LearnT - Specification for a decentralized learning economy

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Abstract

Traditionally, we've used certificates issued by centralised authorities as proof of possessing a skill. This makes the certificates vulnerable to hampering, and makes it very hard to audit the issuance in the first place. We're introducing NFT-L. A non fungible token for learning. These are non transferable tokens of certification of a skill that are decentralised and auditable.

The economic incentives in learning are broken. This paper also explores a whole new economic structure for incentivizing all the stakeholders in the learning process - the teacher, learner *and* those who benefit from people learning a skill. These are implemented and currently live on QuestBook - a learning app on iOS and Android for professionals.

All these NFT-Ls (equivalent of certificates of skill) live outside the app itself in the form of an `EIP 1238` token on the Etherium main-chain. Economic constructs introduced in this paper include Learn Coins, Creator Coins and issuance algorithms for the same. These are implemented using a Proof of Authority system on the Questbook app. However they can be withdrawn to the mainchain since they are extensions of ERC-20 tokens - thereby making them completely decentralized.

1 Introduction

- Today the most popular ways of reporting that an individual posses a skill is either through a certificate issued by a certification programme or, worse, by self reporting them on social media.
- The only way as of today to incentivize the teacher is to extract a fees from the learner. This does not give any incentive for the teacher to improve learning outcomes by reducing the number of students - rather forces them to increase the class size, earn more money, and deliver *lesser* learning outcomes.
- The current economic models completely leave out a crucial stakeholder in the learning process. The companies, organizations and individuals

who benefit from a learner picking up a skill. For example, recruiters. These are people usually with high paying capacity, most vested in skilled individuals - but yet not part of the economy.

Here we highlight some of the problems in the traditional mode of skill development and assessment.

1.1 Problems in - Incentives for teachers

Most teachers are teaching on platforms like Teachable, Kajabi and Udemy - in the hope that people will pay them for what they are teaching. This means that the teacher cares only about the number of people coming into the course. The quality of course delivery and making an impact on the learners lives seems to be a distant secondary metric. Teaching is no longer about learning outcomes. It's turned into a popularity contest of attracting largest number of enrolments.

Online education market places are centralised and reward teachers for enrolments. We think this is fundamentally flawed and incentive structures are designed for a poor learning experience. Using crypto we can create a far better incentive structures that are directly tied to learning outcomes. We propose teachers issuing tokens. This creates a far higher liquidity. With NFT-L, teachers will earn more without charging students. Through small classes and ensuring learning outcomes.

1.2 Problems in - Incentives for learners

In the proposed solution, the incentives are so structured that **it is free to learn - but expensive to not learn**. Because we provide a learning mode that involves close collaboration with an expert in the field, being respectful of their time is critical. We want to consciously weed out people who are here only for information porn and not real learning. With Questbook, learning is always free. Learners learn along with a small cohort of motivated peers interested in the same thing, with the guidance of an expert teacher.

1.3 Problems in - Certification Verifiability

1.3.1 Contacting the issuing authority

The only way to check if a certificate has not been tampered with or created fraudulently, one must contact the claimed issuing authority to verify if they actually issued the certificate. This process is usually non-automatable and cumbersome that most people end up giving the benefit of doubt to the applicant. We will be proposing an on-chain certificate that will be verifiable and auditable in real-time.

1.3.2 No history

Most certification programs happen behind closed doors. If an individual produces a certificate it is impossible to know how the certificate was earned. There

are probably no records, or even if they are - they aren't publicly viewable. Now that most of the learning is now happening online over chat platforms like Slack, Discord, Telegram and Zoom, it is possible to have a record of the *trail of learning*. In the solution we will be proposing, every skill certificate will be auditable using publicly available information.

2 Solution and Specifications

Questbook is a *specification by implementation* of the proposed learning standards.

