



The EdTech platform that pays you for learning

[www.tutellus.io](http://www.tutellus.io)

ver 3.19

December 2017



*“Tutellus.com, the leading Educational platform in the Spanish speaking world.”*

*El País, 2016*



**5 years**  
Teaching



**1 million**  
Students



**2 millions**  
Transactions



**10 billions**  
Minutes learning

### Mission

*“Bringing education to the last corner of Earth”*



*“A living ecosystem since 5 years ago ”*

#### Community

+1.000.000 Students

#### Teachers

+130.000 Videocourses

#### Affiliates

+10.000 content promoters

#### Tutors

+20.000 users with high relevance



#### Countries

+160 on 5 continents

#### Universities

+80 agreements

#### Job finders

+50.000.000 monthly users

#### Companies

+50 corporative channels



## *“Tutellus.io, the first platform that pays you for learning”*

Tutellus.io is the evolution of Tutellus.com towards a decentralized and tokenized model



### The TUT tokens, the cryptocurrency empowering the user

An ecosystem where all players get benefits: Students, Teachers and Companies. Using the Pool tokens and the Market students and teachers may study for free and earn money through tokens, get Relevance and access to valuable services



#### Vision

### *“Reduce the poverty by paying students for learning”*

Over 10 million people will be able to make money through 50 millions courses during the next 2 years



### With a governance and tokenomic model sustainable on the long term



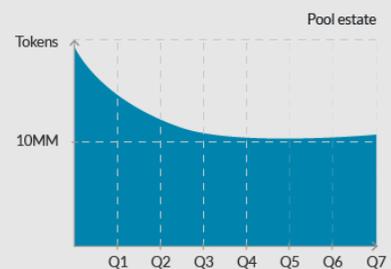
#### STUDENTS

- ▶ Earn money while studying
- ▶ Learn more and better
- ▶ Get rewards through relevance
- ▶ Pay with cryptocurrency
- ▶ Access through complex markets



#### TEACHERS

- ▶ Instant payments
- ▶ Earn money with the best students
- ▶ Earn money through relevance
- ▶ Earn money through subscription services
- ▶ Access to unique promotional services



Shall we begin?

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## Abstract (Vision)

### Education, the pending asset

Education has hardly improved in the last thousand years, and most importantly: no educational model lets people without resources earn money while they study. On the contrary, they have to invest in their own education hoping to earn this money back in the long term.



There are, as we see it, four main problems in education:

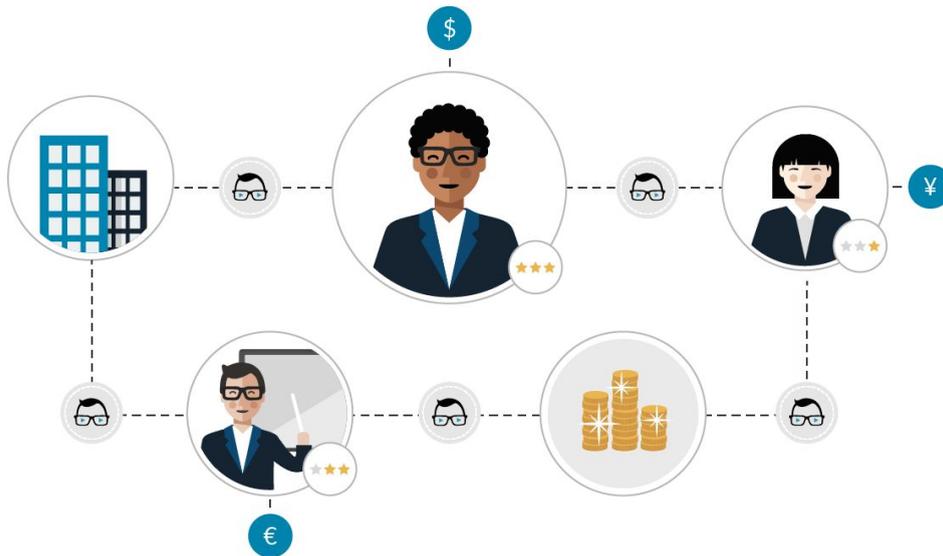
1. People cannot earn **money** studying, only spend it.
2. Students often lack **motivation**, so they leave education behind.
3. Teachers cannot earn money depending on the **value** of the students that they generate, and that's not fair.
4. There's a huge gap between **employment** and education, and millions of jobs ready to be covered without enough people to do it.

### Tutellus.io: A New Paradigm

Tutellus aims to break the *status quo*, introducing a new paradigm in the student-teacher relationship by *the creation of a new decentralized system to strengthen the commitment of both students and teachers*. Tutellus is the first educational platform that **pays the students for learning** (*proof of learning*) and **remunerates the teachers according to their impact in the success of their students** (*proof of teaching*).

Tutellus.io solves the problems we have identified in a very simple way:

1. Students can earn **money** learning, without paying.
2. Students gain the **motivation** to help others to learn.
3. With the success of their students, teachers themselves get more **value** out of teaching.
4. Companies can hire **employees** with a matching process and in an efficient way as never before.



*Tutellus.io generates an ecosystem where both students and teachers earn money depending on the actions and activities they generate in the platform, which also provides all agents (students, teachers and companies) with access to news resources, leads, candidates, and services.*

## Blockchain as a Tool to Diminish Poverty and to Empower People

**Blockchain**, most famously known as the technology behind bitcoin and other cryptocurrencies, makes possible the efficient implementation of the new educational paradigm proposed by Tutellus. At the core of the new system is the creation and management of digital assets, or **tokens**, that will become the foundation of a new reward system for students and teachers.



Tokens will measure the commitment of the students and teachers, as well as the educational value that they provide in the platform through **relevance**. This system will also include functionalities associated with transactionability, governance, and access.

Tutellus contributes three key elements to make this a successful project:

1. A **business model** at work since 2013 with a community of one million users and 130,000 video courses.
2. A **platform** that pays users for their actions and contributions.
3. An **application** of Blockchain technology that matches perfectly with the needs of the online educational market.

## The ICO as the Fundraising Mechanism for the Project Deployment

The Initial Coin Offering (ICO) will be structured in the following way, with 60% of tokens available for crowdsale, a Pool that will assure the continuity of the tokenomics model, and a hard cap fixed at 40.000 ETH in order to turn Tutellus.io into a worldwide reference in education.

The Token Launch is detailed in the [Documents](#) section of Tutellus.io.

# 1. Introduction

In 2016, the online education market was worth USD 165 billion. It is still, however, highly inefficient.

While the job market produces one billion contracts every year, over 300 million recent graduates remain unemployed and in search of a job. In Europe alone, the imbalance between job supply and demand is expected to be around 80%, particularly affecting the technology sector. There is a growing perception that educational institutions are out of touch with employer needs.

For teachers, there is almost no difference between the earnings of a good teacher and those of a bad teacher. *There are still no efficient mechanisms to gauge the effort and dedication of the best teachers.* This lowers motivation, and impacts the quality of the education students receive.

Finally, there are also millions of unemployed people in developing and Third World countries. If these people were able to use a mobile phone to access an application that allowed them to earn money just by studying and helping other people, it could make a big difference.

Since the current educational model has proved unable to solve the key challenges that the market faces, a new approach is needed.



Building upon its large student base (over 1 million students) and teaching material (over 130,000 video courses), Tutellus will become the first decentralized EdTech platform, answering the challenges faced by the education sector by using blockchain technology. Blockchain will allow for the creation of digital assets (or tokens) that will be at the core of the new system of incentives for the Tutellus community.

## The Token System

***The token system will increase its value as more functionalities are developed: from currency, to buying products and services, serving as a measure of relevance<sup>1</sup> in any skill, setting a governance model for the platform, and interacting with other ERC20 tokens.***



The model uses two different tokens. One of them, TUT, will be used as the platform's currency and to interact with other platforms and cryptocurrencies. It will be an ERC20 token, tradable for other cryptocurrency and fiat money. The other, Smart TUT or STUT, will not be tradable, and will be granted when the users contribute educational value to the platform. The

STUT tokens can be partly traded for TUT tokens or stored in the user's virtual wallet as a measure of Relevance in the platform, which will provide benefits in the long term (such as access to better employees, companies looking for influencers, lead acquisition, etc).

Both tokens will be distributed among the current students and teachers to generate activity from day one. *Our teachers and students, already numbering close to 1 million, will thus be our greatest ambassadors and will play a key role in growing the platform.*

### **Ok, but how will the token value will increase?**

The TUT token will increase in value because of the increase in the demand of services with associated functionalities versus a fixed offer:<sup>2</sup>

- Course purchases (cheaper in tokens than in fiat currencies).
- Course purchases from complex access fiat countries or high inflation rates: Venezuela, Cuba, Zimbabwe, etc.
- Donation services, only available in tokens.
- Teacher services, only available in tokens.
- Company services, only available in tokens.

<sup>1</sup> Relevance is the measure of knowledge and activity in any skill or micro-skill. The more relevance you have, the more you impact over the community and other users. Relevance can be won (learning more) or lost (not updating your knowledge or associated activities).

<sup>2</sup> Since the demand for a fixed amount of tokens will go up, their price will go up as well.

## 2. The Problems

### 2.1. Poverty and Lack of Job Opportunities

There are millions of people in developing countries and the so-called Third World with a lack of job opportunities for trained workers. They may have unstable and poorly paid jobs, or can be living below the poverty line.

The use of mobile phones in some of these countries, however, is high—close to the level seen in the USA or Europe. Mobile phones may, with Tutellus, end up providing a way out of poverty.

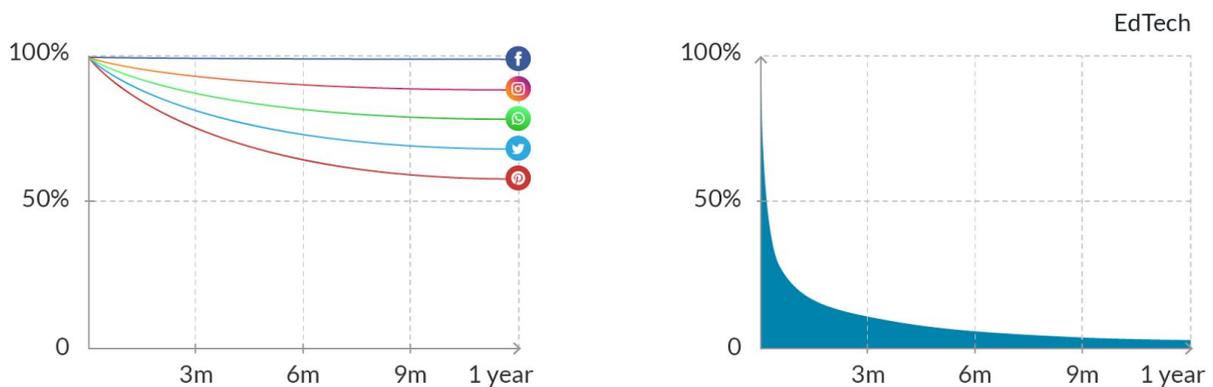
These people will be eager to earn money through the Internet, learning new skills in the process.



### 2.2. Low Student Motivation

Learning demands effort and motivation.

All EdTech platforms currently suffer from low levels of conversion and user retention. When comparing user engagement—the frequency a service is used on average—to those of other social platforms (either business or leisure-focused, from social networks to messaging services), we can observe how different user behavior is. While the main social platforms get a high monthly engagement with cohorts over 80%, educational platforms seem unable to retain students, with a dramatically lower engagement and cohorts around 5-10% in the long term.



User engagement on social media platforms Vs EdTech.

This issue is not particular to a single company nor even to a single business model, but rather a constant, implicit trait affecting the entire sector. Low engagement on any platform means fewer social relationships, and generally lower revenue per user. Another direct consequence for the market as a whole is higher marketing spending in order to get new users since the current ones are not active enough to make the system sustainable

The main reason behind this user behavior is the lack of motivation. Studying, whether online or offline, requires dedication, even sacrifice, and the investment of significant amounts of money, effort and time. Students may be skeptical about whether the courses will meet their expectations, related either to learning itself or to finding a job.

### 2.3. Low Teacher Motivation

Teaching is far from easy. Most of us probably remember our best teachers and the effort they put into their work. *This effort, however, is hardly recognized.* Good teachers are not better paid teachers, nor do they get benefits that acknowledge their work. This leads to a lack of motivation, lower-quality teaching, and worse-trained students with less job opportunities—and it is not fair.



An efficient education system should reward teachers according to the performance of their students, as measured by high grades, high engagement, or job placement.

## 2.4. Weak Link with the Job Market

Another problem concerning education is the diminishing value of degrees and certifications, which were at the core of the education system until the beginning of the 21st century. Their market value is lowering in a system in which people are normally assessed not by their grades, but rather by their work experience, involvement in real projects, and personal job fit. The job market is changing dramatically with regard to the way in which it values education.



Despite this, there is an immense need for properly trained workers in several sectors, such as IT. Employers, however, still struggle to find suitable candidates. This new job market requires a new educational paradigm that fills the existing gap between supply and demand.

Formal education as it stands now does not respond to the market's needs; new tools and systems to identify the most appropriate candidate for a position are needed. This disconnect creates a vicious circle by which companies become more disengaged from the education sector, widening even more the gap between both worlds.

## 3. The Solution

### 3.1. Main Objective

The main objective of Tutellus is to create a new educational model that responds to the challenges of the market by cultivating the most committed students, getting the best teachers more involved, and creating an educational community with a strong link to the job market.

