Editorial Platform in Blockchain for Application in Higher Education

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Abstract: In the current publishing industry, all stakeholders are faced with problems ranging from copyright management, to piracy, to the lack of transparency of the actual number of sales and the unfair division of profit between the publisher and the author. In this paper, we propose an editorial platform for application in higher education based on Blockchain technology in order to eliminate the problems that publishers, writers, translators and readers currently deal with. The proposed platform aims to eliminate the prices and rules that publishers impose on authors, redefining their responsibilities so that they are only in charge of the printing and distribution of content. This proposal also allows to the royalties received by the author to increase by 50-90% of the value of the sale, a substantial increase compared to the 10-25% they receive in the current panorama. In this way, new writers and other lesser-known writers who produce content related to the field of education will have a greater opportunity to publish their content and be fairly rewarded.

1 INTRODUCTION

Transposing knowledge to books, articles, magazines, newspapers or publications is the only way to perpetuate it. Currently, for authors not to take charge of the process involved, from writing to delivery of the content to the reader, there is an editorial system that facilitates it. However, there are problems in the publishing industry that harm publishers, readers and most importantly, authors. Publishers face problems ranging from copyright management and piracy to the management of contractual components. As they also focus on profit, they force bookstores to sell content that has big sales figures and is authored by renowned writers. Thus, from the perspective of the reader, when purchasing his choice is influenced on these criteria and not on what really matters, which is the quality of the content. The author is not only subject to the rules, prices and changes of the content imposed by the publisher but also receives a small share of the profits without a transparent way of confirming the actual sales numbers. This is not only the case in the academic publishing community, but also in independent publications, newspapers, magazines, among others.

In this paper, a critical analysis is made to the publishing sector. The main contribution of this paper is a proposal of an editorial platform in Blockchain applied to higher education.

The rest of this paper is structured as follows. Section 2 defines concepts such as Blockchain technology and its applications to higher education, and in section 3 the state of the art is analyzed. Section 4 describes an already existing platform aimed at the general public in order to make the proposed platform easier to understand. In section 5, SCAMPER analysis is defined and in section 6 the advantages of implementing a Blockchain platform for Higher Education are discussed. Finally, in section 7, the conclusions and future work are presented.

2 KEY CONCEPTS

To understand the proposed model, it is necessary to define some concepts. Blockchain is one of the most innovative technologies in the world today, even more revolutionary than the invention of the Internet that began to take force in the 90s. It was implemented by Satoshi Nakamoto (Nakamoto, 2008), a pseudonym used by the person or the group

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to keep their identity anonymous. This technology is basically a chain of blocks that contains information. It was first adopted in the creation of the first and most well-known decentralized cryptocurrency - Bitcoin. It is organized as if it were a digitally synchronized book, allowing access to anyone belonging to its network. Once data is recorded, it becomes virtually impossible to change (By analogy, once a page of a book is written, it cannot be erased or torn; it remains intact and accessible to anyone who wants to read it). Thus, any application in Blockchain is immune to piracy. Given that Blockchain is a technology based on an interconnected network of computers, the most important aspect to consider is its security. Therefore, this technology has three main concepts: The hash that functions as a fingerprint that is unique to the block; Proof-of-work that is a security method that limits the addition of blocks by time; The social consensus in which all the members of a network have to evaluate each new block added, which is only integrated in the network if it is accepted by more than 51% of the members.

Each block contains its data, its hash, as well as the hash of the previous block as shown in Figure 1.
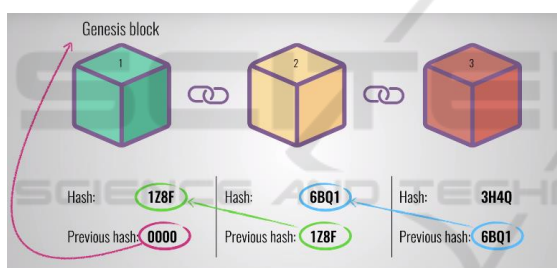

Figure 1: Blockchain network scheme (Savje, 2017).