2.1 New format of learning - Quests

We've traditionally been used to only a big-bang learning approach either in the form of years long or months long courses. On Questbook, every course is to be broken down into small bite-sized courses called Quests that are both atomic and independent. A Quest consists of

- **A Questmaster** who will run the Quest
- **A Questroom** where the participants can chat with each other and the Questmaster. At any point in time a Quest room can only have a fixed number of participants - thereby, limiting the number of people who can participate in the Quest at any point of time.
- **Quest material** is what the participants must read/watch before participating in the Quest room. These could be videos, blogs or podacasts that are required reading to complete a task in the Quest.
- **Quest task** is what the participants must apply the learnings on. This is what the Questmaster will evaluate the participant on. E.g. *Write a for loops in Python to draw a triangle*
- **A proof of learning** at the end of the Quest. A Questmaster approves a participant when they have mastered the material shared in the Quest. Once approved a non-fungible non-transferable token (certificate) is credited to the participant's wallet

2.2 New Certification - NFT-L

We propose NFT-Ls as an **open global standard** in issuing certificates against attaining a skill. These NFT-Ls consist of the following information.

2.2.1 Public Key

Every NFT-L (non-fungible token of learning), will be issued on the main Ethereum chain and queryable by the publickey to get further details about the issuance.

2.2.2 Issued By

This is the public key of the Questmaster who ran the Quest. Who ran the Quest is a very important signal in who issued the Quest. We will see later that the incentives of the Questmaster are tightly tied to the quality of learning accrued by participants in the Quest.

2.2.3 Issued To

The public key to whom the NFT-L has been issued. This is, unlike regular NFTs, **non-transferable**.

2.2.4 Quest information

The Quest that this NFT-L was issued as a part of. Each Questmaster could potentially have multiple Quests running.

2.2.5 Time to complete

How long it took for the participant to complete the Quest. Though not foolproof, someone learning something faster than the others assuming they all started at a level ground is a valid signal in the quality of learning of an individual.

2.2.6 Metadata

- Date of issuance
- NFT-L Merkel root
- Signature of issuing platform (e.g. Questbook)

2.3 New Creator Economy Standard - Creator Coins

On the Questbook app, a Questmaster is a Creator. Every creator has their own unique set of Creator Coins. This will be based on an ERC-20 Token standard, minted by a Proof of Authority source.

2.3.1 Genesis

Every teacher gets, upon sign up, 10 Creator Coins with their name on it. e.g. Alice Creator Coin, Bob Creator Coin.

2.3.2 Price

There is a price to pay in Learn Coins to mint new Creator Coins. The cost of minting a Creator Coin keeps going up exponentially. Number of Creator Coins

of Alice you get η_{alice} by paying 1 Learn Coin is dependent on how many Alice Creator Coins have been minted (N_{alice})

$$\eta_{alice} = 10^{-(0.03*N_{alice})}$$

The price paid goes directly to the Creator i.e. Alice.

2.3.3 Scarcity

There is no theoretical limit on the number of Creator Coins of a particular Creator. However with growing number of Creator Coins in circulation, the prices will get prohibitively high.

2.3.4 Specifications

Extension of an ERC-20 token specification.

- Creator Public Key
- Owner Public Key
- Issuing Authority
- Value (number of coins)

3 Teaching Process

3.1 Gating the quality of Quest creators

Only high quality Quest creators will be allowed on to the platform to create Quests. To create Quests, the teacher must list their profile along with what they will teach in Quests on a public voting platform. Companies and individuals who want to see that Quest becoming a reality will vote on the Quests by paying up Learn Coins. The top n voted quest creators will get to start quests every 24 hours. n will double every month

$$n = 2^{t_{month}}$$

This ensures only good quality and respected creators are actually dropping Quests. Also means that there is sufficient demand for the skill being imparted by this Quest. All the Learn Coins collected in the voting process is credited to the Questmaster.

3.2 Cohort size

Questbook recommends Questmasters start their first Quest with a small group of four participants. Gradually increasing the cohort size with experience. This is because it is hard enough to teach a group of learners, but even more so on a new platform.

3.3 Gating participants

All the users who have shown interest in parcipating in the Quest are listed for the Questmaster to approve entry to the Quest. They are prioritized based on the following two signals.

3.3.1 Staking an NFT-L

The Questmaster can optionally define a pre-requisite NFT-L for every Quest. That means, people who have completed the other Quest will get an advantage - by getting an automated entry to the Quest. This is also a way to tell the participants as to what knowledge is required to participate in this Quest to get the maximum benefits.