#### Added Value to the Students

*Imagine a platform that pays its students for learning.* The logic is simple: the better the training the student gets, the higher the value of the student for both the community and third-parties (employers, job placement agencies, other service providers). This value increase thus stretches across the platform, the employers, and society as a whole.

#### Added Value to the Teachers

*Imagine a platform in which teachers are rewarded for the excellence of their students:* the more relevance the students get, the more money their teachers will receive. This will significantly improve students' motivation, the quality of the content, and the teachers' commitment to their students.

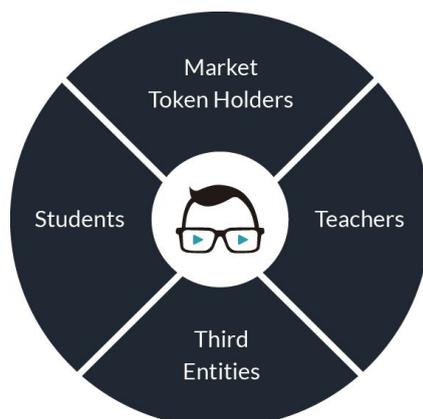
#### Added Value to Companies Searching for Candidates

*Imagine a platform where companies may find the perfect fit for a position or contract.* Both cheaper and risk-minimizing, the candidates can use the platform to prove their value in any specific skill.

This is the vision of Tutellus: a novel educational model that creates a new system of incentives by which all users get rewarded directly according to the value they provide to the community.

This model is possible today using blockchain, and particularly Ethereum technology.

The reward system will be built with digital assets or *tokens*, the currency that will be at the core of the market. The entire system will operate according to rules implemented as *smart contracts*, thus ensuring the full digitalization and the autonomous operability of the platform.



*The vision: an ecosystem where teachers, students and third entities create and receive value as users of a decentralised model.*

## 3.2. The Token System

The Tutellus platform will issue two different tokens: STUT (Smart TUT) and TUT.

The Smart TUT, or STUT, is an internal token that rewards actions that add value to the community. A user may earn STUT in multiple ways, all of them related to learning or helping other users to learn, and the number of STUT tokens provides a measure of the relevance or importance of the user inside the platform. A reward system will grant additional benefits for holding high amounts of STUT tokens.

The STUT token can only be traded to TUT, and only under certain conditions. The user cannot buy STUT at any point: it must be earned by doing actions inside the platform.

	TUT	STUT	Example
<b>What is it?</b>	money	relevance	The price of a course is 30 € (it can be paid in TUT), and has a relevance of 3,000 STUT
<b>Where can I get it?</b>	inside the platform / Exchanges	inside	You can get TUT from an Exchange, a grant, or many other ways. STUT can only be earned by studying
<b>What can I use it for?</b>	transactioning, donations, trading, governance	relevance, and a chance of benefits	TUT are tradable. STUT show relevance and can give you additional income through Third-party entities.
<b>What is the price of the token?</b>	fluctuating according to market	1 € = 100 STUT	The price of the TUT depends on the laws of supply and demand. The price of the STUT is 0,01 EUR

The TUT token connects the platform with the Ethereum ecosystem. It is a full tradable token that the user may use to, among other things:

- Buy any product in the platform
- Buy services, such as promotion and marketing for teachers, access to the students' profiles, and other third-party services
- Access scholarship programs funded through third-party donations
- Influence governance decisions associated to relevance: approval of courses, career design, teachers, tutors and master management, etc.
- Transfer money to other people, inside or outside the platform
- Trade for other cryptocurrencies.

The TUT tokens will be available to students, teachers and third-party entities in multiple ways:

- By buying them during the ICO or through the bounty program
- Through the scholarships granted by Tutellus that reward the best students
- By getting a share of the money paid by third parties (e.g. income generated by employers paying for identifying the best students)
- Through the loyalty program
- By trading the second token, STUT (up to 50%)
- In exchanges where the TUT is listed.

### 3.3. Added Value for the Student

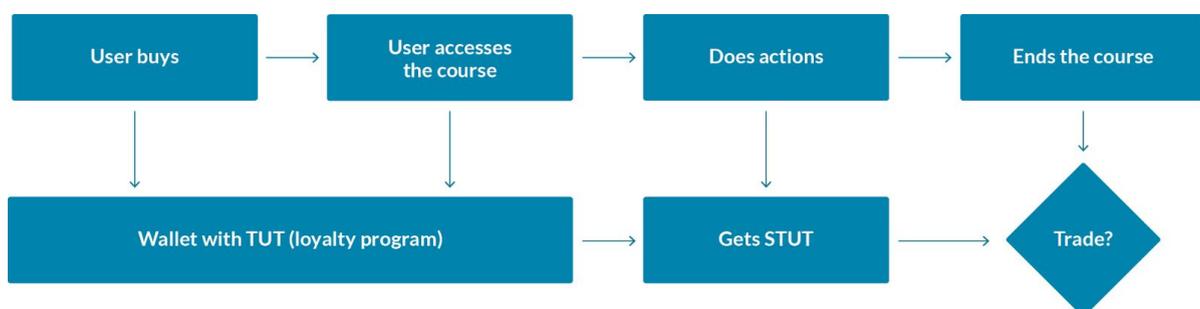
Each course will have a number of associated STUT tokens, depending on the price and duration of the course. Students who successfully finish a course get STUT tokens depending on the value of their contributions to the community. A full reward system will be implemented in order to foster activity and engagement.



The reward system will be decentralized, with the users themselves being the ones that ultimately decide how much a user has contributed to the community. Actions to be rewarded include:

- Asking relevant and insightful questions on the subject of a course
- Providing valid answers to questions from other students
- Applying the content taught in practical ways
- Successfully passing exams
- Submitting projects and related works
- Taking part in evaluations of other students via a rubric system
- Taking part in tutorials with other students
- Reviewing the course, rating it, and providing feedback for improvement to both the teacher and Tutellus

Each action has an associated value of STUT tokens that is known to the user, with the final number giving a measure of the effort, dedication, and work put into the learning process. The maximum number of STUT tokens available for a course is one hundred times the price of the course in EUR; that is, 100% of the course's price in tokens.



*Flow of STUT tokens (relevance) as a result of finishing a course*

As the STUT tokens quantify the relevance inside the platform, they are not directly tradable, so what we actually give to the user during the course is the *right* to receive the tokens when the course is successfully finished. When the course is finished and closed, the student is given a chance to trade up to half these STUT tokens to TUT tokens, and after this decision the final result is stored in the blockchain through the deployment of a smart contract. In addition, and to promote the use of the TUT tokens inside the platform, all products will carry a 10% discount if paid in TUT tokens, which provides an added value to the student.

### 3.4. Added Value to the Teacher

Currently, teachers at Tutellus have two main income streams. First, teachers get between 70% and 85% of the price paid by the student when they buy a course. In addition, they get an income from the subscription service fees, by which a student pays a flat rate to access Tutellus' content for a period of time. Teachers receive an amount from that fee that corresponds to the share of the time that the student spent in their specific courses.

With the implementation of the token infrastructure, Tutellus will become the first platform that creates a system to directly reward teachers for their performance, acknowledging the value contributed to the system through two additional income streams:

- From actions in their own courses that show commitment to the students, such as answering questions or evaluating projects, the teachers will get a higher relevance, as measured in STUT tokens. These STUT tokens can be traded partly to TUT tokens following the same model that applies to the students.
- Teachers may also receive 20% of the fees paid by employers using Tutellus in order to search for students to fill a position if the contracted students learned the skills required for the position in the courses given by the teacher.



*Teachers may receive income from up to four different sources*

Both new sources will boost teacher motivation, and the additional effort and dedication will increase the quality of the final educational product. As with the students, the system is fully decentralized. It will ultimately be the members of the community who are the ones measuring the contributions and having a voice in how much their teachers are rewarded through these new sources.

The other big disruption in the model is the way teachers will be paid:

#### **Instant Payment**

The tokenization of the entire platform will also improve the payment terms for teachers, as payments can be made instantly, using tokens instead of fiat money.

This instant payment model will cause an enormous market disruption, since no other EdTech platform has the capacity to immediately pay their teachers. Currently, the sector standard is between 60 and 120 days of delay. This improvement is expected to draw the best teachers to the Tutellus platform.

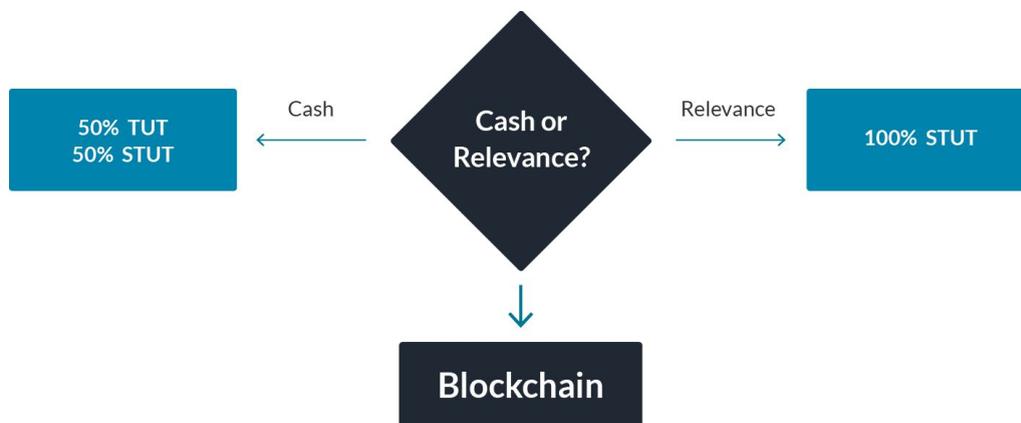
### 3.5. STUT to TUT trades

The trade of STUT for TUT allows for the monetization of the relevance inside the platform, as TUT tokens can be exchanged for other currencies and later spent outside the platform. The decision to trade STUT into TUT will take place after successfully finishing a course, and will be limited to 50% of the total number of STUT earned during the course.

The trade cannot be done in the other direction: owners of TUT tokens will not be able to trade them for STUT. Reputation and relevance can only be earned through engagement in the platform and cannot be bought.

The STUT to TUT trade decision is driven by two opposing forces:

- The willingness to cash out the value provided to the community, and
- The willingness to grow in reputation and relevance inside the community, measured in STUT tokens, which provide benefits in the long term.



*STUT tokens can be traded for TUT according to the preferences of the user (teacher or student).*

When making this trade, the price of the STUT token does not depend on the market's supply and demand. The total number of STUT tokens in a course is one hundred times the price in EUR paid for the course and accounts for 100% of the price. Thus, there is a fixed exchange rate of 1:100 between EUR and STUT. On the other hand, TUT is a tradable token, and its price will be given by the market.

By using STUT tokens as the only measure of relevance for students using Tutellus, we hope to reward those who choose to hold onto their STUT as opposed to exchanging them for TUT. The ultimate goal is to promote long-term commitment to the platform instead of immediate, short-term benefits.

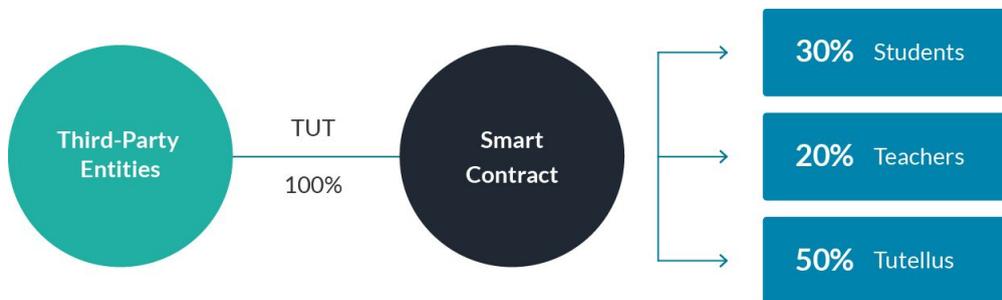
### 3.6. Third-Party Access

The students with the highest relevance, as measured by STUT tokens, will be able to quantify their excellence in a set of specific skills, and this will attract attention from companies searching for the best candidate to fill a vacant post. These high quality students are influencers with a proven and updated knowledge in their skills. By buying TUT tokens, companies may gain access to the best profiles.

The tokens will be distributed as follows during the execution of the smart contract:

- 30% for the students with the proper profile.
- 20% for the teachers associated with them.
- 50% for Tutellus.

The price to be paid by these third-party entities will be determined by the laws of supply and demand. For example, at the time of writing this paper, access to the profiles of the best Solidity developers would be more expensive than accessing the best Excel expert candidates.



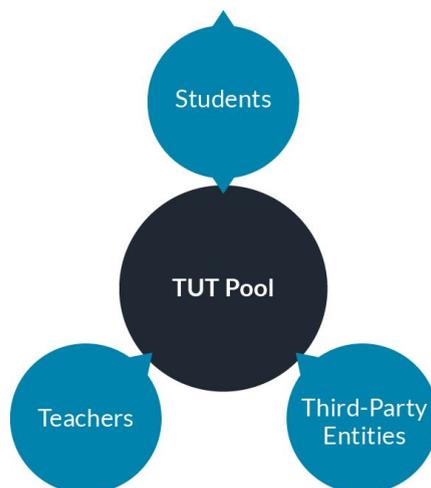
*Share of benefits from services given to third-party entities*

### 3.7. Study Grants and NGOs

We'll have two complementary ways to distribute study grants (and TUT tokens) to their students:

- Maximizing benefits: we'll align third-party interests with targeted students (ie: a company looking for Blockchain developers with potential Blockchain students, according to their relevance). In this case we match offer with demand and solve a need market.
- Maximizing social impact: we'll empower people from the Third World and with high relevance to help them to learn and earn money, depending on where the biggest possibilities to do it are in the platform.

