we have identified are the following:

- not everyone, whether they are part of ethnic minorities or with disabilities, have the opportunity to follow lectures in presence at school or university;
- meeting new people and staying in touch with them is not easy after the restrictions caused by the pandemic (e.g., many university campuses are almost entirely empty because of limitations that disallow the existence of well-performing study or working groups);
- adults that work or that have children are unable to follow lectures and study with others during normal day schedule.

The **features** that we highlighted in the Ideate phase that correspond to our project's *value proposition* are listed below:

- *matchmaking* functionality related to **Voluteering**: in this way every user will have the possibility to become a Tutor and share her/his knowledge to other people, highlighting a strong difference with other learning platforms where this functionality is not included (e.g., Coursera, Udemy or Udacity);
- study groups represent a complete novelty because they do not exist elsewhere.

LearningRoad's **success** can be measured by collecting and analyzing the following data:

- user demographics, age range, gender and ethnicity;
- the number of active users that daily use the platform;
- customer retention;
- the percentile of use of each implemented feature;
- the total number of people that are willing to pay online tutors for private lessons;

In order to realize a full working platform the **professionals** that our team will require are the following:

- *Engineering*: a back-end developer, a front-end developer, a UX designer, a full stack developer and a CTO that coordinates them.
- *Marketing*: a social media manager, a community manager, a campaign marketing strategist, a costumer support specialist and a Chief Marketing Officer that coordinates them.

- *Finance & Accounting*: a financial analyst, a budget analyst and a CFO that coordinates them.
- *Business operations & Administration*: a business analyst, an administrative assistant, a talent acquisition specialist and a CEO that coordinates them.

Many of these skills are already covered by our current team.

Regarding the **distribution channels**, we will initially foster our broad network of university professors and students, in particular exploiting word of mouth, until we reach a Minimum Viable Product. Then we will get in touch with social media *influencers* that are congregating our possible users in order to publish ads on their videos (or sponsoring our platform through a collaboration).

We decided, in the early stages of the project, to focus our attention on a *niche market* (a customer segmentation based on specialized needs and characteristics of its clients): users that are, for any reason, far from university campuses and that cannot join the lectures due to the pandemic.
    Our product will be worldwide available (without restrictions) for anyone with basic digital capabilities. Our purpose is to reach as many people as possible. *Who are we going after first?* We have to carefully consider the impact our product will have on *early adopters*. We could, in a first moment, consider young students as our main customer, with an age range that goes from twelve to twenty-five years, thinking about unique features that our application could give them in order to let them reach and contact new users.

    The main **costs** identified are the ones related to:

- research and development;
- infrastructure maintenance (keeping in mind all the IBM technologies presented in **Section 3**);
- marketing;
- payment processing fees;
- general/administration expenses.

The *business model* chosen for our *LearningRoad* service is *free*: the platform will be freely accessible for everybody, the main **revenue stream** is represented by private lectures held by `Level 3` Tutors presented in the **Ideate** phase (a better revenues estimate could be realized with a *Break-Even Analysis*).

In **Figure 8** it is possible to see a projection of fully online learning growing at around 10% a year until 2020, then a slight acceleration can be predicted over the next couple of years because of COVID-19, then it reverts back to slower growth from 2025.
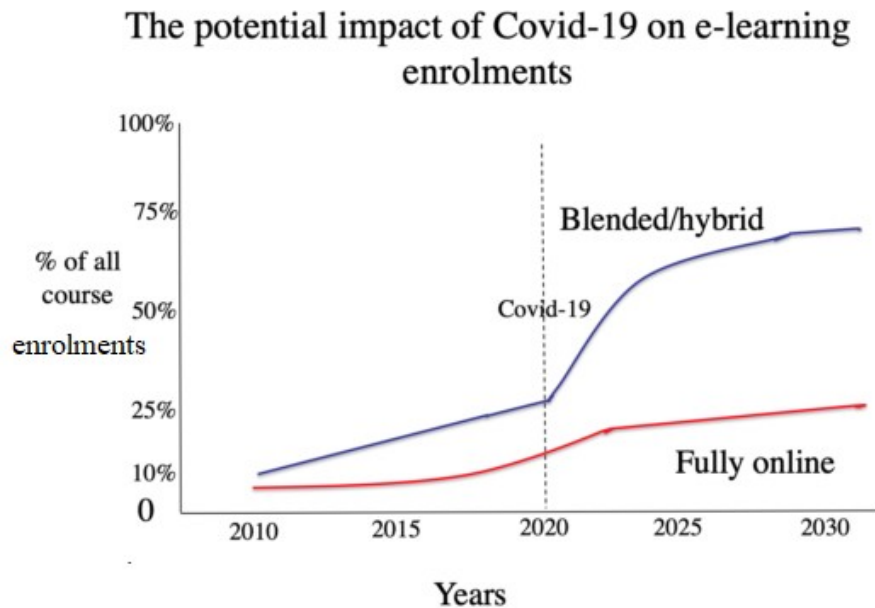

Figure 8: *Projection of hybrid and full online learning in the next years.*

The curve will keep growing beyond 2030, mainly because of life-long learning and immigration, where workers and their families will need further skills and qualifications in an increasingly automated world. In the meantime, campus-based enrolments are likely to decrease because of a fewer number of students.. For some institutions, then, fully online learning will become important for maintaining enrolment numbers.

A considerable growth can be seen in the blended/hybrid learning curve. As teachers have become more familiar with online and digital learning due to the pandemic, they will begin to integrate it more and more into their regular teaching. They will gradually learn by trial and error what the best practices are in a class of students and what is best for efficient online teaching.

In **Figure 9** you can see our *business model canvas.*

Problem	Solution	Unique Value Proposition	Channels	Costumer Segments
• Unable to follow lessons in presence due to pandemic restrictions, work reasons, money issues • Struggle to find mates to study with	• Study groups trough matchmaking • Online tutors **Key Metrics** • User demographics, age range, gender, ethnicity and disabilities • Number of active users • Customer retention • % usage of each feature • % users paying for online tutors	• Tutor with levels • Matchmaking for meetings • Gamification learning system	Early stages: • Our network made of students, professors and working unions • Word of mouth After having a MVP: • Influencer marketing	• Highschool students • University students • Workers

Costs	Revenue Streams
• Research and development • Infrastructure maintenance • Marketing • Payment processing fees • General/administration costs	• Private lessons fees

Figure 9: *Business model canvas.*

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5 Conclusion

Education is a right and nobody should be excluded from accessing a high-quality education system.

We designed *LearningRoad* to show that something can be really done in practice: we followed the five key steps of Design Thinking to empathize with possible users and customers, we tried to understand their needs to provide a product easy to use for everyone. We have conceived features that, in our opinion, could be helpful in letting people meet new colleagues and friends, exchange ideas and solve problems together.

We think the *Persona* we created perfectly matches the purposes of the project and the product concepts we designed can be modified during the real development to meet the needs of the future active community. To see if our project will have impact, the first thing we are going to do is to test it in a small portion of *early adopters*: we think that a university class could perfectly meet our expectations, then we will make the platform accessible to a wider range of users. The most critical aspect among the features we proposed is the ***Voluteering*** **service** to keep the user engaged to the platform, so a considerable amount of effort will be required in order to make the system properly working.

We dedicated several weeks to this project, we are proud of what we have done and we really hope that our *LearningRoad* platform will soon see the light.