3.3.2 Staking Learn Coins

If there aren't enough applicants who already own a pre-requisite NFT-L, the other participants are sorted by how many Learn Coins they are willing to stake to complete the Quest. We will see later that more the participant stakes, more they are invested in learning what is being shared in the Quest.

3.4 Time limit

The Questmaster also sets their availability by setting a tentative duration to the Quest. The participants must complete the Quest before the specified time. Once the Quest is ended by the Questmaster, the participants can no longer get an NFT-L in this version of the Quest. Again, this is to be respectful of the experts running these Quests.

3.5 Quest Edition

The Questmaster can choose to run multiple editions one after another of the same Quest. Each edition opens up the voting mechanism again, where institutes and individuals pay the Questmaster for the new edition. This is how the Questmaster primarily earns on this platform.

4 Learning Process

4.1 Choosing a Quest

There are various signals that will be made public to the users who are browsing through all the available Quests. We leave it to the open market dynamics to pick the winning Quests. The following are public information for the user to make an informed choice

- **Questmaster Reputation** : Reputation of the Questmaster is a function of how many participants participated in all their Quests aggregated

and the number of NFT-Ls they've issued. Indicating the quality of the Questmaster.

- **Quest edition** : How many times has this Quest been run before. More it has been run, more it has been battle tested.
- **Votes** : Number of Learn Coins paid to Questmaster to run this Quest - thereby suggesting the market value of the skill taught in this Quest. Resets to zero at every edition of the Quest.
- **Avg. time to complete Quest** : Those who have been awarded an NFT-L in an earlier edition of this Quest, how long did it take them to get it. Indication of time commitment required from the learner.
- **Last issued NFT-L** : When was the last NFT-L issued in any earlier or current edition of this Quest. This shows how active the Quest is right now.
- **Pre-requisite NFT-L** : An NFT-L that is suggested pre-requisite to attend this Quest. Suggests what knowledge is required to make the most off of this Quest.

4.2 Learning Material

The learning material is public and anyone can view it without participating in the Quest. These are typically links, videos or PDFs. The user can see if they want to master the material by participating in the Quest. Learning Material is only a small part of the learning process. Lot of people are used to assimilating information but never applying it. Anyone is free to open these learning material. The ones who want to master can choose to participate in the Quest by requesting an entry to the Quest.

4.3 Requesting Entry

All the Quests are gated and number of participants limited. To participate, one must produce one of :

4.3.1 A pre-requisite NFT-L

If the learner owns the pre-requisite NFT-L they are given automatic entry to the Quest on a first come first serve basis. The NFT-L is automatically staked in the Quest.

4.3.2 Staking Learn Coins

If the learner doesn't have the pre-requisite NFT-L and wants to participate, they can stake some Learn Coins.

4.4 Completing a Quest

4.4.1 Public Chat

The Quest can be run in any format the Questmaster deems appropriate, by coordinating with the participants directly over a public chat. Questbook recommends the Questmasters conduct all the communications in the public. Questbook automatically archives all the chats in a public repository. This public repository can be accessed whenever someone wants to audit a particular NFT-L.

4.4.2 Request for NFT-L

The issuance of the NFT-L is initiated by the learner. The learner uploads a *Request for NFT-L* as a special attachment in the Questroom chat.

4.4.3 Approval or Rejection of the NFT-L

The Questmaster can then look at the *Request for NFT-L* and either accept it or reject it along with a voice/text that stays as an authentic commentary with the NFT-L forever, if approved. If rejected, the chat continues and the learner can attempt a request any number of times.

4.4.4 Recovering the Stake

If the NFT-L is issued, the participants gets back, along with the new NFT-L, the staked NFT-L or the staked Learn Coins.
If the participant is not able to get an NFT-L before the Quest ends, the staked NFT-L is burnt and the staked Learn Coins goes into a community pool.

5 Voting process

Voting for new Quests and re-runs of existing Quests is a core pillar of this economy. There are few reasons for the voting

- Shows market demand for the learning outcomes - individuals or institutions voting will be the ones who want to see the material taught and more people skilled in that particular field.
- This is also how the Questmaster is incentivized monetarily. We don't think want to charge the learners for learning.
- Bragging rights!