The input streams for the pool are the TUT tokens coming from teachers, third-party entities, and students paying with the cryptocurrency.



*TUT scholarship pool, with TUT tokens entering from students paying for courses with cryptocurrency, third-party entities and teachers buying services, and later exiting to the most relevant students and teachers*

In addition, we take very seriously the chance we have to make a big impact in the third world, and by that we'll launch a Scholarship program with NGOs:

#### **Scholarship Program for underprivileged students**

Tutellus will provide both users and companies with the ability to assign scholarships to any person or people in any part of the world, letting them to study free (and earn money while doing it).

To make this happen, we are negotiating with several NGOs (as main influencers to arrive to all these places) with a clear final goal:

- To let anyone to give a scholarship to anyone else, either directly or in group, in any part of the world, and
- To let a company to give scholarships to a defined target group of people, of any discipline or skill, thus letting them to earn money while they study.

The currency traceability is absolute, and model transparency assures that tokens and courses will arrive to the correct person or people.

### **3.8. Loyalty program**

In order to reward loyalty inside the platform, TUT tokens—ranging between 5% and 10% of the price of the course—will be granted to all students who buy a course. The specific amount each individual student receives within this range will be determined their relevance as measured in STUT tokens.

As in the rest of the cases, these transactions will be deployed through smart contracts.

## 4. Tokenomics

### 4.1. Functionality

The following section details the flow of tokens inside the platform.

#### **Student:**

- A student buys a course or any other product inside the platform. For a paid course, the loyalty program grants the student a number of TUT tokens, up to 10% of the value.
- While doing the course, and due to the student's interactions that add value to the platform, the student obtains the opportunity to receive a number of STUT tokens. When the student finishes the course, the student can trade up to half of these STUT tokens to TUT.
- A student gets a scholarship granted by Tutellus to get products for free or at a discount.
- A student gets a share of the TUT tokens granted by a third entity in search of the best students.

#### **Teacher:**

- A teacher creates a course and contributes this extra value to the community, which grants the teacher a number of STUT tokens. The teacher may trade up to half of these STUT tokens to TUT tokens.
- A teacher receives an income from the students buying the course or related products (fiat or TUT).
- A teacher receives TUT tokens from the companies in search of the best students.
- A teacher gives TUT tokens to the Tutellus pool in return for additional services within the platform.

#### **Third-party entity in search of students:**

- A company in search of the best students grants TUT tokens to the pool in order to access the top students in the platform—that is, the most relevant ones in each skill set.
- The most relevant students, with the highest number of STUT tokens in the necessary skills, get 30% of the amount, to be distributed equally.
- The teachers whose courses these students did to get the STUT tokens get 20% of the amount from the companies, to be distributed according to the relevance of the teachers.
- Finally, 50% of the tokens go back into the Tutellus pool.

#### **Tutellus:**

- Gives TUT tokens to students from third-party entities and in-platform scholarships.
- Gives STUT tokens to students and teachers as a measure of their relevance.
- Gives TUT tokens to students and teachers in return for STUT tokens.
- Gives TUT tokens to students via the loyalty program.
- Receives TUT tokens from teachers in return for services inside the platform.
- Receives TUT tokens from third-party entities in search of the best students.
- Gets a commission for the sales of paid products, both in fiat and in TUT tokens.

At any time, any participant may trade TUT tokens outside the platform. The STUT tokens cannot be traded except inside the platform, only into TUT tokens, and with the limitations previously explained.

## 4.2. Token Distribution

During the initial token distribution (see 9.2), a portion of the tokens will be distributed between as many users as possible, both students and teachers, with a focus on the most active users. This initial distribution will kick off the flow of exchange as soon as the ICO ends.

- 60 million tokens will be offered in the Token Sale. Up to 30 million additional tokens may be issued during the sale if discounts are applied. No more tokens will be issued after the ICO.
- 10 million tokens for the team, with one year vesting.
- 10 million tokens for advisors, PR and others.
- 20 million tokens to be kept in a pool in order to activate the ecosystem by granting scholarships.

### 4.2.1. Initial Study Grants

As a first step, scholarships will be granted to the most active users on the platform. To do this we will use metrics already implemented and monitored during the last three years. An initial share of STUT tokens will be distributed, as detailed in Appendix II.5, as well as a share of TUT tokens according to the relevance. Countries going through economic problems will have preference in TUT tokens.

### 4.2.2. Token Flow State Model

By using a cash flow state model approach, we can develop a model for token inputs and outputs for the pool.

In the beginning a high number of TUT token scholarships will be granted, so many students will be able to study for free by paying with the tokens they have received, thus boosting activity and motivating the rest of the students. This increase in the activity will eventually lead to an input stream of tokens to the pool, both by purchases by other students and by the payments from teachers and third-party entities.

#### Token Outputs:

- Study grants: about 12% of the active students will get a grant, according at first to their activity and user type, and later according to relevance.
- STUT to TUT trade:
  - Students will get tokens from both free and paid courses. We will differentiate between students completing free courses (around 5-30% of the ones who start) and those completing paid courses (between 30%-100% of the ones who start), keeping the 30% division in order for us to build out the model.
  - In both cases, the decision to trade STUT to TUT is expected to be taken by about 70→30% of the students, progressively, as the incomes from companies rise. The increase in potential incomes will be a high motivation for the students to hold STUT tokens as a sign of their relevance instead of trading them.
- Both outputs will eventually lead to a rise in the number of active users (QAU), which will trigger a rise in the conversion and the number of transactions.
- Loyalty program: when buying a course, the student gets 5-10% of the price of the course back in TUT tokens to use for future purchases.

**Token Inputs:**

- Purchases in TUT tokens of any product in the platform.
  - We start Q1 of 2018 with 350,000 students in countries where it is difficult to buy online using fiat money, so we will consider a minimum conversion of 0,5%→6%. Current conversion is about 2.40%.
- Services to teachers.
  - We estimate, following the Pareto principle, that between 5% and 20% of the teachers will be interested in promoting their courses using different products (sponsored courses, Home page, email marketing, mobile campaigns, push apps, etc.).
  - The average quarterly income will be estimated between 200→500 USD. It will be only payable in TUT tokens.
- Services to companies.
  - According to the predicted number of geolocalized students and the job deficit, between 10 and 400 companies per quarter are expected to be interested in buying services to get access to profiles (job offers, lead access, influencers, etc.).
  - We will take 2,000USD as the average quarterly ticket per company. Since the current cost of using a service to find a profile is 20% of the salary of the first year, this seems reasonable.
  - These services can only be bought through TUT tokens.

As illustrated by the following table, the token's distribution has a cascade effect, with the pool getting full again at the end of the first year; the goal is to keep the pool stabilised around 100 million tokens. If it goes higher, as in the predicted model, the number of grants will also get higher in order to bolster activity between the users.

	2018				2019			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1 - Output tokens	-501	-1,444	-2,891	-5,792	-7,265	-8,761	-9,936	-14,915
2 - Active students (QAU)	100	200	400	800	1,200	1,800	2,700	4,050
3 - Free transactions	200	400	800	1,600	2,400	3,600	5,400	8,100
4 - % free courses completed	5%	7%	10%	15%	20%	25%	30%	30%
5 - Paid - fiat transactions	2	5	12	32	60	99	162	243
6 - % conversion	2%	2,5%	3%	4%	5%	5,5%	6%	6%
7 - Free - token transactions	0	24	48	96	120	144	162	243
8 - % Students w Scholarships	12%	12%	12%	12%	10%	8%	6%	6%
9 - Scholarship tokens	-500	-1,440	-2,880	-5,760	-7,200	-8,640	-9,720	-14,580
10 - Scholarship value (USD)	250	720	1,440	2,880	3,600	4,320	4,860	7,290
11 - Tokens trade - choice	-1,1	-3,1	-8,8	-26,2	-52,6	-98,6	-177	-269
12 - % Students w Trade choice	70%	65%	60%	55%	50%	45%	40%	30%
13 - Fidelization program	-0,3	-1	-2	-6	-12	-22	-39	-66
14 - Input tokens	73	257	742	1,890	3,955	7,728	14,175	25,702
15 - Paid - token transactions	2	5	16	42	95	189	354	638
16 - Users in no - fiat	350	525	1,050	2,100	3,150	4,725	7,088	10,631
17 - % Students buying	0,5%	1%	1,5%	2%	3%	4%	5%	6%
18 - Tokens traded	52,5	157	472	1,260	2,835	5,670	10,631	19,136
19 - Teachers	1	2	3	5	7	8	10	12
20 - % Teachers w promotions	5%	10%	15%	20%	20%	20%	20%	20%
21 - Courses	3	6	9	14	16	19	23	28
22 - Average ticket (USD)	200	250	300	350	400	450	500	550
23 - Tokens traded	20	100	270	630	1,080	1,458	1,944	2,566
24 - Companies					10	100	200	400
25 - Average ticket (USD)					2	3	4	5
26 - Tokens traded					40	600	1,600	4,000
27 - Net status tokens	-428	-1,187	-2,149	-3,902	-3,310	-1,033	4,239	10,787
28 - Pool status	19,572	18,385	16,236	12,334	9,024	7,991	12,230	23,017

Token flow state model (figures in thousands)



### 4.2.3. Reserve

The pool is also part of a reserve of both ETH (from the fundraising) and TUT (from the pool), accounting for about 20% of value of the tokens, that will be used to stabilize the price of the token. To this end, we may use this reserve to sell or buy tokens. We also may burn—that is, permanently remove—a small percentage of them.

## 4.3. Token Governance

The token monetary policy will be governed by the following business rules:

### 4.3.1. Related to Relevance

- The relevance, as measured by STUT tokens, is associated with predefined micro-skills through tree-based tags.
- The price of the TUT token is given according to supply and demand, while the price of the STUT token is linked to the EUR: 1 € = 100 STUT.
- We start with a STUT pool of ten times the size of the TUT pool (1000 million STUT), distributing in a first step 10% of the pool among the active users according to a Zipf/Pareto model (see Appendix II.5), and later adjusting the number of STUT downward as we distribute the tokens to students with less relevance, a process described in Appendix I.1.
- The entire governance model is detailed from an econometric point of view in the Appendices.

### 4.3.2. Related to Courses

- The price and duration of the course are the key factors in determining the number of STUT tokens associated with it. The higher the price and duration, the larger the amount of tokens.
- Free courses have a maximum relevance (STUT tokens) associated with the duration they have, according to the average duration and price of paid courses of the same type, taken at a rate of 1/10. For example, if the average for the paid courses belonging to the “Databases“ skill is 60€ and 3 hours (6,000 STUT), a free course of the same skill with a duration of 3 hours will get a maximum of  $(6,000/3)/10 = 200$  STUT.
- In both paid and free courses, only the most relevant student will get the maximum number of STUT tokens, with the rest of the students receiving a lower number. This distribution is detailed in the Appendices.
- Following a decentralised model, actions will be validated by rubrics. For example, a student answering a question will need N students to validate the answer before getting the STUT tokens.
- Users with enough relevance will be able to take high value decisions such as:
  - Courses approval
  - Career design
  - Tutor mentoring
  - New category proposals

### 4.3.3. Related to the Trade Decision

- Any student will be able to make the decision of how many STUT tokens are traded to TUT tokens at the end of the course. The decision will be stored in the blockchain and cannot be modified.
- The STUT tokens granted by the actions done during the course will be registered in a wallet, but will not actually be granted until the trade decision. Due to the cost associated with its execution, this decision can only be made once.
- By implementing a token trade per course, every student may choose which courses/tokens will be used to keep relevance, and which will be cashed out, thus being able to increase the relevance in some skills while trading in others.