- The data each block contains depends on the Blockchain type. In Bitcoin Blockchain, for example, it keeps the details of a transaction (who sends, who receives and the number of transferred Bitcoins);
- The hash is always unique, like a fingerprint, and identifies a block and all its components. It is calculated when its block is created and is changed whenever it is modified (If the hash is changed, the block is not the same.);
- The hash of the previous block is what makes Blockchain so secure. Each block points to its predecessor (unless it is the genesis block), and if a block belonging to the middle of the string is changed, it will make all of the following invalid (A change occurred and therefore the hash was recalculated.).

The hashes are not sufficient to prevent unlawful manipulation. Computers are now very fast and capable of computing hundreds of thousands of hashes per second, so another layer of proof-of-work security is needed. It is essentially a mechanism that limits the creation of new blocks (In Bitcoin's case, it takes ten minutes to calculate the proof-of-work needed to add a new block to the chain.) so that in case there is an attempt to tamper with a block in the middle of the string, it will take, in minutes, the number of following blocks multiplied by 10 to recalculate the proof-of-work for all of them.

Instead of using a central entity that directs the chain, Blockchain uses a peer-to-peer connection in which anyone can join the network. When someone enters the network, they receive a full copy of the Blockchain and every time a block is created a copy is sent to all those who belong to the network so that they can verify that it has not been tampered with. If there is no evidence to the contrary, each member then adds the new block to its chain. This method builds consensus on both valid and invalid blocks. Blocks that have been tampered with will be rejected by another member of the network. For a block to be successfully manipulated, it is necessary to manipulate all of the following, redo the proof-of-work for all of them and control more than 50% of the network.

Smart contracts are simple programs stored in the Blockchain that facilitate and apply certain obligations automatically without any external intervention. It is an unalterable agreement that has specific logic operations related to a real contract. Once signed, it cannot be changed.

As the term "Blockchain" comes up more often in publications, many publishers are beginning to wonder about this technology and the impact it can have on their business (Giri, 2018). As already mentioned, this decentralized and secure public platform allows for solving problems in the editorial field not only in the higher education community, but also among authors, editors and journalists.

The long-term practical impact of its use is that it enables researchers, publishers, writers and authors to work simultaneously on the same platform by providing their input and ensuring universal and secure access, making it possible to review all changes made and her/his authorship.

Another immediate application is in the management of digital rights. Locating content ownership and licensing discussion is a difficult and time-consuming task for the licensor. For the licensee, tracking the use of the content after it has

been granted is a challenge that implies a limited potential in terms of financial opportunities.

Through Blockchain-based rights management, content can automatically incorporate information about them, and smart contracts can be created that make sharing, licensing and use much easier. For publishers, this will increase profitability through the automation of rights information by freeing up human resources to do other tasks and by monitoring the contractual components, including the amounts due and the availability of rights.

3 STATE OF THE ART

In this section we will analyze some real cases of Blockchain's application in education (Bartolomé et al, November 2017) in a general way, indicating for each one the problem and the solution that this technology allows to implement and finally three concrete solutions already proposed are specified.

Education is one of the main focuses of any developed country. There have already been a number of very important, and some very deep, contributions to how Blockchain might revolutionize it, which will be addressed in the course of the article. This is due to the fact that the future of important areas such as science, medicine, agriculture, industry, among others, are directly dependent on the level of education in the country (Adão and Bernardino, 2003). Several applications (Ark, 2018) of Blockchain in this area will be presented (summarized in Table I):

Table 1: Applications of blockchain in education.

Use Cases	Problem	Solution
Diplomas and Certificates	These can be easily lost and even falsified	Creation, emission, visualization and verification of diplomas/ certificates
Badges	Skills are difficult to prove	Open "passport" in which users send requests that will be verified by others
Identification	Identity management in institutions	Identity use on the Internet
Security of Infrastructures	Networks are vulnerable to hacker attacks	Sharing security data between devices
Cloud Storage	Local databases are not secure	Cheaper and safer alternatives to data storage.
Renewable Energy Management	Intermediaries do not allow the sale of energy to other entities	Decentralized network of power generation systems allowing institutions to buy and sell it to neighbors

