

# A case study on teaching decentralized autonomous organizations in a business school

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## Abstract

This paper presents a descriptive case study on teaching the topic of Decentralized Autonomous Organizations (DAOs) at a business school, highlighting the growing importance of blockchain technology and DAOs in the context of Web 3.0. The case study was conducted at the School of Business, University of Applied Sciences and Arts Northwestern Switzerland (FHNW), introducing students to the concept of DAOs. A core element of the teaching was the organization of the course via a newly created DAO and voting. The findings suggest positive feedback from educators and students, affirming the effectiveness of this pedagogical approach. However, the paper also discusses challenges related to student engagement within the DAO governance model, including academic regulations.

## Keywords

Decentralized Autonomous Organization (DAO), Education, Case Study

## 1. Introduction

Our world is increasingly changing at breakneck speed. Technological change is increasingly shaping our economy and society. One of the latest technological disruptions is blockchain technology. Cryptocurrencies, led by Bitcoin, have shaken up the financial industry and carved out a place for themselves in the world of currencies. This is part of Web 3.0 - a decentralized Internet based on which information can be created and shared (Web 2.0) and on which values can be generated and transferred. The organizational characteristic of Web 3.0 is its decentralization, which is implemented not only technically but also organizationally. The term for a decentralized organization is DAO (the abbreviation for Decentralized Autonomous Organization) [1]. This paper is a descriptive case study about teaching the topic of DAO in a business school. We refer to the approach of Ivančević-Otanjac and Milojević [2], which suggests the following structure for a descriptive case study: Introduction, Findings, Discussion, Conclusions and Recommendations. In this first section, the background on DAOs is elaborated along with

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justifying their relevance for business managers. Open research topics in the field of DAOs are elaborated followed by outlining the context, which this case study is embedded in.

### **1.1. Background on decentralization and DAO**

Centralized systems offer advantages in structured industries and organizations, like finance, including user access control, adaptability, data management, efficiency, monitoring capabilities, permission-based usage, and confidentiality. However, centralized systems come with drawbacks, such as user risks due to corruption, lack of oversight, data breaches, inaccessibility, system failures, and a single point of failure. To address these flaws, decentralized systems were introduced, though early versions lacked financial incentives, limiting their growth.

Bitcoin, the first fully decentralized digital currency, with its blockchain architecture, introduced decentralized cryptocurrency incentives, fostering widespread adoption [3]. Bitcoin's distributed and decentralized nature has prevented hacks or shutdowns, a feat unmatched by centralized systems. Decentralized cryptocurrencies like Bitcoin have disrupted the financial industry, extending blockchain technology beyond digital currencies.

DAOs offer a solution for organizations incompatible with traditional top-down management, implementing decentralized governance influenced by holacracy. Decentralized governance in DAOs allows participants to make decisions, manage funds, and modify rules, enhancing collaboration and efficiency compared to legacy systems. For instance, DAOfest, managed as a DAO, efficiently organized numerous events across multiple countries, using a decentralized proposal system and milestone-based payments. Correctly implemented, DAOs offer various benefits, including favoring contributions, reducing entry barriers, enhancing governance, transparency, and accountability, and mitigating the flaws of centralized management (e.g., [4]).

### **1.2. Relevance of DAOs for business managers**

DAOs can be viewed as organizations 2.0. Legacy organizations were created during an age when humanity was technologically primitive and society was designed to be hierarchical – top-down societies and social structures.

A similar example would be the inception of decentralized cryptocurrencies which was designed and engineered with modern capabilities such as the Internet in mind, versus the integration of legacy financial systems within the Internet – introducing inefficiencies, risks and incompatibility issues. Business managers can take advantage of this disruptive technology by embracing a system designed for modern collaboration.

### **1.3. Research topics in the field of DAOs**

The open research topics in the field of DAO cover a wide range reaching from technical challenges to governance, legal considerations, and practical applications. Selected topics are elaborated in the following.

**Governance Mechanisms** are needed in organizations to decide about the ways how communication, responsibilities and decisions are structured and formalized [5]. In the context of DAOs, this involves examining the various mechanisms, such as token-based voting, reputation systems, quadratic voting, and hybrid models. These mechanisms aim to ensure decentralization

and equitable decision-making and profound insights into their chances and challenges are still a gap in research and practice [6]. A sub-topic in this field is research about **reputation systems** tailored to DAOs. They play a crucial role in incentivizing cooperative behavior and assessing participant trustworthiness as traditional identity verification methods and central control are lacking [7]. Also connected to this topic, economic models in DAOs are a subject for research.