## 4.4. Full Workflow

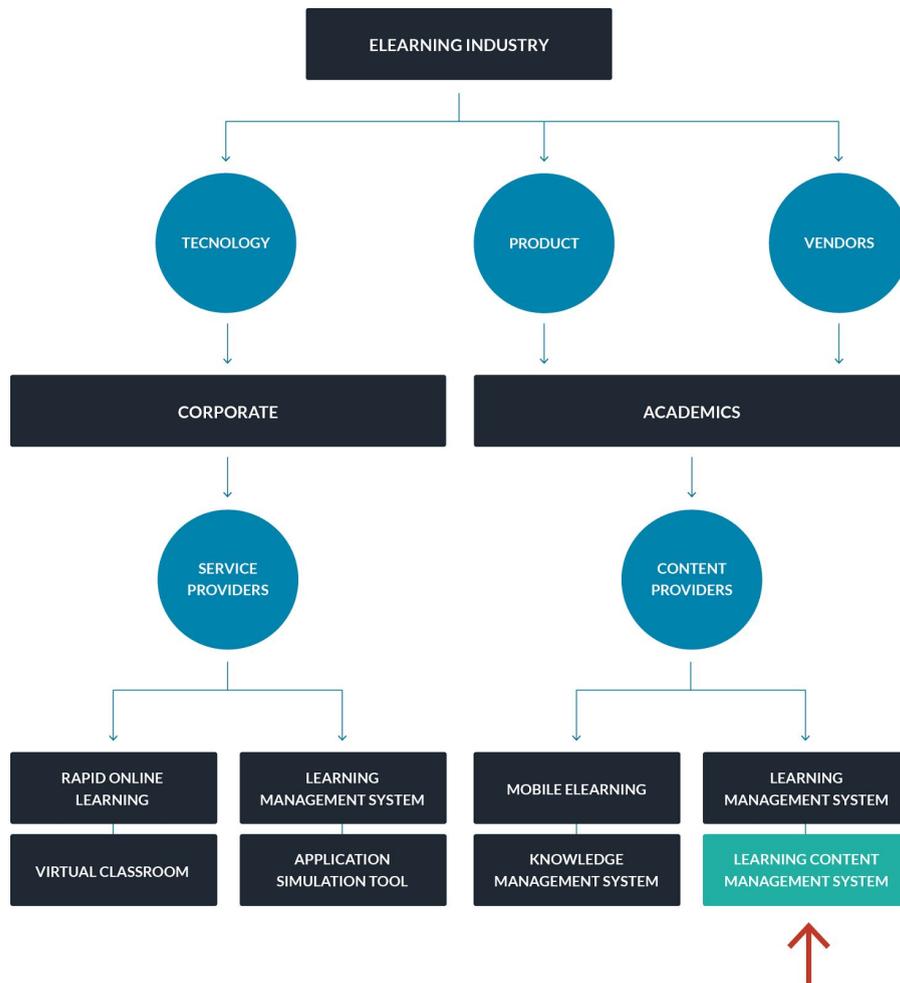
An example of the full workflow describing the platform could be as follows:

- A student pays 30€ for a course (1). The same student could get the course for free through a study grant. If the payment is done in TUT tokens, the student gets a 10% discount.
- Due to the loyalty program, the student gets between 5% and 10% of the price in TUT tokens (2). A wallet is created to store the TUT tokens, which will also be used to store the STUT tokens to be generated after the STUT-to-TUT trade decision (6).
- The student starts the course and, by doing actions that add value (3), gets a number of STUT tokens (4) from the Tutellus' pool, up to a hundred times the price of the course in euros, in this case up to 3,000 STUT, which show the student's relevance inside the platform.
- After successfully finishing the course (5), a trade decision is made (6): either the student keeps the STUT token as relevance or trades up to 50% of them to TUT tokens, with the STUT tokens keeping a fixed trade rate of 100:1 with the EUR, and the TUT tokens being worth up to 15 EUR. It is at this point that the information is stored in the Ethereum's blockchain, with the student that traded 50% of the 3,000 STUT tokens earning TUT tokens worth 15€ and keeping 1,500 STUT tokens to show as relevance. If the trade is not done, the student keeps 3,000 STUT as relevance, increasing the chances of earning additional income later.
- At the same time, a company is searching for the best students in certain skills, to fill a job position (7). The company buys TUT tokens in an exchange and gives them to Tutellus to get access to the best user profiles for certain skills. If the user who bought the course is one of the most relevant students, measured with the STUT tokens, the user will be selected as a candidate, and get a part of the income.
- The income is distributed as follows: 50% will be for the platform, 30% will be distributed between the candidates, and 20% to the teachers of the courses where the students learned the skills.
- The teacher will get a fee from the course purchase (8), either in fiat or TUT tokens. In addition, the teacher will be rewarded in STUT tokens (4) for actions that increase its value (9), tokens that may be kept as relevance or traded to TUT, as in the students' case (10).
- In addition, the teacher will get a share of the incomes coming from the third-party entity that found the student (7), thus getting a boost in motivation.
- Finally, the teacher can buy products or services inside the platform (promotion, campaigns, etc.) using TUT tokens (11).



## 5. The Market

According to [Forbes](#), the online education market was worth over USD 165 billion in 2016, mostly in the English-speaking world (USA, the UK, and India). It is expected to keep growing, reaching over USD 240 billion in 2023 (source: [Docebo](#))



Source: Ambient Insight Research

The target submarket was worth USD 33 billion in 2016, with over 90% located on North America, Asia and Europe. Latin America accounted for only 4% of the submarket, with an immense growing potential.



2016 WORLDWIDE REVENUE FOR SELF-PACED ELEARNING BY THREE PRODUCT CATEGORIES (IN US\$ MILLIONS)



*Business distribution for "Learning Content Management System." Source: Ambient Insight Research*

## 5.1. EdTech Companies

There are multiple sub-markets to distinguish:

- **MOOC Platforms.** Coursera, Edx. The content is available during a specific amount of time, and it is created by Universities. No relation with the job market.
- **Subscription Models.** Lynda, Pluralsight, and others. Focused on vertical markets and B2B.
- **Marketplaces.** Udemy, Skillshare, and others. No relation with Universities, focusing on the less valuable product (courses). No relation with the job market.
- **Specialized platforms.** Udacity being the leading company. Video courses to train professionals in a short period of time, about 4-6 months. Discretionary relation with the job market.

- **New projects on blockchain:** we have found three startups starting right now, but lacking a product already available in the market, a pool of students, a track record in the sector, and an ability to start courses immediately: beOne, DLS Academy and BitDegree. Only BitDegree seems to have a well defined model.

The following table shows all players involved, pointing out pros and cons of each:

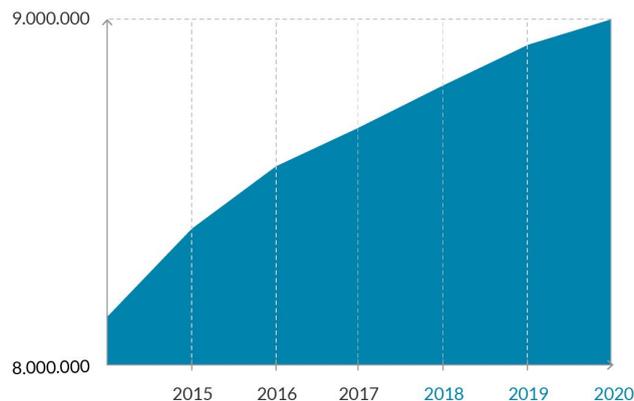
	Tutellus	Udemy	Coursera	Edx	BitDegree	Lynda
Free or paid courses?	both	paid	both	both	free	paid
Does the student earn money?	yes	no	no	no	yes	no
Free certification?	yes	no	no	no	yes	no
Value through third entities?	yes	no	no	no	yes	no
Collaborative platform?	yes	yes	no	no	no	no
Tested technology?	yes	yes	yes	yes	no	yes
Already available courses?	yes	yes	yes	yes	no	yes
Track record in EdTech?	yes	yes	yes	yes	no	yes
Blockchain integration?	yes	no	no	no	yes	no
<b>Value*</b>	<b>10</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>4</b>

*EdTech platforms. Value of 0 / 1 / 2 depending on the value added by tokenizing the service.*

The biggest platforms have internal structures involving hundreds or thousands of employees, and it would be extremely difficult to move all services and technology to blockchain. Only Tutellus has blockchain technology, a track record in EdTech, and a business model that is proven to benefit everyone involved in it.

## 5.2. Relationship between Education and Employment

The demand for highly specialized profiles, particularly in the IT market, is expected to experience a massive growth in the following years, both in Europe and in the rest of the world. Multiple studies point at toward a great need for people with the right academic formation in the near future.



*Expected demand for IT professionals for the following years in Europe.*

At the same time, the market itself has identified clear training opportunities for specific skills. With Tutellus we will promote the formation of these skills while offering services to third-party entities in search of them.

Job Profiles	2016	2017	2018	2019	2020	2021
Front-End Developer	20	-4	-7	-9	-26	-82
UX/UI Designer	30	-15	-62	-62	-71	-74
Digital Product Manager	4	-1	-2	-12	-73	-63
Back-End Developer	15	-5	-27	-9	-45	-52
Solution Architect	5	0	-1	-1	-1	-2

*Expected demand on technical positions for the following years. Source: BCG*

There is a strain on the market, with a multitude of companies fighting in the upcoming years for the best candidates to fill their vacant posts.

### 5.3. Issues during the Search for Talented Candidates

Employment platforms, headhunters, and temporary employment agencies are experimenting serious roadblocks to offering quality products to find and select acceptable candidates for the companies in need of them. They are using models that worked in the previous century.

The final experience with these platforms, of all sizes and in all sectors, tends to be negative:

- The candidates do not fit the needs of the companies.
- The training that they are supposed to have does not become apparent.
- The margin for any person hired is high (usually 20% of the first year's salary).

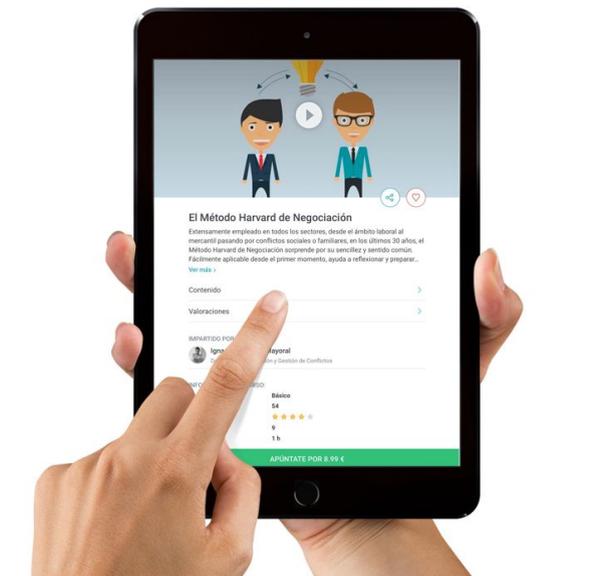
Our decentralized model allows us to do a far better segmentation of the potential candidates. We are able to offer companies the most optimal profiles with a filtering by skill deeper than anything seen before.

For instance, when searching for a candidate with knowledge on Javascript, we can find out how much of the knowledge is associated with NodeJS, how much with JQuery, and so on, combined with as many micro-skills as desired.

## 6. The Company

### 6.1. Figures and Traction

Tutellus is the biggest online educational collaborative platform in the Spanish-speaking world. We started in May 2013, and after four years we have users from 160 countries forming a community of one million people with over 130,000 video courses, positioning us as the leading platform in the market.



VISIT TUTELLUS

We have agreements with over 80 universities and business schools for the distribution of unique content, as well as four joint ventures for the issue of university degrees with exclusive content.

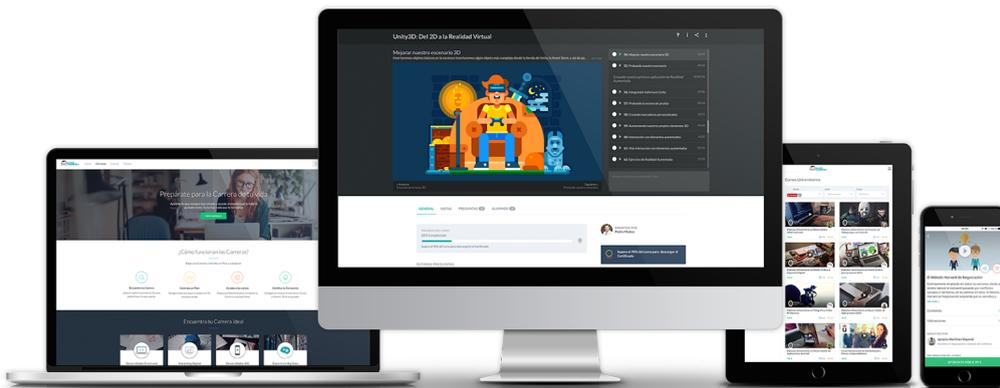
Our base product is the video course: educational packages formed by videos and additional services that improve the learning experience. From this core element we offer products with added value and higher prices, such as subscription services or University degrees.

<b>1,000,000</b> STUDENTS	<b>2,000,000+</b> TRANSACTIONS	<b>1b+ min</b> LEARNING	<b>\$10M</b> TRADES
<b>120,000+</b> VIDEOCOURSES	<b>3,000</b> TEACHERS	<b>80+</b> EDUCATIONAL INSTITUTIONS	<b>160</b> COUNTRIES

After four years of steady growth we have made possible over two million transactions inside the platform, with a transactional volume of over USD \$10 million, and more than a billion minutes spent on online education. An exhaustive analysis of the user behavior has given us a profound knowledge of their needs and the best training opportunities for each of them.

Not content with that, we aim to be THE online educational decentralized platform worldwide by bringing an additional, unique advantage: **Tutellus is the only platform that pays you for learning**. The traction created around this new concept will be the force drawing new offers and demand in all languages.

The company has so far invested 1.5 million USD to date in developing the platform and defining the target market and the value proposal.



## 6.2. The Team

These are the technical profiles of those most relevant in the company. We are located in Madrid, Spain.



**Miguel Caballero**, *CEO, co-founder*

20 years in Business Administration and Management. Miguel is an industrial engineer with an MBA from the Instituto de Empresa (1999) and a serial entrepreneur. In 2000 he founded Quoba (sold to IBM), in 2002 Neomedia (closed in 2010), and MET (spin-off of Neomedia, sold to Vectalia). Since 2012 Miguel has been completely focused on Tutellus.