Smart Contracts	Excessive paperwork and bureaucracy	Validation of completion of tasks and attendance triggered by a check-in, paying the teacher and transferring micro-credits to the student
Records management	Most records are saved in physical format	Reduction of processes in physical format (paper) minimizing fraud
Libraries	Management of copyrights	Creation of protocols that aim at a more efficient management of digital rights
Publishing	Publishers receive the largest share of profit and lesser-known writers find it difficult to see their books published	Creating a level playing field and encouraging collaboration between authors, editors, translators and journalists
State Aid	The use of these social aids is not controlled	Payment of social benefits in separate funds for different expenditure

These use cases are described in more detail below:

- Higher Education diplomas, school certificates and other supplementary courses may be lost, just like the original itself. As soon as they are inserted into a Blockchain network, information about a student's classifications and the courses they have completed will never be lost nor will it be possible to change or falsify this information. However, anyone can access such data with the consent of the owner;
- Certain skills can be verified and communicated through a digital badge. A "passport" with multiple badges can be created for students to share with potential employers;
- With the dissemination of applications and services, identity management is a major problem in education. Hence, Blockchain-based platforms allow their users to access different decentralized applications (DAPPS) and decentralized networks always having the portability of their guaranteed identity;
- As institutions buy more surveillance cameras and sensors, they need to protect their networks from possible attacks;
- With the constant increase of data stored both by students and by the institutions themselves, a decentralized cloud storage service can offer a cheaper and safer alternative;

- Although in Portugal it is not something common, institutions that have renewable energy sources can use Blockchain to generate, buy and sell energy to their neighbors, avoiding the need for intermediary regulatory entities, thus monetizing the surplus of energy;
- Smart contracts can be used to sign contracts automatically as soon as certain predefined conditions are met;
- Another indisputable advantage of Blockchain is the dematerialization of documents, by replacing physical for digital support. It is also possible to eliminate the risk of loss and/or falsification of those documents;
- Libraries can also expand their services by building a metadata file and facilitating more efficient management of digital rights;
- In the publishing sector, this technology has the capacity to revolutionize multiple areas, from the management of copyright to piracy. Blockchain-based platforms offer better conditions that encourage collaboration between authors, editors, translators and journalists;
- With this technology, it is also possible to streamline the public social security system by dividing the aid into separate funds for different expenditure, allowing for greater transparency and ensuring that the aid is being used for the intended purposes, as these would be transferred directly to a given entity without being passed by the citizen. For example, a student of higher education who benefits from a scholarship does not receive the monthly tuition amount, which is automatically transferred to the educational institution.

Blockchain can be used for the issuance, monitoring, validation and sharing of diplomas (Kolvenbach et al., 2018). Although physical diplomas are easily stored, they can be presented to anyone for any purpose and are difficult to falsify if they have built-in security methods. For a third party, an extra effort is required to validate the diploma. This verification is obtained by contacting the entity that issued the said diploma; that is, they have to maintain a file with all the diplomas issued in the long term.

It can also serve to create a system of credits and evaluation as demonstrated in EduCTX (Turkanović et al., 2018). This platform is based on the European Credit Transfer and Accumulation System (ECTS) system. This is a credit system with the aim of facilitating their transfer between European countries. Taking into account that it is based on the competencies developed and the workload of a curricular unit, a student of higher education can transfer ECTS credits among Universities in order to continue her/his studies. EduCTX represents a credible and decentralized assessment and credit system that provides a unified view for students and higher education institutions, as well as for other potential stakeholders such as companies and organizations. Based on a distributed global network, the platform processes, manages and controls tokens that represent the credits students receive for completing curricular units, equivalent to ECTS. This proposal is the first step towards a more transparent and technologically advanced system applied to higher education.

Another similar platform, though based on Ethereum, is used to store student classifications and provide a cryptocurrency (Rooksby and Dimitrov, 2017). In this platform, the following problems were identified:

- The use of Blockchain in storing and managing grades is interesting because it supports auditing. However, the most important thing would be to make this functionality stand-alone rather than simply being used as an auditable database;
- Grades are not generated by an algorithm. The use of smart contracts stored in a Blockchain to calculate grades is problematic since there is no formal algorithm to calculate them. Some discretion on the part of the teacher is used in specific cases, and the limits of the grades are usually flexible (In the case of a student who obtains a final grade of 9.4 but who has good results in another component, the teacher may have the wisdom to pass the student, thus sparing a new evaluation phase, if any);
- Reputation and trust are linked. Universities use their status to build trust and a Blockchain can be counterproductive in the sense that trust is based on an external audit rather than on the reputation of the institution;
- Ownership and scope would be problematic considering that it is not known who the Blockchain system will belong to and whether it will even be controlled by a University, or by a group of Universities or even by a public network just like Ethereum. Where and what limits to set are quite uncertain.