The **application** of DAOs in different industries presents a further range of challenges. One example would be the healthcare sector, issues revolve around access inequalities and lack of patient trust as well as missing transparency. They could be addressed by DAOs [8]. However, to be applicable in industry, security aspects are crucial. DAOs, which often rely on smart contracts are vulnerable to exploitation and resulting financial losses. Challenges include criminality, inaccuracy, and under-optimization in the contracts [9]. Furthermore, application of DAO is dependent on sound legal frameworks. However, as traditional legal systems struggle to classify and regulate DAO, **legal and regulatory aspects** are an issue. The Insight Report from the WEF [1] elaborates the need for legal formalization and structures.

For our teaching case study, the governance mechanisms and applications of DAO have been identified of highest importance to business school students.

#### 1.4. Context of the case study

The DAO course was introduced at the School of Business, University of Applied Sciences and Arts Northwestern Switzerland FHNW (in the following named as FHNW). The mission of the FHNW School of Business is to educate innovative, responsible specialists and managers for an interconnected and ever-changing world [10]. The FHNW School of Business runs a bachelor program for business information technology (BIT); full-time and part-time study are possible. As part of the bachelor program for BIT, students have the possibility to choose topics of interest as electives. Electives are allocated with three ECTS and have a typical duration of six weeks with weekly lectures of four hours. The FHNW School of Business offers a blockchain introduction course; DAO has not yet been taught so far. The DAO university course has been initiated by the Competence Center Digital Trust<sup>1</sup> – a team of researchers with a focus on cybersecurity, data privacy, ethics, blockchain and governance, risk and compliance (GRC).

## 2. Findings

### 2.1. Course objectives

The DAO university course is targeting students wanting to get insights into the concepts of Web3.0 (decentralized economy) and DAO. Students should learn new concepts of DAO. One central course objective is to give students a chance to experience the mechanisms of a DAO first-hand. Programming skills or pre-knowledge on distributed ledger technology, blockchain, DAO, Web3.0 were not a prerequisite. The detailed learning objectives can be found in table 1.

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<sup>1</sup><https://digitaltrust-competence.ch/>

**Table 1**

Learning objectives of the DAO university course.

Learning Goal	Description
Knowledge and understanding	Students acquire a sound knowledge of methods and tools for the strategic and operational areas of decentralized autonomous organizations (DAO) /ecosystems that are the foundation for enabling Web 3.0.
Application	Students actively shape the course directly using Web 3.0 technology themselves for voting, sharing, rewarding, and abstracting in a direct course governance role. The teachers, the content, and the grading are part of the DAO mechanism.
Ability to make judgements	All participants learn principles and settings under which a DAO governance performs. They acquire the ability to judge which method/approach is suitable for which initial situation, and which advantages or risks are associated with DAO governance.
Communication	Students acquire the ability to judge and discuss the potentials and limitations of DAO and Web3.0.

## 2.2. Course design

The design of the DAO university course is outlined in table 2. It is structured into six weekly lectures, each covering one specific topic in the field of DAO. As mentioned above, a special focus was set on DAO governance mechanisms. Students should be able to understand them conceptually and practically. Moreover, applications of DAOs have been another priority. International guest speakers from industry have been invited to showcase their DAO start-ups/businesses. As a side topic, security and legal issues were covered as part of the DAO foundations.

As can be seen in second column of table 2, one central element of the course design was to experience DAOs first-hand. Very specifically, the first lecture was used to introduce the students to one DAO platform and to onboard them on a newly created "University course DAO". After getting started with some test votes, selected aspects of the course were governed by decisions taken through DAO votes. This included voting on grading conditions and voting on lecture topics. Moreover, towards the end of the university course, students could vote for the Most Valuable Person (MVP) and award students that had particularly contributed to the course.

## 2.3. Course implementation

Aragon App was chosen as a fundamental tool to show students how to design and manage DAO. Aragon App<sup>2</sup>, an open-source blockchain-based framework, allows users to establish, manage, and govern DAOs on the Ethereum blockchain without requiring programming skills [11]. One essential feature of using Aragon App is the possibility of establishing DAO on Ethereum test networks – alternative blockchains used solely for testing purposes. Operations on test networks doesn't require Ether (ETH). This cryptocurrency is used on Ethereum's main network,

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<sup>2</sup><https://aragon.org/>

**Table 2**

Design of the DAO university course

Topics	Vote
<b>1. Introduction:</b> - Context and Conditions of the module; - Overview Web3.0, Blockchain, DAO; - Intro and first steps in a DAO platform.	Test vote to accommodate with the platform.
<b>2. DAO Foundations:</b> - Decentralization vs. centralization; - Decision-making; - Governance issues.	Assignment conditions I/II – vote on assignment type (which assignment, if graded by classmate, if bonus point system).
<b>3. DAO Governance:</b> - Decentralization vs. centralization; - Decision-making; - Governance issues.	Vote on topic preferences for lecture 5.
<b>4. DAO Platforms:</b> - Selected DAO platforms and its use cases; - Launching and managing a DAO; - Examples of real-world DAOs.	Assignment conditions II/II – Vote on assessment criteria.
<b>5. Voted Topic:</b> Case study of nature collectibles; DAO governance in Swiss corporates.	Vote on most valuable player (MVP) of the course.
<b>6. Closing:</b> - Summary and conclusions; - Assignment outcomes/next steps; - Feedback.	Conduct a retrospective quality assurance voting.