**Javier Ortiz**, *CTO, co-founder & main developer*

25 years as a programmer. Java evangelizer, open-source project contributor and entrepreneur. Founder of Sokartec, has worked for Apple and Telefónica in multiple R&D projects from 2002 to 2011. After meeting Miguel at University (both are from Alicante), they started developing professional products together since 2007. In 2012 they joined forces to create Tutellus.



**Carlos López**, *Backend & blockchain developer*

15 years as a programmer. Computer engineer, has developed the infrastructure and services of Tutellus since 2014. An expert on Docker, microservices and NodeJS. Miner and fan of blockchain, Bitcoin since 2010, and now Ethereum.



**Javier Calvo**, *Engineer, mathematician & tokenomics manager*

25 years of experience. Degree in Mathematics and computer engineer. Manager of deep learning projects inside the company and the math behind the tokenization of the platform. Designer of the algorithm stabilizing the Tokenomics flow in the long term.



**Karolina Szymańczak**, *UX & Designer*

10 years of experience. Graphic designer with a track record of working with apps in BQ and other projects. Since 2014, Karolina has been in charge of the entire interface design, as well as the services inside the platform.

### 6.3. Advisors



#### [Miguel Solana](#)

Blockchain and VC advisor since 2011, ex-head of new initiatives in Santander China. Worked with the World Bank. Postgraduate courses on the Stanford University and the London School of Economics.



#### [Jesús Pérez](#)

Fintech Ventures director. President of AEFI (Asociación Fintech e Insurtech España). Founder of Bolsa.com and advisor on Civeta VC and Housers. Serial entrepreneur specialized on trading. One of the main influencers behind the Unconference 2017, the first tokenized event worldwide.



#### [Rodrigo de la Cruz](#)

CEO Finnovating. President FinTech Iberoamérica. Leader Innovator IEB. He was named “Top Global FinTech & InsurTech Influencer” in 2017, with Postgraduate courses in IEB (Cum Laude) and the London School of Economics.



#### [Daniel Díez](#)

Global Head of Blockchain UST Global. ESIC professor, co-author of "The Blockchain book". Working on Blockchain since 2011, being cofounder of Furai.co, Blockchain Toolkit, Bit2Me & YUROHS. One of the references in the ecosystem.

### 6.4. Partnerships

Tutellus works closely with educational institutions such as:



#### **Massachusetts Institute of Technology (MIT)**

Since 2017, developing joint R&D projects with Computer Science interns. AI project involving deep learning implemented during summer 2017 using TensorFlow.



**Spain Business School**

One of the leading online business schools. Creation of exclusive degrees, with official certification.



**Cremades & Calvo-Sotelo**

An international full service law firm, Cremades & Calvo-Sotelo is one of the most well known and well respected law firms in Spain, having professionals with extensive knowledge in the field of economics, FinTech, and finance.



**Finnovating**

A leading company giving Smart Advisory in FinTech, InsurTech, PropTech, RegTech & ICOs.

**Agreements with Latin America and Spanish Universities**

 <b>Universidad Politécnica de Madrid</b> La Universidad Politécnica de Madrid (UPM) se fundó en 1971 al agrupar diversos centros ya ... 57 Cursos 0 Profesores	 <b>Universidad de Navarra</b> La Universidad de Navarra es una universidad privada fundada en Pamplona (Navarra España) en 1952 ... 8 Cursos 0 Profesores	 <b>Universidad Politécnica de Cartagena</b> La Universidad Politécnica de Cartagena o UPCT es una universidad pública ubicada en la ciudad ... 23 Cursos 0 Profesores	 <b>Universidad Internacional de la Rioja</b> La Universidad Internacional de La Rioja (UNIR) es una universidad privada española de educación online líder en su sector. Ha sido ... 35 Cursos 0 Profesores
 <b>Clínica Universitaria de Navarra</b> La Clínica Universidad de Navarra es un centro médico-hospitalario que se caracteriza por su alto ... 15 Cursos 0 Profesores	 <b>Universidad de Deusto</b> La Universidad de Deusto fue fundada en 1886 por la Compañía de Jesús. En su ... 21 Cursos 0 Profesores	 <b>ESIC Business School</b> ESIC es la escuela de negocios líder en la enseñanza de Marketing en España y ... 7 Cursos 0 Profesores	 <b>Escuela Politécnica Nacional de Ecuador</b> La Escuela Politécnica Nacional fue fundada el 27 de agosto de 1869 por el Presidente ... 10 Cursos 0 Profesores
 <b>Instituto de Economía Digital ICEMD</b> El Instituto de Economía Digital (ICEMED) nació en 1995 con ESIC y ADIGITAL como cofundadores ... 49 Cursos 0 Profesores	 <b>Universidad de Alicante</b> La Universidad de Alicante (UA) es una universidad pública española con sede en San Vicente ... 15 Cursos 1 Profesores	 <b>Universidad Simón Bolívar de Venezuela</b> La Universidad Simón Bolívar (USB) es una institución pública Venezolana de educación superior creada en ... 8 Cursos 0 Profesores	 <b>Universidad Técnica Particular La Toja</b> La Universidad Técnica Particular de Loja es una institución autónoma de Ecuador con finalidad social ... 15 Cursos 0 Profesores

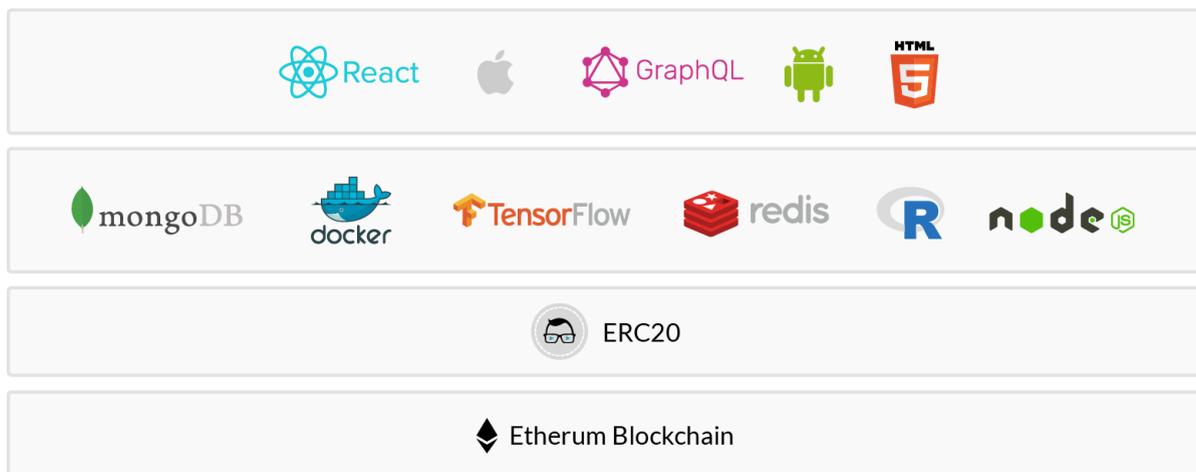
Over 70 agreements with the main universities and business schools in the Spanish-speaking world to promote content created by them, covering all topics and levels.

These agreements translate into over 50,000 video courses available in the platform, free and with free distribution allowed, for anyone interested in learning.

## 7. Technology

Tutellus will use a four-layer architecture, as follows:

- **Multi-platform Application:** providing services both to apps (Android, iOS, web apps, etc.) and decentralized services. Fully developed and already in production.
- **Microservices API:** Open-source API providing methods and functions to the services. Partly in production (Affiliates API).
- **Token:** Fully tradable ERC20 token, TUT, with the ability to interact with any other token of the Ethereum ecosystem.
- **Blockchain:** Database where we will store the relevance of the users and any deployed smart contracts.



### 7.1. Multi-Platform Application Layer

This layer is fully developed with the following features:

- ReactJS as front-end
- Customized React interface based on GraphQL for business intelligence and econometrics.
- AI Chatbots for support services and lead acquisition
- Services to apps (Android, iOS, web apps, etc.)

### 7.2. Microservices + API Layer (Tutellus.ai API)

Tutellus already has a [public API already in production](#) for affiliate management. This interface gathers together the methods and functions for the services that work to integrate the platform with third-party websites and apps.

- Designed to operate in the main languages: NodeJS, JavaScript, Python, PHP, and Ruby
- Docker.io for microservices
- NodeJS as core
- MongoDB as a NoSQL database

- R and Python for big data analyses
- TensorFlow for deep learning
- Redis and environments for other projects built around the API.

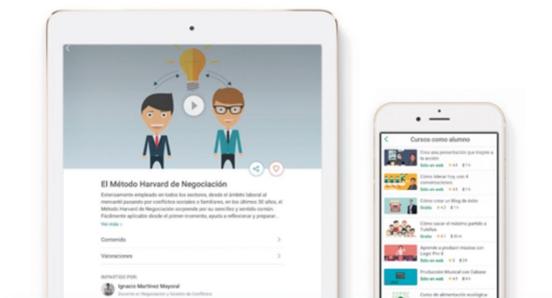
### **7.3. Token ERC20 Layer (TUT)**

The TUT token follows the ERC20 standard and is fully integrated with the Ethereum ecosystem and able to communicate with the rest of the tokens.

### **7.4. Blockchain Layer**

In this layer, Tutellus will store the results from the transactions between all participants, as well as the relevance of the users by skill and micro-skill.

## 8. Roadmap



Operating without interruption since 2013, now is the time for Tutellus to make a quantum leap, migrating most of its infrastructure, applications and services from the current stack (microservices built around an API against a MongoDB database) to the Ethereum blockchain. It will be a transparent process to the user, with all services functioning as before.

To date, the most important landmarks of the company concerning the product have been:

- **April 2013**                      The platform is launched with an offer of 2000 video courses
- **January 2014**                    10,000 video courses and 100,000 users
- **December 2014**                Joint ventures with universities to create exclusive degrees
- **May 2015**                         New platform: API-based with microservices
- **October 2015**                  Over 50,000 video courses and 400,000 users
- **November 2015**                Tuitermachine and other self-produced growth products
- **May 2016**                         Public API for affiliates
- **September 2016**                Apps published in Apple and Google stores
- **February 2017**                 Collaboration with MIT for a deep learning project
- **September 2017**                Over 130,000 video courses and 900,000 users. Move to blockchain.

There will be three large groups of services to be put into production during the following months:

### 8.1. Services for Users

- Wallet interoperability and management
- Implementation of internal operations with TUT and STUT cryptocurrencies
- Tokenization of the entire range of products (courses, subscription services, etc.)

The model will start working as soon as the users are able to gain relevance (STUT), and for that to happen, the activities to be rewarded with tokens should be ready. It is then a first priority to tokenize the activities that grant STUT tokens to the students, detailed in section 3.3, all of them related with the learning process of the student.

These activities are expected to be fully implemented at Q1 of 2018.

## 8.2. Services with Third-Party Entities

- Setting of parameters for access management, based on relevance
- Design of target entities (employers, organizations, companies, teachers)
- Creation of associated products (leads, big data, promotion, advertising, marketing, etc.)
- Implementation of smart contracts between all parties involved

## 8.3. Services with Other Players through API

- API publishing by microservices
- ERC20 multifunctionality
- Tokenomics optimization applying deep learning techniques

Looking at this process chronologically:



## 9. References



- Tutellus reinventing MOOCs (SP blog, Apr 2013): <http://2tel.us/2kbrFkT>
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## APPENDICES

# Appendix I: STUT and TUT tokens

## I.1. STUT Token

The STUT token measures the educational value the user contributes to the Tutellus community, and is associated with a set of skills, both general (e.g., programming, history, etc.) and specific (solidity, php7, etc.). There are multiples ways for a user to earn STUT, but all of them are related with learning and with helping other users to learn. STUT tokens are not tradable by themselves: they cannot be bought, and can be sold only under special conditions.

Initially there will be a STUT pool ten times bigger in size than the TUT pool (1,000,000,000). 10% of the initial pool will be distributed among the members of the community, students and teachers, according to the educational value provided by them at the moment. This gives us an initial quantification of the relevance of each member of the platform.

After that, students and teachers may earn STUT tokens by interacting with the platform. These tokens are taken from the pool. From time to time the state of the pool will be checked, and if the percentage of the tokens in the pool against the total number of tokens goes below a certain percentage, the pool will be increased in one of two ways:

### a) Issue of New STUT Tokens.

This option implies a moderately inflationary model for the STUT tokens, with different goals:

- To make it easy for Tutellus to implement changes in the model in order to stabilize it.
- To slowly adjust the value of the payments in STUT already done without changing the nominal value and thus prioritizing the relevance recently obtained. A course finished two years ago will still provide the same number of STUT tokens, but the actual value of the amount will be less since there are more tokens in the system

**b) Withdrawal of a Percentage of STUT Tokens** from students that have been inactive in the system for a long period of time who do not contribute educational value for themselves or for other users.

The goals behind this are:

- To assume the eventual obsolescence of the skills learned. After a while, the value of what is learned yet not used is zero.
- To motivate the creation of more value in the community, either by learning or by helping others to learn.

The percentage taken from the user will depend on the skill associated to the STUT. Tutellus has a wide range of courses, from history to recent technology, and the rate at which how fast something becomes obsolete greatly varies between subjects.

If the student takes the decision of trading the STUT, the value in TUT tokens of the STUT token traded is directly related with the price of the course, up to 100% of the value, depending on the relevance of the student and the commitment shown in the learning process.