They can purchase Creator Coins from the creator or from a public exchange. If they buy it from the Creator by voting, they are also incentivizing the creator to actually run the Quest. If the price is prohibitively high because of the pricing function, they can buy a small token amount from the Creator to incentivize

them and buy more tokens from a public exchange to rank high in ownership of that Creator Coins.

6 Uses of NFT-L

It is uncertain as to where all NFT-Ls will be used, but it is clear that the application will be as wide, if not wider, as the expanse of certificates itself.

6.1 Job Opportunities

The institutions who had paid the Questmaster for a particular Quest, could have had the motive of building skills that they want to hire. Producing such an NFT-L to such institutes will be a great optimization in their hiring process.

6.2 Grants and Scholarships

Questbook will be working closely with institutions and organizations to give out grants like Gitcoin Grants or Scholarships from governments or other NGOs.

7 Uses of Creator Coins

To get the benefits of holding a Creator Coin, the user must own atleast 1.0 Creator Coins or more.

- Full history of chat when the Quest is on-going, for all Quests of that Questmaster. Others will be able to see only the latest messages till the Quest ends. All the chats are archived and made public only after the end of the Quest.
- Priority intimation of NFT-L issuance. The NFT-L issuance is made public information only 168 hours after the actual issuance. The issuance notification is sent to the Questmaster coin holders in order of priority defined by the number of Coins of that Questmaster held by the user.
- Trade it for on a public exchange

8 Initial incentivization Model

To bootstrap the initial liquidity on the platfrom we will be incentivizing the early customers with Learn Coins - based on a definitive logic. First 3M Learn Coins will be distributed as a part of the Initial incentivization plan.

8.1 Questmasters initial Incentive Plan

Total pool = 2M Learn Coins. The factors that define the number of Learn Coins a Questmaster L gets on dropping the first Quest :

- Sum of **Number of Learn Coins in votes** across all Quests by that Questmaster, v
- **Authority score** on other social media, s
- **Editors' score** based on who will be most useful to the platform as decided by a jury, e

$$L = \sum v + (S * s) + e$$

$S = 0.002$

8.2 Learners Initial Incentive Plan

Total Pool = 1M Learn Coins. The factors that define number of coins a learner gets upon completion of their first Quest L

- **Authority score** on other social media, s
- **Time to acceptance** into the first applied Quest, t_{accept} (number of hours)
- **Time to complete Quest**, $t_{complete}$ (number of hours)
- **Editor's score** based on who will be most useful to the platform as decided by a jury, e

$$L = \frac{S * s}{10 * (5 * t_{accept} + t_{complete})} + e$$

8.3 Ongoing incentivization

Every month 100,000 Learn Coins will be distributed to the top 5% of the Questmasters using the following weighting w

8.3.1 Questmaster

- Number of NFT-Ls issued ever by this Questmaster, N
- Number of Learn Coins paid as vote in the last completed Quest v
- Number of NFT-Ls issued by this Questmaster staked and recovered ever R
- Number of Learn Coins staked in last ended Quest σ
- Number of months since the ending of the last Quest t

Equation for distributing Learn Coins to Questmasters :

$$w = v * e * \frac{R}{N} * \frac{t^{0.9}}{e^t}$$

8.3.2 Learner

Every month 100,000 Learn Coins will be distributed to the top 20% of the Learners using the following weighting w

- NFT-Ls earned in Quest q
- Total Learn Coins used to vote on the Quest σ_q
- Total NFT-Ls issued so far in the Quest N_q

$$w = \sum_q \frac{\sigma_q}{N_q}$$

9 Governance

9.1 Issuance of NFT-Ls

The NFT-L is an open standard that can be issued by any individual. However, the NFT-L also holds an optional Meta-data that signifies which platform this NFT-L was issued on. Any platform can implement the Questbook specification or improve upon it and implement their own specification. That signature when added to the meta-data assigns some credibility as to how the NFT-L was issued.