Thus, in order to solve these problems, the proposed system would keep all the information regarding the students' academic progress, their grades and the equivalent final certification. It would have a specific cryptocurrency for each University that would be automatically paid by smart contracts to the best students of each course, promoting and rewarding the merit of the school. In this way, the best students from

each curricular unit would receive a reward that could be used inside the institution for the payment of tuition, lunch passwords or expenses in the bar.

4 AUTORSHIP PLATFORM

The Authorship platform allows authors to publish their content in it. Readers can buy books using Authorship Tokens (ATS), which is a cryptocurrency based on Ethereum (Ark, 2018), and authors receive 90% royalties in that same currency. They have the copyright for their content and are therefore free to publish and distribute it wherever they wish.

It is described as follows:

- The author simply has to register on the platform, upload the content and it is available automatically;
- A translator has a similar process. He/She registers, translates the book and uploads it. The translator's share will increase considering the number of books translated and its quality;
- Since writers, readers and translators are all on the same platform, publishers do not need to look for better opportunities;
- The reader has the possibility to buy the digital or physical version of the book. If the reader selects the digital version, when the payment is made, the respective translator and author are paid immediately (the author receives 90% of this amount). If the reader prefers the physical version, the publisher is responsible for printing and sending the book, and the purchase value is divided equally between the author and the publisher.

4.1 Problems That the Platform Intends to Solve

These are the current problems that the authors face and that Authorship aims to solve:

- The appearance of publishing technology and publishers have served as the intermediary role in publishing the book between authors and readers;
- The process from publication to launch can take from 18 to 24 months. This wait can be quite frustrating for the authors;
- The way the current publishing industry deals with unsold books creates a huge problem for authors. Unsold books mean less profit;
- Low profits for the author. Publishers keep a large part of the revenue generated by sales while the author receives only 6 to 10% of the net value;

- New authors are constantly contributing to the publishing industry; however, the competition has never been as intense as it is today and they do not always have the visibility they want;
- Throughout the process of publication and distribution, one of the fears that lingers in the author's mind is the "fear of selling" (if no one buys the book, it will not be profitable);
- Discovering the content of new writers has become a major concern since the emergence of local retailers;
- Although large bookstores have played a major role in the book distribution process, they typically sell only the best authors and bestsellers to ensure that sales come to fruition.

4.2 Authorship vs. Current Publishing Industry

On the Authorship platform authors are paid even though they do not charge for their content. Free books will be used as a reference in paid books and if they are purchased, the author of the free book will receive a share. All books are available in any language and profits will be divided between the original author and the translator of the intended language. This creates a great opportunity for hundreds of thousands of translators around the world who can decide which books they intend to translate without having to worry about copyright and other agreements.

Table 2: Authorship advantages over the current industry.

Authorship	Current industry
Authors receive 50% royalties from the sale of books in physical format and 90% from eBooks	Authors receive 10% royalties from the sale of books in physical format and 25% from eBooks
Thousands of publishers compete by offering the lowest print price ensuring a higher profit for authors	Authors are forced to use prices and rules imposed by the publisher. Many publishers force the author to pay upfront for the stock of books
Authors are paid immediately upon each sale	Authors are forced to wait several months for royalties and it is virtually impossible to accurately track sales

5 SCAMPER ANALYSIS

Creative thinking and problem-solving are crucial

parts of the process of transforming ideas into innovation. A method of creative analysis - SCAMPER (Elmansy, 2015) was used in order to facilitate the identification of improvement opportunities to be implemented in the proposed platform.