With free courses, the value of the STUT token when traded is related to the duration of the course. It is possible to earn STUT tokens exclusively through free courses, without relying on grants, paid products, or other sources, but the amounts of STUT obtained will be low. Quality education has a cost, and the educational value of a paid course should be bigger than that of a free course of similar content. This difference is thus reflected in the platform's reward system.

STUT that are not associated with any course cannot be traded; they act as a measure of the knowledge and relevance of the user in their skills.

The teachers earn STUT tokens by doing activities in their own courses, ensuring the quality of the courses, and by contributing value to the community, according to a model similar to the students'. By doing this we get a quantification of how valuable each teacher is for the platform. Often, the teachers may also be students themselves; in these cases, the two reward systems are treated separately.

## I.2. TUT Token

The TUT token is an ERC20 token connecting the platform with the rest of the Ethereum ecosystem. The total number of TUT tokens is capped after the end of the ICO, following a deflationary model.

The decision between a deflationary model against a moderately inflationary model is not trivial, with both options having positive and negative features:

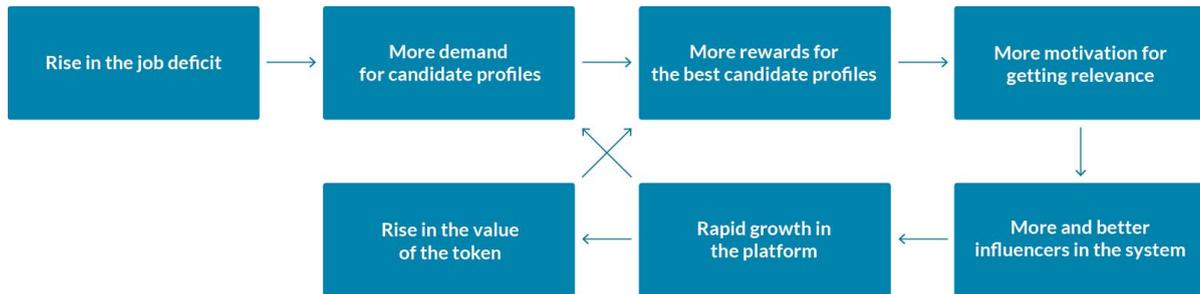
- In a deflationary model, a growth in the value of the assets brings a growth in the value of the coin, which attracts investors, increases the loyalty of the coin holders, and thus benefits all the participants.
- All coin holders are therefore tempted to maintain its possession, seeing the token as a long term investment and refraining from making new transactions, which can have severe negative effects over the growth and economic stability platform.

The balance between these opposing forces depends on the health of the market. According to [a study from the Bank for International Settlements \(BIS\)](#) involving 140 years and 38 countries, there are two types of deflation: one that is created due to a loss in the demand, and the one that is created due to a rise in the supply.

In this study, the negative aspects of deflation only become relevant in the first case, a loss in demand. If demand holds or rises, the market grows, and the value of the coin rises with it with no negative effects.

This is the reason we have chosen to use a deflationary model for the TUT token: all studies on the job market show a dramatic increase in demand for the next years. There is a steadily growing need for qualified candidates, and the job deficit behind it is the driving force behind the growth of the platform, increasing the number of transactions and the market cap.

This demand keeps the TUT flowing by acting as an economic engine and stopping the system from going stale, with an active flow of tokens in and outside the platform.



*Growth in value of both the platform and the TUT token.*

- The demand for talented students will keep third-party companies investing in the search of new talents adding more and more TUT to the system as the platform continues to grow and produce the best students.
- The same demand will also heighten competition between the teachers, which will cause a continuous growth of the demand for additional services, again putting more TUT tokens getting back to the flow.
- Finally, for the students, holding or selling TUT will depend on personal decision. But again, the rise in the demand for qualified profiles will be the key factor for this decision in the long term. Additionally, a 10% discount in all products for students buying in TUT tokens will serve as another reason to use the tokens within the platform itself.

In this way, we get a continuous rise in the value of the token while keeping the system healthy.

In certain situations that call for it, a number of TUT tokens from the reserve may be permanently destroyed in order to keep the system healthy.

## Appendix II: Tokenomics in Detail

In this section we will provide a deeper look at some aspects of the model, detailing the economical and mathematical foundations behind it.

### II.1. Token Sharing Model Based on Relevance

On multiple occasions through the TUT token flow, a certain amount of them is shared among a number of users according to the educational value contributed to the community. These shares are done using a simplified Zipf distribution.

Zipf's law is an empirical law, closely related to Pareto's principle, found in many aspects of real life, usually associated with popularity ranking, frequency of use, or relative relevance inside a set of elements. An ordered array of  $K$  elements

$$[v_1, v_2, v_3, \dots, v_k]$$

follows Zipf's law if the value of the element found in the  $k$  position,  $v_k$  is close to  $v_1/k$ , the value of the first element divided by the position of the element inside the array, for all values of  $k$ .

As an example, natural languages follow the law of Zipf. If we order the words that form the vocabulary of a language by how often they are used, the aforementioned property is found. For the English language the most often used word, ('the') is used close to 7% of the time in any text or collection or texts big enough for analysis. The second most often used word, 'of', is used about half as often, 3.5% of the time. The third most often used word, 'and', is used about 1.75% of the time, and so on. The same behaviour can be found in many other situations, such as population distributions, web page traffic, activated neurons in our brains after stimulation, or the number of people following a certain news channel. If there are enough elements in a set, it seems the Zipf's law structures their popularity or relevance in countless situations.

The decision to use this law to do the shares comes from three considerations:

- It properly values the effort made by the users, since it is based on a model that is often found in real life. Thus it can be considered a fair system.
- It rewards in greater quantities those users that provide high value to the community. This way the best users will get significant payments that cannot be easily discarded as irrelevant.
- It rewards all value provided, even those from the smallest contributions. This way all users actively providing value to the platform will be rewarded, with a clear cause-and-effect relationship between effort and reward.

All three considerations have a common goal: to motivate the user to participate. To work, the model should be completely transparent, with all users being informed of their relevance in the platform, the value associated with this relevance, and how much of a share this results in.

Let's call  $A$  the number of active users in Tutellus in a given skill at the moment of a share. To distribute a quantity, we need all users ordered in a decreasing order by relevance, measured in STUT tokens, both globally and for any given skill.

When distributing  $B$  in this set of users, every element found in position  $k$  is given  $1/k$  times the value of the first element. So the values to share are

$$[q, q/2, q/3, \dots q/A]$$

Where the sum of the values is  $B$

$$\sum_{k=1}^A \frac{q}{k} = B$$

$$q \cdot \sum_{k=1}^A \frac{1}{k} = B$$

$$qS = B$$

This  $S$  is a harmonic series in which partial sums follow a logarithmic growth, a property that produces the features we are looking for. Its value for a finite number  $A$  is

$$S = \ln A + \gamma + \varepsilon(A)$$

Where the second term is the Euler-Mascheroni constant (close to 0.5772), and the third is close to  $1/2A$  for high values of  $A$ . Given the values found for active users in Tutellus we can visualize the sum as

$$S = \ln A + 0.5772 + 1/2A$$

And the shares thus being

$$[B/S, B/2S, B/3S, \dots B/AS]$$

Some examples of distributing 1000 TUT between students with a given skill are provided here:

Students	S	Best student	Student 10	Student 100	Student 1000
1000	7,48	133	13,3	1,33	0,13
10000	9,78	1022	102,2	10,22	1,02
100000	12,09	8271	827,1	82,71	8,27

As expected, *benefits are quite significant for the best students, and very low for the last ones.*

It is important to keep in mind that these payments are in TUT, and so the real value in EUR or ETH of these rewards depends on the market value of the TUT token at the moment. Since the TUT token follows a deflationary model, an increase in the transactional market associated with a growth in the value of the platform will create a bigger value—measured in EUR or any coin other than TUT—of these rewards, following the growing and the increased worth of the entire community. It is because of this that the community of users itself is the body that determines the ultimate value of the rewards, ensuring through their efforts that those are economically significant.

In this way, a large increase in the value of the Tutellus community generates—through a totally transparent process—an equally large increase in the rewards the community can give back to its users.

Other criteria, such as nationality, may be involved in the distribution of the tokens in order to help those coming from developing and Third World countries.

## II.2. Gain Model for Students

One of the innovations offered by Tutellus is the distinct possibility for the students to get significant economic benefits, from both learning and helping other people to learn. The platform rewards the students that provide educational value to the community through the STUT and TUT tokens. The TUT token provides liquidity at all times, and the STUT token quantifies the effort of the student, with indirect benefits associated.

Let's take  $S_0$  as the total number of STUT for a student at the beginning of a period. These STUT are associated with specific skills, in which the student knowledge and contributions are quantified by an array of  $H$  skills with associated values

$$H_0 = [s_{10}, s_{20}, s_{30} \dots, s_{H0}]$$

Which we consider follows a decreasing order. The sum of all values is greater than or equal to  $S_0$ , since a single STUT may be associated with multiple skills, depending on the skills associated with the course it comes from.

This number of STUT determines the student position within the ordered array of students, with  $\omega_0$  the position of the student at the beginning of the period, and  $\omega_{h0}$  the position of the student in the STUT array associated with the skill  $h$ . The  $H$  array is thus associated with a  $P$  array giving the relative position of the student in all the skills acknowledged:

$$P_0 = [\omega_{10}, \omega_{20}, \omega_{30} \dots, \omega_{H0}]$$

This example assumes that the student has not suffered STUT wallet penalizations as a result of significant period of inactivity. While a highly relevant student may still have significant earnings even after long periods of inactivity, this is not a common case. In addition, this modification to the model is quite trivial; it merely subtracts all elements  $s_{i0}$  from the student's STUT array according to the quantity taken.

There are four different sources from which a student can earn tokens:

1. Through paid products, usually courses.
2. Through free products.
3. By getting a share in income from third-party entities
4. By getting a share in study grants.

The sum of the totals from these four sources—which can be TUT, STUT, or both—represents the total income.

## II.2.1. Paid Products

Let's say a student finished  $N$  paid courses during a certain period, each one with a price  $p_i$ . Each course is associated with a set of skills, with the student who finishes the courses generating STUT associated with those same skills. Once finished, a course gives the student tokens in different ways:

### 1- STUT Tokens

At the end of the course the student gets a certain number of STUT tokens associated with the skills tagged in the course depending on the price of the course  $p_i$  and the level of additional participation and effort shown by the student  $\alpha_i$ . This amount is quantified up to the equivalent of the total price paid for the course. Up to half of these STUT tokens can be traded for TUT tokens, so the final amount of STUT tokens, for a  $\beta_i$  percentage of STUT tokens traded to TUT, is:

$$I(STUT) = \sum_{i=1}^N p_i \alpha_i (1 - \beta_i); \alpha_i \in [0, 1], \beta_i \in [0, 0.5]$$

### 2- TUT Tokens

The loyalty program provides the student with a number of TUT tokens, between 0.05 and 0.1 times the price of the course, to use for future purchases:

$$p_i * 0.05 * (1 + \mu), \mu \in [0, 1]$$

The value for  $\mu$  depends on the global relevance of the student, quantified through the total amount of STUT tokens. Following the Zipf's distribution to reward this relevance, the share will depend on the position held by the student in the STUT array  $\omega_0$

$$\mu = \frac{1}{\omega_0}$$

Which gives us the total number of TUT tokens provided by the loyalty program:

$$I(TUT)_1 = \sum_{i=1}^N p_i * 0.05 * (1 + \frac{1}{\omega_0})$$

We must add here the total amount of TUT tokens coming from the trade of STUT tokens at the end of the course, as explained in the previous section:

$$I(TUT)_2 = \sum_{i=1}^N p_i \alpha_i \beta_i; \alpha_i \in [0, 1], \beta_i \in [0, 0.5]$$

Adding the price paid for the courses, the total balance for the student is

$$I(TUT) = I(TUT)_1 + I(TUT)_2 - \sum_{i=1}^N p_i$$

Which means that the completion of  $N$  paid courses, each with a price  $p_i$ , where the user is holding the  $\omega_0$  position in the STUT array of global relevance, has received a number of STUT tokens accounting for  $\alpha_i$  of the price, and has traded a proportion  $\beta_i$  of them to TUT gives us the following total amount of TUT gained:

$$I(TUT) = \sum_{i=1}^N p_i \cdot [0.05 * (1 + \frac{1}{\omega_0}) + \alpha_i \cdot \beta_i - 1] ; \alpha_i \in [0, 1], \beta_i \in [0, 0.5]$$

## II.2.2. Free Products

The number of STUT tokens the student receives after finishing a free course depends on the duration of the course  $d_i$  through a function  $f(d_i)$ . This function is defined as a step function to avoid excessive values. The STUT obtained thus follow the same treatment as the STUT coming from the paid courses, with the user being able to trade up to 50% of them for TUT tokens.

So, if during a period the student finishes  $M$  free courses with a duration  $d_i$  each, after trading  $\beta_i$  of the STUT tokens, the student finally gets:

$$II(STUT) = \sum_{i=1}^M f(d_i) \cdot (1 - \beta_i) ; \beta_i \in [0, 0.5]$$

$$II(TUT) = \sum_{i=1}^M f(d_i) \cdot \beta_i ; \beta_i \in [0, 0.5]$$

## II.2.3. Income from Third-Party Entities

During the period being considered, a certain number  $E$  of third-party entities provide a number of TUT tokens associated with specific skills in which they are most interested, searching for a number of users adept at those skills. Being one of these potential candidates generates income for a student.