which can be obtained in many ways (mining, staking, trading exchanges etc.), which are not suitable for students who only start to explore Web3 and **blockchain** technology. Instead, each test network uses special cryptocurrency, that can be obtained from faucets – websites or applications that give away small amounts of cryptocurrency for free or for performing simple tasks using user's device computational power. Still, faucets have time limits, which means that they restrict the frequency at which users can claim rewards, such as once every hour or day. As any operation requires some amount of cryptocurrency (establishment, voting, etc.), lecturers were obliged to collect test cryptocurrency for a long time before the beginning of the course (approximately for two weeks every day). This is for sure the most time-consuming task during course preparation.

Aragon App provides several DAO design templates (e.g., "Company", "Reputation", "Membership" etc.) which makes establishment process quick and easy. We found "Membership" template a good fit for the educational process. Membership is indicated by a non-transferable token, limited to one token per address. Only members can create votes, and a member vote is needed for any organization action, such as adding, removing members, or granting special rights. Below the process of DAO establishment is described:

1. Students download one of two chosen cryptocurrency wallets of their choice. Metamask and Coinbase Wallet were proposed due to their widespread use.



**Figure 1:** Result of initial voting.

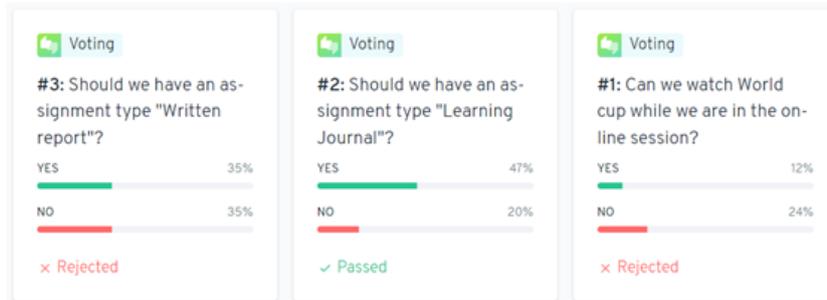
2. Students share their account addresses and via online form with lecturer.
3. A new DAO on Görli test network was created using Membership template. Initial membership tokens were provided to students who shared their addresses with the lecturer. Important to mention that after initializing the DAO (deploying DAO smart contracts to blockchain), further membership tokens can be provided to new DAO members only via voting. This specification leads to the following step.
4. Since any operation on Ethereum test network requires test cryptocurrency, every student received little amount for executing further votings.
5. The first voting process was initialized. Due to some students missing the first class, the proposal sounded as follows: "Should we grant access to the lecturer to mint and assign new membership tokens?" This voting was not only functional but also educational in nature, so students could try how mechanism is generally executed in DAO. This permission brings strong centralization to DAO, but for the course it's acceptable to have it to show how poor DAO management can bring further problems. On the Figure 1 the result of this initial voting is shown

During the course, various voting processes were initialized. For instance, students were asked to vote for the desired assignment type for the course. There were three options available to choose from, as seen on the Figure 2.

### 3. Discussion

#### 3.1. Lecturer learning and feedback

The feedback from the lecturers was very positive, which justifies the continuation of the course. The course was set up and conducted by three internal teachers as a team, so that mutual learning and improvement was possible directly in the first course implementation. The involvement of external speakers from the field was an absolute added value for all participants. The FHNW members could gain direct insights into real existing DAOs; the international external speakers could present their DAOs to and get valuable insights of the Swiss culture.



**Figure 2:** Votings for the final assignment type

One example was the decentralized university Bittopia<sup>3</sup> which was discussed as a case study during the course.

One central learning from the side of the lecturers was the issue of living up decentralization. Even though one core idea of the DAO course was to experience a decentralized organization first-hand, it was challenging to implement it given the centralized structure of the university. Many parameters were pre-defined by the university structures, such as course dates and times, duration, and credits. The decisions that could be made by the students, the DAO members, were hence limited to fit to the university framework. Voting upon grading schemes or lecture topics was a good initial experience but was far from the possibility considering real decentralized governance.