There is no requirement for an NFT-L to be issued on the Questbook app alone. Infact, we would encourage more platforms to adopt and improve a standard for learning certification that is decentralized and verifiable.

9.2 Learn Coins

Learn Coins will be minted in a Proof-of-Authority model on the Questbook App. Every month 200,000 Learn Coins will be minted. The damping function will be decided on a later date.

10 Conclusion

TODO

11 Future Work

TODO

12 Example

Here we will illustrate end to end how the ecosystem will use the specifications and implementation.

Acme Corp is a company that builds and sells subscription to a CRM software.

Alice used to work at Acme Corp but recently started her own consulting firm to setup CRMs for companies. She runs a popular Youtube channel too about CRMs.

Bob is a final year MBA student who wants to learn tools that are used in the industry.

Charlie is a customer success executive who lost a job due to the pandemic and is looking to upskill himself to earn a new job.

Danny is a freelancer who works with CRMs once in a while

Acme Corp wants Alice to run Quests that it can hire as customer success executives at Acme Corp. Acme Corp usually pays 10k USD to a hiring agency for every customer success hire they make. But they decide to put in 5,000 USD into finding a hire through Questbook. They buy 5,000 USD worth of learn coins and vote for Alice's Quest on *Pro-User of Acme CRM*

Alice typically makes 10k USD per month in her consulting firm. So, for her 5K is a welcome top up. She agrees to do the Quest for Acme Corp. She decides to do a series of 5 Quests. They are : *Introduction to CRMs, Installing Acme CRM, Importing all customers to Acme CRM, Tips and tricks for Acme CRM, Pro User of Acme CRM.* The last one is what Acme Corp paid for, but Alice realized that to do a good job, she needs to take learners through all the hoops. She launches these Quests, where the pre-requisite for each quest is the Quest before it in the list above. There is no pre-requisite for the first Quest.

Bob joins the first Quest and Alice happily shares what she knows about CRMs by sharing a few of her own Youtube videos. Bob is able to quickly grasp the basics and Alice awards him the NFT-L.

When the second Quest starts, Bob having the NFT-L of the previous Quest gets automatic entry to the Quest. However Charlie also wants to join this Quest. He didn't want to join the Introduction Quest because he is already experienced in CRMs, just not Acme CRM. So, he stakes 100USD worth of Learn Coins and tells Alice why he didn't join the first Quest. Alice sees his point and allows him into the second Quest. Both of them complete the Quest, Bob gets his previous NFT-L back and Charlie his 100USD worth of Learn Coins.

Both Bob and Charlie move on to Quest three - *Importing customers.* This time Danny shows up staking only 10 USD worth of Learn Coins. Alice is skeptical, but still lets him in. Bob and Charlie complete the tasks that need to be done, but Danny slacks off. Alice ends the Quest, gives Bob and Charlie the NFT-L and Danny's 10 USD worth of learn coins are sent to the community pool. He doesn't get it back.

Again Bob and Charlie glide into the most interesting Quest *Tips and Tricks.* This time Danny shows up again, staking 5 USD this time. Now, Alice knows

Danny is just shopping around not serious about learning. Because if he were, he wouldn't have slacked in the previous Quest and would have put in a sizable stake to show seriousness. So only Bob and Charlie participate in the Quest and complete it to Alice's statisfaction.

Both Bob and Charlie have now become good friends with each other and with Alice. They casually move into the most important Quest - Pro user. This time Danny doesn't even show up. Everyone's happy. Bob and Charlie dig deep into all the wisdom Alice has to share and really become Pro users of Acme CRM. Alice, ofcourse grants both of them the NFT-Ls.

Acme Corp sees that 2 people have completed the Quests, quickly check how the conversations went in each of the NFT-Ls. They're happy to see how well Alice conducted the sessions. They interview both Bob and Charlie directly with the CEOs not needing the initial rounds. Both of them get hired.

Acme Corp sees this is way more efficient than paying a hiring agency. They set out a budget of 50K USD to hire the next 10 customer success executives. They vote for Alice and 2 more Youtubers like her. It's a major success.

Everyone lives happily ever after. Except Danny, he's now jobless.