Let  $H$  represent the set of skills of a student with an ordered STUT array  $[s_{10}, s_{20}, s_{30}, \dots, s_{H0}]$ , which gives us an array of positions within the total of students for this skill,  $[\omega_{10}, \omega_{20}, \omega_{30}, \dots, \omega_{H0}]$ .

For each of these skills  $h$ , the third-party entities have contributed a number of TUT tokens  $[T_{1h}, T_{2h}, T_{3h}, \dots, T_{Nh}]$  in order to find the best  $n_i$  students in the skill. Being among the candidates gives the student a share of 30% of the income provided by the entity, which is equally distributed between the number of selected students.

$$\sum_{i=1}^E \sum_{h=1}^H \frac{0.3 * T_{ih}}{n_i}$$

Where  $T_{ih}$  is the income given by the entity  $i$  for the skill  $h$ , searching for  $n_i$  candidates.

To get access to this income, the position of the user in the STUT array for every skill,  $\omega_h$ , must be one of the  $n_i$  highest positions in the array, which gives us:

$$III(TUT) = \sum_{i=1}^E \sum_{h \in H, \omega_{h0} \leq n_i} \frac{0.3 * T_{ih}}{n_i}$$

It is important to keep in mind that the goal of these searches is to connect companies searching for specific profiles of skills with students who excel in those skills, so these benefits for the students inside the platform are just the beginning, with the opportunity to be hired by one of these companies being the ultimate goal.

#### II.2.4. Shares in Study Grants

Monetizing the platform lets the most active and valuable members take a larger share in the benefits to the whole community. This is implemented through a study grant system associated with skills of high interest.

In a certain period, a student receives benefits from study grants awarded for some of the  $H$  skills associated with the student. For these  $h$  skills, the funds are  $[B_1, B_2, B_3, \dots, B_H]$  TUT, which are shared according to the application of Zipf's law detailed in a previous section

$$\frac{B_h}{\omega_{h0} * [LnA_h + 0.5772 + 1/2A_h]}$$

Where  $A_h$  is the number of active students during the period with the skill  $h$ , which ultimately gives us:

$$IV(TUT) = \sum_{h=1}^H \frac{B_h}{\omega_{h0} * [LnA_h + 0.5772 + 1/2A_h]}$$

Other criteria, such as nationality may be involved in the distribution of the grants in order to help people from developing and Third World countries.

#### II.2.5. Conclusion

As a result of the different sources of incomes, the final benefits for the student are:

Liquid (TUT):

$$\begin{aligned} G(TUT) &= I(TUT) + II(TUT) + III(TUT) + IV(TUT) \\ G(TUT) &= \sum_{i=1}^N p_i \cdot [0.05 * (1 + \frac{1}{\omega_0}) + \alpha_i \cdot \beta_i - 1] + \sum_{i=1}^M f(d_i) \cdot \beta_i + \\ &+ \sum_{i=1}^E \sum_{h \in H, \omega_{h0} \leq n_i} \frac{0.3 * T_{ih}}{n_i} + \sum_{h=1}^H \frac{B_h}{\omega_{h0} * [LnA_h + 0.5772 + 1/2A_h]} \end{aligned}$$

Relevance (STUT):

$$\begin{aligned} G(STUT) &= I(STUT) + II(STUT) + III(STUT) + IV(STUT) \\ G(STUT) &= \sum_{i=1}^N p_i \alpha_i \cdot (1 - \beta_i) + \sum_{i=1}^M f(d_i) \cdot (1 - \beta_i) \end{aligned}$$

Where:

- $N$  is the number of paid courses finished, each with a price  $p_i$ , with a participating coefficient  $\alpha_i \in [0, 1]$
- $M$  is the number of free courses finished, with a gain following a function on the duration of the course,  $f(d_i)$
- $\beta_i \in [0, 0.5]$  is the proportion of STUT tokens traded to TUT tokens, both in free and paid courses.
- $H$  is the set of skills known by the student
- $\omega_0$  is the position of the student within the ordered array of relevance, measured with the total number of STUT tokens, and  $\omega_{0h}$  is the position of the student within the ordered array of relevance for the skill  $h$ .
- $E$  is the number of third-party entities searching for candidates to fill a job vacancy, each one contributing  $T_{ih}$  TUT tokens to get  $n_i$  candidates in a skill  $h$  known by the student.
- $B_h$  is the fund contributed by Tutellus for the skill  $h$ , to distribute between the  $A_h$  students knowing this skill.

The student will get a total relevance (STUT) of

$$S_1 = S_0 + G(STUT)$$

In addition, for every skill  $h$  known, the student will earn the STUT associated with the skill, following the same formula, yet only counting the STUT coming from courses associated with that skill, with the  $H$  set that determines the relevance of the student in every skill becoming  $H'$ :

$$H' = [s_{11}, s_{21}, s_{31}, \dots, s_{H1}] = [s_{10} + G_1(STUT), s_{20} + G_2(STUT), s_{30} + G_3(STUT), \dots, s_{H0} + G_{H'}(STUT)]$$

Which will give us a new position of the student inside the global STUT array  $\omega_1$ , as well as new values for the STUT array for every skill,  $P_1 = [\omega_{11}, \omega_{21}, \omega_{31}, \dots, \omega_{H1}]$ , with the possibility of adding new skills to the array.

The first term in the TUT income coming from the paid courses is always negative, with a maximum of

$$Max(I(TUT)) = -0.4 * \sum_{i=1}^N p_i$$

With the losses becoming earnings for teachers and the platform.

As to the second term, while the balance for the student is always positive both in relevance and liquidity, this is not expected to be the main source of their benefits. The student may obtain a small benefit from this, but these benefits are not supposed to be significant.

It is in the third and fourth term where we can find a way to get a positive and significant income, with these terms heavily depending on the position of the student inside the relevance arrays: the global array when it comes to the study grants and the skill specific arrays when it comes to third-party entities.

As a result, the number of STUT tokens is the key to a high income of TUT tokens. The value of what the student contributes to the platform is main parameter of their income.

Any student may have two different goals in mind when entering the Tutellus community, not mutually exclusive: either gaining relevance in some specific skills (STUT), usually looking for a reputation that will help when trying to find a job, or earning a direct income (TUT). The first goal quite obviously contributes to the addition of educational value to the platform, but the second, once analyzed, does the very same. If the student is getting high liquid benefits, it is because the contributions to the platform in terms of effort and dedication have been high as well.

In this way, the key to the student's personal gain is always the community's gain, with the result being a community working together for the benefit of all.

## II.3. Gain Model for Teachers

Teachers are the core element of any educational community. Consequently, they take part in the token flow and are rewarded for their efforts, both in liquid tokens (TUT) and in relevance (STUT).

The distinct feature Tutellus gives to its teachers is the possibility of gaining direct rewards as a result of the excellence of their students. The contribution of educational value from the students who learn from a given teacher may become a noticeable income for the teacher, with the goal of giving all teachers an added motivation to encourage the best from their students.

Just like in the case of the students, the relevance of a teacher inside the platform is quantified by a number of STUT tokens  $SP_0$ . These tokens are also associated to specific skills, with any teacher having associated an array of STUT  $[sp_{10}, sp_{20}, sp_{30}, \dots, sp_{H0}]$  in a number  $h$  of skills. If the teacher is also a student in the platform, which is usually the case, the STUT generated as a student are stored in a different array in order to avoid unfair comparisons between students and teachers of a given skill when it comes to the distribution of shares.

Let's call  $\omega p_0$  the position hold by the teacher at the beginning of the period in the global array of STUT, and  $\omega p_{h0}$  the position in the STUT array associated with the skill  $h$ . The STUT array is thus associated with a positional array  $PP$  that gives us the relevance of a teacher as compared with other teachers in every skill:

$$PP_0 = [\omega p_{10}, \omega p_{20}, \omega p_{30}, \dots, \omega p_{H0}]$$

There are four different sources from which a teacher can earn STUT and TUT:

- I. Sales of paid courses
- II. Income from subscription services
- III. Income from third-party entities
- IV. Activity as a courses' teacher

The sum of the totals from these four sources—which can be TUT, STUT, or both—represents the total income.

### II.3.1. Sales of Paid Courses

During a certain period a teacher sells a number  $N$  of courses, each one with a price  $p_i$ , retaining a percentage  $\sigma_i$  between 75% and 85% depending on the type of sale.

$$I(TUT) = \sum_{i=1}^N p_i \sigma_i; \sigma_i \in [0.7, 0.85]$$

### II.3.2. Income from Subscription Services

One of the most popular products offered by Tutellus is the subscription service, by which the student gets the right to access as many courses they want for a specific period of time. Teachers get their share of the subscription fee depending on the total amount of time the students spent in their specific courses.

Let  $M$  be the number of courses the teacher is getting an income this way. For every course there is a number of students  $u_i$ , who have paid a fee  $c_i$  for the subscription during this period of time and who have spent some time  $t_i$  on the course. Over this value it's applied the teacher benefit  $\sigma_i$ .

$$\sum_{i=1}^M u_i c_i t_i \sigma_i; \sigma_i \in [0.7, 0.85]$$

Currently there are three types of subscription services: monthly, quarterly, and yearly. The subscription price is calculated from the subscription payment  $U$ , divided by the number of times the income is calculated. If  $W$  is the number of times per month, the fee is

$$c = \frac{U}{W\rho}; \rho \in \{1, 3, 12\}$$

Which gives us

$$II(TUT) = \sum_{i=1}^M u_i \frac{U_i}{W\rho_i} t_i \sigma_i; \sigma_i \in [0.7, 0.85], \rho_i \in \{1, 3, 12\}$$

### II.3.3. Income from Third-Party Entities

During a specific period a number  $E$  of third-party entities searching for candidates with high levels of relevance in specific skills contribute a number of TUT tokens associated with those skills. A fraction of this income is distributed among the teachers associated with these students. A student is associated with a teacher in a skill if the student successfully finished one or more courses associated with the skill and taught by the teacher.

For every skill  $h$  they are interested in, the third-party entities contribute a number of TUT tokens  $[T_{1h}, T_{2h}, T_{3h}, \dots, T_{Nh}]$  while in search of the best  $n_i$  students. For every student associated to a certain teacher, the teacher will receive an income to be distributed according to a Zipf distribution related to the relevance of the teacher..

If the STUT array of the teacher, by skills, is  $[s_{10}, s_{20}, s_{30}, \dots, s_{H0}]$ , then we have an array of positions of the teacher relative to the rest of the teachers of each specific skill  $[\omega p_{10}, \omega p_{20}, \omega p_{30}, \dots, \omega p_{H0}]$ , which will then determine the income.

Let's name  $K$  the number of students associated to the teacher that have been selected. For every one of them the teacher gets the a share  $p_k$  of the 20% of the income from exchange divided by the number of students searched.

$$\sum_{i=1}^E \sum_{h=1}^H p_h \frac{0.2 * T_{ih}}{n_i}$$

The proportion depends on the position of the teacher in the STUT array  $\omega p_{h0}$ , determined by a Zipf distribution as detailed in earlier sections.

$$p_h = \frac{1}{\omega p_{h0} * [LnT_h + 0.5772 + 1/2T_h]}$$

Where  $T_h$  is the number of teachers with courses associated to the skill  $h$ . Adding all  $K$  students we have incomes for every  $E_k$  third-party entities and  $H_k$  skill.

$$\sum_{k=1}^K \sum_{i=1}^{E_k} \sum_{h=1}^{H_k} p_h \frac{0.2 * T_{ih}}{n_i}$$

Which finally gives us:

$$III(TUT) = \sum_{k=1}^K \sum_{i=1}^{E_k} \sum_{h=1}^{H_k} \frac{0.2 * T_{ih}}{\omega p_{h0} * [LnT_h + 0.5772 + 1/2T_h] * n_i}$$

### II.3.4. Activity as a Teacher in the Courses

Just like the students, the teacher gets TUT and STUT tokens for additional educational contributions in the courses.

If the course is a paid course, the teacher gets a share  $\alpha_i$  of the price  $p_i$  in STUT tokens, up to 50% of which can be traded to TUT tokens. For  $NP$  paid courses evaluated during a certain period we get:

$$IV(STUT)_1 = \sum_{i=1}^{NP} p_i \alpha_i \cdot (1 - \beta_i); \alpha_i \in [0, 1], \beta_i \in [0, 0.5]$$

$$IV(TUT)_1 = \sum_{i=1}^{NP} p_i \alpha_i \beta_i; \alpha_i \in [0, 1], \beta_i \in [0, 0.5]$$

If the course is free, the number of STUT tokens is correlated to the course duration  $d_i$  via an increasing step function  $f(d_i)$ . As in the case of the paid courses, up to half of the STUT tokens earned can be traded to TUT.