### 3.2. Student learning and feedback

One of the primary objectives of our DAO-based university course was to foster student learning in the context of DAOs. In this regard, the selected assessment mechanisms played a pivotal role. The quality of assessments was observed to be notably high, reflecting the effectiveness of the adopted pedagogical approach, a mix of hybrid and on-premise settings, both with internal lecturers and external experts. The assessments were designed to evaluate the students' knowledge and encourage critical thinking and problem-solving skills in the realm of DAOs.

As such, the students demonstrated a profound understanding of common DAO principles. This was evidenced by their ability to articulate and apply these principles in various course-related activities and discussions. The students' comprehensive grasp of DAO concepts is a testament to the efficacy of the presented instructional materials and methods. In terms of feedback, the response from the students was overwhelmingly positive. Their feedback encompassed two fundamental aspects: the course structure and course content. Students appreciated the well-structured nature of the course, highlighting its logical progression and alignment with the DAO framework. They found the course materials to be informative and accessible, allowing them to navigate the complex world of DAOs with ease. Overall, the positive feedback on structure and content underscores the course's success in delivering valuable educational experiences to its participants. Teaching DAO principles as a DAO is

<sup>3</sup><https://bittopia.org/>

possible and welcomed by students and without prior knowledge, a steep learning curve can be achieved.

### **3.3. Student engagement**

While student learning and feedback painted a favorable picture, student engagement presented a more nuanced perspective. Attendance throughout the course was notably high, indicating a robust initial enthusiasm among the students. However, as the course progressed, we observed a gradual decline in voting participation—a vital element of the DAO governance model we adopted.

The decline in voting participation could be attributed to several factors. Firstly, as students became more familiar with the course and its processes, some may have assumed a passive role, trusting the DAO's governance mechanisms to operate smoothly without their continuous input. Additionally, the complexity of some decision-making processes within DAOs may have deterred some students from active participation, as it required a deeper level of engagement and understanding of the DAO ecosystem.

DAO participation is an issue recognized and researched upon e.g., by Wiriya Chaokit, Augustin and Eckhardt [12].

## **4. Conclusion**

### **4.1. Summary and achievement**

The university course and the partnership between FHNW and external guest speakers, in particular Bittopia, proved to be a successful collaboration producing a hybrid foundation of knowledge. Merging the gap between existing institutions and decentralized organizations.

The result means that students can simultaneously learn from those educating and those developing and implementing the ideas being taught. A full spectrum combining traditional teaching methods with modern technologies. During this collaboration, we were able to measure various aspects of the learning process: First, fundamentals about perceptions, knowledge, learning capability, and engagement levels. Second, limitations in the curriculum and teaching methods. The education process should be anti-fragile, like Bitcoin itself. Each teaching cycle should lead to a better curriculum, with the input of the stakeholders, mentor, and students. Due to the flexibility of the curriculum that can be updated in real-time, and secured on a decentralized network, we can ensure that students receive the most optimal and relevant form of knowledge.

### **4.2. Limitations**

A critical examination of the DAO-based university course reveals certain limitations inherent in its design and execution and educational contexts. A notable constraint emerged from technical limitations experienced by select participants. Disparities in technical proficiency and access to requisite technological infrastructure hindered some individuals from fully engaging with

specific aspects of the DAO. This disparity potentially restricted the course's inclusivity and increased coaching activities beyond expected levels at the start of the course.

In adherence to legal and regulatory standards, the course refrained from incorporating real-value tokens within the DAO's governance framework. While this compliance safeguarded the course's integrity and security, it simultaneously deprived students of the opportunity to interact with genuine economic incentives and disincentives commonly associated with DAO involvement. This limitation could have influenced student motivation levels but was impossible to achieve.

Furthermore, token acquisition and mining within the DAO presented difficulties for specific participants. The untransparent procedure to find and use Goerli faucets and the technical impediments may have discouraged some students from actively participating in token-related activities, potentially affecting their overall engagement. Moreover, finally, the course was subject to legally binding requisites that lay beyond the purview of the DAO. These encompassed academic regulations and accreditation standards that the decentralized entity could not supersede. While the DAO model afforded flexibility in various aspects, it could not transgress these established legal and academic boundaries, e.g., not having a graded assessment in the end, even if participants would create a vote for it. This limitation constricted the scope of autonomous decisions the DAO could undertake.

## 5. Recommendations

Limited understanding about decentralization requires more institutions and organizations to be open to teaching and learning about the Web3.0 and decentralized technologies. There are a lot of misunderstandings at the fundamental level, let alone on the level of DAOs. The basics must be included in the teaching process, otherwise people will be fragmented and their ideas as a result will also suffer.

Education should come from the core, and there must be an open discussion between education, business, and other industries and those who are creating and using technologies. The separation that currently exists has led to a great level of misunderstanding and misinformation, which has also introduced unnecessary fears, doubts, and mistakes that are blamed on the technology rather than their respective creator(s).

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