The SCAMPER method enables the creation of ideas for new products and services through questions based on different perspectives that help identify ways to innovate and improve current products, services, problems and ideas. It starts from the assumption that something new is actually the modification of something already existing and was created with the purpose of solving problems and stimulating creativity in brainstorming meetings. Its name is an acronym for seven techniques: Substitution, Combination, Adaptation, Modification, Put to another use, Elimination and Reorganization. The SCAMPER method does not require the sequential use of these and any suggestion is accepted regardless of whether it is logical or not. The process is described as follows:

- The (S)ubstitution technique focuses on the parts of the product, service or solution that can be replaced by others. It intends to propose alternatives to those with decision-making power so that they can reach an agreement;
- The (C)ombination tends to evaluate the possibility of adding several ideas, processes or products into a more efficient one;
- (A)daptation refers to a reflection discussion with the objective of improving or adjusting the current products or services. These adjustments can be small or adjustments that cause radical changes. This is one of the most efficient techniques for strengthening the current system;
- The (M)odification, (M)inimization or (M)aximization refers to the changes that can trigger innovation capacities;
- (P)ut to another use intends to find new purposes or new ways of using the product for problem-solving;
- As the name implies, the (E)limitation focuses on the identification of processes that can be eliminated;
- Finally, the (R)eorganization determines the potential when a change is made.

6 BLOCKCHAIN EDITORIAL PLATFORM

Applying the SCAMPER analysis to the publishing market, more specifically in the area of Education, the following innovations are proposed:

- (C)ombining a Blockchain-based platform like Authorship with this sector is the main focus of this article. A higher education institution would pay for the ability to assign digital rights to its students and teachers, thus gaining symbolical capital of innovation, creativity, trust, and honorability. From the perspective of students, they would be attracted by the concern of the adherent institutions with their future, by the easy access to better quality content and with a lower price since there would be no intermediaries. In addition, they would also have a platform available to publish their own contributions and may even be monetarily rewarded with their micro-coins for each comment/review, which would be used to purchase other content, for example. Teachers would also benefit from the fact that the book distribution process of their authorship would not be vulnerable to publishers' impositions on prices, rules and often content itself;
- The (A)daptation of an evaluation system by readers who have acquired it, as well as by a community specialized in an area (teachers). Both would be rewarded, and given that teachers' rating would have more weight, they would have an opportunity to create a new source of income;
- In current bookshops, physical or online, books with a greater number of sales, with hot themes or that were written by famous authors are always the ones getting recommended. This takes visibility away from lesser-known writers although they may deserve the same merit. Taking into account the suggestion of the previous point of an evaluation system, the books that would be recommended would be those with the best evaluations in a given area, thus prioritizing the quality of the content ((P)ut to another use);
- As was also discussed in the course of this article, the current role of publishers is an obstacle to smaller writers and those without financial means and to the freedom of authors regarding the sale price of their content and often to the content itself. Therefore, the new role of publishers would be simply to print and distribute books on a global scale, competing amongst each other to offer a lower price maximizing the profit ((M)odification). This suggestion may be taken as a disadvantage for publishers. However, we are faced with a paradigm shift. All intermediate entities will disappear or have fewer responsibilities. The sooner they accept this, the faster the industry moves forward;

▪ (R)eorganizing the way books are used in colleges would also be advantageous for all parties. Currently, teachers refer to works on the course sheet on which they were based for the creation of their content (as PowerPoints) or simply as a way to broaden their knowledge. However, this assumes that students will have the autonomy to do so. Using these works directly in teaching would lead the students to have direct contact with what is used for the transcription of the knowledge used since always. In this way, works selected by teachers and / or institutions would be used on a much larger scale, which is the goal of any writer: to bring their content to as many readers as possible instead of being on a waiting shelf for an indefinite time or in the middle of dozens of other books in a shelf.

7 CONCLUSIONS AND FUTURE WORK

In this paper, we propose an Editorial platform in Blockchain for application in higher education. This platform takes full advantage of Blockchain technology in order to create a completely redesigned, transparent and easily auditable editorial system with the aim of benefiting the publishers, authors, translators, readers and higher education institutions. In addition, suggestions were made to improve the publishing sector from a more general perspective, such as the adoption of a method of content evaluation so that this is the reader's choosing factor when purchasing.

As future work, we intend to analyze in a more profound and critical way the actual use of the Authorship platform and others that may arise in the meantime, identifying problems and disadvantages. From this study, we intend to implement a functional platform that solves the disadvantages encountered.

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