If the number of free courses evaluated during the period is  $MP$  with a duration of  $d_j$ , after trading a part  $\beta_j'$  to TUT tokens, we have:

$$IV(STUT)_2 = \sum_{j=1}^{MP} f(d_j) \cdot (1 - \beta'_j); \beta'_j \in [0, 0.5]$$

$$IV(TUT)_2 = \sum_{j=1}^{MP} f(d_j) \cdot \beta'_j; \beta'_j \in [0, 0.5]$$

With a total number of TUT and STUT tokens of:

$$IV(STUT) = \sum_{i=1}^{NP} p_i \alpha_i \cdot (1 - \beta_i) + \sum_{j=1}^{MP} f(d_j) \cdot (1 - \beta'_j)$$

$$IV(TUT) = \sum_{i=1}^{NP} p_i \alpha_i \beta_i + \sum_{j=1}^{MP} f(d_j) \cdot \beta'_j$$

$$\alpha_i \in [0, 1], \beta_i \in [0, 0.5], \beta'_j \in [0, 0.5]$$

### II.3.5. Conclusions

Combining all possible sources of teacher income, the total benefit is:

Liquid (TUT):

$$G(TUT) = I(TUT) + II(TUT) + III(TUT) + IV(TUT)$$

$$G(TUT) = \sum_{i=1}^N p_i \sigma_i + \sum_{i=1}^M u_i \frac{U_i}{W \rho_i} t_i \sigma_i + \sum_{k=1}^K \sum_{i=1}^{E_k} \sum_{h=1}^{H_k} \frac{0.2 * T_{ih}}{\omega p_{h0} * [Ln T_h + 0.5772 + 1/2 T_h] * n_i} +$$

$$+ \sum_{i=1}^{NP} p_i \alpha_i \cdot (1 - \beta_i) + \sum_{j=1}^{MP} f(d_j) \cdot (1 - \beta'_j)$$

Relevance (STUT):

$$G(STUT) = I(STUT) + II(STUT) + III(STUT) + IV(STUT) = 0 + IV(STUT)$$

$$G(STUT) = \sum_{i=1}^{NP} p_i \alpha_i \beta_i + \sum_{j=1}^{MP} f(d_j) \cdot \beta'_j$$

Where:

- $N$  is the number of paid courses sold, each at a price of  $p_i$ , with a profit percentage  $\sigma_i \in [0.7, 0.85]$  depending on the type of sale.
- $M$  is the number of paid courses  $u_i$  that students follow through a subscription service with a type  $\rho_i \in \{1, 3, 12\}$ , having paid a total amount of  $U_i$  for the service. There are  $W$  evaluations per month, and the time a student has dedicated to the course is  $t_i$ .
- $H$  is the set of skills of each teacher, with  $T_h$  the number of teachers with the skill  $h$ .

- $\omega p_0$  is the position of the teacher in an ordered array of relevance, given by the number of STUT tokens, and  $\omega p_{0h}$  is the position of the teacher in the ordered array associated with the skill  $h$ .
- $E$  is the number of third-party entities in search of potential candidates for a job offer, each one contributing  $T_{ih}$  to get access to  $n_i$  candidates in a skill  $h$ .
- $K$  is the number of students selected by these entities  $E_k$  in the skills  $H_k$  and associated to the teacher.
- $NP$  is the number of paid courses belonging to the teacher that have been evaluated during the period at a price  $p_i$ , where the extra educational effort by the teacher has been quantified as  $\alpha_i \in [0, 1]$
- $MP$  is the number of free courses belonging to the teacher that have been evaluated during the period, with an income depending on the duration of the courses following a function  $f(d_i)$
- $\beta_i, \beta'_j \in [0, 0.5]$  are the percentages of STUT tokens traded to TUT tokens in both paid and free courses.

The two first terms of the sum represent the traditional gain for the teacher in a traditional educational platform, with the third and fourth terms only being found in Tutellus.

The fourth term determines the relevance of the teacher in the skills taught, giving a small liquid benefit to the teacher and also being essential in the determination of the third term.

It is in the third term that the teacher is rewarded for both their own significant contributions as well as those of their associated students. This occurs in two ways. First, the relevance of the teacher in a given skill determines the share they receive of the incomes coming from the third-party entities. Second, since the quality of the courses determines in part the selection of the students, the teacher earns an additional income every time one of their students is selected.

By doing this we encourage the commitment of the teacher both within the community as a whole and within their own courses, thus forming a direct relationship between the educational efforts of the teacher and the income they receive.

## II.4. Balance inside the STUT Pool

STUT tokens quantify the relevance of a user, both students and teachers, by measuring the educational value given to the platform. Users draw STUT tokens from a pool maintained by Tutellus.

At the beginning, the pool will be ten times the size of the TUT pool. 10% of this amount will be distributed between the users according to their activity within the platform to date, which gives them an initial value for their relevance measured by their level of STUT.

From that point forward, the activities of both students and teachers earn STUT that come from this pool. From time to time, the state of the pool will be evaluated, with the long-term goal being to keep about 30% of all existing STUT tokens inside the pool.

### II.4.1. Variation Due to User Activity

Let  $P_0$  denote the proportion of STUT tokens in the pool at the beginning of a period, with a total number of  $S$  STUT tokens in the system as a whole. Throughout this period, a number of users  $N$  gets  $n_i$  of STUT tokens each, trading an up to 50%  $\beta_i$  to TUT tokens. The amount of STUT lost is:

$$\sum_{n=1}^N n_i(1 - \beta_i); \beta_i \in [0, 0.5]$$

The pool then moves to a new proportion

$$P_1 = \frac{P_0 S - \sum_{n=1}^N n_i(1 - \beta_i)}{S} = P_0 - \frac{\sum_{n=1}^N n_i(1 - \beta_i)}{S}$$

Let's call  $\Delta P$  to the increase in this percentage.

$$\Delta P = - \frac{\sum_{n=1}^N n_i(1 - \beta_i)}{S}$$

$$P_1 = P_0 + \Delta P$$

The total number of STUT tokens in the pool is  $P_1 S$ , and the increase of STUT tokens in the pool is  $\Delta P S$ .

#### II.4.2. Restoring the STUT Pool

If  $P_1$  gets below 70%, the pool is adjusted through two mechanisms. First, tokens are taken back from students who have been inactive for a long time, and then, new STUT tokens are created. The restoration of the pool is complete if the value of the  $P_1$  percentage has gone below 30%, and between 30% and 70% a part  $\lambda$  of the percentage is restored, with  $\lambda$  given by a generalized logistic function inverted in the OY axis and with an inflection point of 0.5.

$$\lambda = \frac{1}{1 + e^{K(-P_1 + 0.5)}}$$

The growth rate of the function,  $K$ , will be regularly updated after the real behavior of the platform is tested, with an initial value of 20.

By using this function the system will make conservative decisions close to 70% and more extreme decisions close to 30%, with a 50% of STUT tokens recovered if the new  $P_1$  percentage is 50%. For this value for  $K$ , the system recovers 2% of STUT tokens at 70% and 98% of STUT tokens at 30%. If  $P_1 < 30\%$ , then  $\lambda$  is considered to be 1. If  $P_1 > 70\%$ , then  $\lambda$  is considered to be 0.

The tokens added to the pool may come from two sources, either from inside the system, having been taken from inactive users, or having been created from scratch. If we call  $\gamma$  the proportion of STUT tokens coming from within the system, the STUT tokens added can be written as:

$$\lambda \Delta P S = \gamma \lambda \Delta P S + (1 - \gamma) \lambda \Delta P S = R + \Delta S$$

Where  $R$  are the STUT tokens taken from the users and  $\Delta S$  is the amount of new STUT tokens created and added to the system.

### II.4.3. STUT Tokens Taken from the Users

The value for  $\gamma$  is determined by the number of STUT tokens taken back from inactive users. A user is considered an inactive user if a given amount of time has passed without any interaction with the system. This threshold will be determined by a study of the churn rate of the platform and will represent the amount of time needed to assure, with 95% confidence, that a user is not going to return. Currently, this value is estimated to be 15 weeks, or 105 days, with further analysis of the churn rate potentially updating this value.

From the inactive users we take a proportion  $p_i$  of STUT tokens, depending on the amount of linear time that the users have been inactive  $t_i$ , starting with 5% when the value of  $t$  is reached and never going over 20% of a user's STUT in a single period, a value reached at five times the value of  $t$ . A user with  $s_i$  STUT who has been inactive for a time  $t_i > t$  suffers the following loss of STUT

$$\min[0.2, 0.0125(3^{\frac{t_i}{t}} + 1)] * s_i$$

For  $M$  inactive users, the amount of STUT taken is

$$\sum_{i=1}^M \min[0.2, 0.0125(3^{\frac{t_i}{t}} + 1)] * s_i$$

Which is the value of  $R$  in the equation that gives us the number of STUT given to the pool.

$$R = \gamma \lambda \Delta P S = \sum_{i=1}^M \min[0.2, 0.0125(3^{\frac{t_i}{t}} + 1)] * s_i$$

With a final value for  $\gamma$  expressed as

$$\gamma = \frac{\sum_{i=1}^M \min[0.2, 0.0125(3^{\frac{t_i}{t}} + 1)] * s_i}{\lambda \Delta P S}$$

Which is used to determine the number of new STUT tokens to be created.

### II.4.4. Creation of New STUT Tokens

The amount of new STUT tokens created comes from the equation that gives us the amount of STUT tokens added to the pool as

$$\Delta S = (1 - \gamma) \lambda \Delta P S$$

Where  $\gamma$  is calculated as seen in the previous section:

$$\Delta S = (1 - \frac{\sum_{i=1}^M \min[0.2, 0.0125(3^{\frac{t_i}{t}} + 1)] * s_i}{\lambda \Delta P S}) * \lambda \Delta P S$$

$$\Delta S = \lambda \Delta P S - \sum_{i=1}^M \min[0.2, 0.0125(3^{\frac{t_i}{t}} + 1)] * s_i$$

Where:

- $\lambda$  is the percentage of the loss of STUT tokens in the pool to be recovered: 0 if the loss has left over 70% of the STUT tokens in the pool, 1 if the pool falls below 30%, and a number in between in any other case.
- $\Delta P$  is the increase of the percentage of STUT tokens in the pool during the period.
- $S$  is the total number of STUT tokens in the system.
- $M$  is the number of inactive users, with a user being considered inactive if a certain amount of time has passed without interacting with the system,  $t_i$ , bigger than a given  $t$ , whose value is determined through the churn rate of the platform. Each of these users has an amount  $s_i$  of STUT tokens.

These new STUT created allow us to update the total number of STUT tokens in the system

$$S_1 = S_0 + \Delta S$$

Which will be used to determine the percentages for the next period.

By using economic metrics to issue new tokens, we can make objective decisions, thus conditioning the creation of new tokens and the following inflation to the health of the platform itself.

An increase in the activity and value of the platform and a high retention of the most valuable students and teachers in the system will give us a low value for  $\gamma$ , with many valuable contributions to the community. This will create a high level of inflation in the system, with the relevance earned by the users keeping its absolute value but being worth less when considering the total number of users. As a result, the level of excellence needed to be relevant in the system will be higher, with more effort and value needed due to the inflation in the token quantifying it.

On the other hand, a decrease in activity and a high level of abandonment among the users will give us high levels for  $\gamma$ , lowering the amount of new tokens issued and rewarding those users loyal to us by stabilizing their positions in the STUT array.

## II.5. Initial Distribution of STUT Tokens

The initial issue of STUT tokens is ten times the number of TUT tokens issued. 10% of these STUT tokens will be distributed among the students and teachers within Tutellus, currently numbering nearly a million users.

This distribution will be done according to the educational value contributed by the user to date, as measured by the activity in the system. Each user in Tutellus has a value of activity, measured by a system implemented over two years ago, to measure the educational effort. To date, this metric has been to identify the most valuable users of the platform, and with the monetization of the platform it is now possible to reward these value-bringing users.

This activity metric lacks the level of detail of the STUT token. Each user has associated in our database a set  $k$  of skills, either by expressing interest in the topic, or by getting products, free or paid, associated with the skill. User relevance in the system is currently measured by the activity metric, which is not segmented by skills, but rather is a constant along the array of skills

$$[a_1, a_2, a_3 \dots a_K]$$

In comparison with other students, we get a position in the array of activities associated with the skills, for every student and every skill.

$$[\omega_1, \omega_2, \omega_3 \dots \omega_K]$$

Let  $B$  be the initial number of STUT tokens to be distributed to current users. For every skill  $h$  in the platform, we count the users that have either tagged the skill as an interest, or have shown interest in the skill by finishing a course associated with it. Thus we get an array of number of students by skill

$$[n_1, n_2, n_3 \dots n_H]$$

Where the sum of these values is greater than or equal to the total number of users, since each user can have multiple skills. The share of STUT tokens among these skills follows a proportional distribution, so the amount given to the skill  $h$ ,  $b_h$ , is

$$b_h = \frac{Bn_h}{\sum_{i=1}^H n_i}$$

This amount is distributed among the  $n_i$  users associated with the skill, again following Zipf's law, thus rewarding in a significant way the biggest contributions while making sure every contribution has, in some way, been rewarded. For this process we use the position of the user  $\omega_k$  inside the relevance array, with the total amount of STUT tokens per user and skill being expressed as

$$G(STUT)_k = \frac{Bn_k}{\sum_{i=1}^H n_i * \omega_k * [LnA_k + 0.5772 + 1/2A_k]}$$

Where  $A_k$  is the number of students with activity greater than zero in the skill. The total amount given to the user in the initial share of STUT tokens is then

$$G(STUT) = \sum_{k=1}^K G(STUT)_k = \sum_{k=1}^K \frac{Bn_k}{\sum_{i=1}^H n_i * \omega_k * [LnA_k + 0.5772 + 1/2A_k]}$$

With an initial array of STUT for the  $K$  skills

$$[G(STUT)_1, G(STUT)_2, G(STUT)_3, \dots, G(STUT)_K]$$

Which provides us with the values used to quantify a user's initial relevance in the system.



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