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Blockchain Teaching Simulation Using Gamification

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Abstract

A public blockchain simulation, which bears some resemblance to Bitcoin. All players are interconnected with several possibilities to form coin and block transactions and the power to get a taste of the consensus algorithm controlling transactions and blocks. A software medium that is based on blockchain games began using whiteboards to become web-based simulation games with various teaching scenarios. Contributive tool-based instruction with experience in blockchain concepts that can be used in the classroom as well as online. Along with this, simulations can give students the opportunity to experiment with all relevant blockchain operations like signing, creating transactions, building blocks, etc. This post was written to offer our firsthand experience teaching evolving blockchain technology to business and business information technology students at the undergraduate and graduate levels using newly built gamification teaching applications. This research is based on a design-based research methodology. We describe the process from identifying the problem, to designing the tool and demonstrating its implementation.

Keywords: *Technology, Blockchain, Gamification.*

1. Introduction

This article presents structured analysis and its achievements, namely solving teaching problems. The gaming experience makes it easier to understand abstract and complex blockchain systems. The precedence applies to the consensus algorithm, which is very well simulated. The software application evolved from a classroom-based blockchain game to a web-based simulation game with a variety of teaching options.

situations. It's a game that simulates a public blockchain, similar to Bitcoin, in which each participant takes on the role of a node with the ability to make coin and block transactions. This tool allows students to learn the consensus algorithm by examining transactions and blocks. It supports blockchain concept experience-based instruction and can be used in the classroom or for online teaching. With this the game offers students the opportunity to experiment with all relevant blockchain operations like hashing, signing, block generation, etc.

This article summarizes the knowledge of teaching methods, especially during the Covid 19 pandemic, so that they can be used for instruction and for exam tools in blockchain elective courses. In addition, the race for further research on the innovation of this tool, and the next stage of development is accommodated.

2. Ease Of Use

2.1 Maintaining the Integrity of the Specifications

The demonstration stage in the research process must prove that the solution works and achieves the stated goals [2].

With this tool, it is hoped that it will be a solution to always be able to work optimally using software and focus on teaching activities. Using this tool to instruct and train understanding of the underlying algorithms and mechanisms of using blockchain for handling distributed transactions, especially during this covid19 pandemic. The combination of online teaching software using the concept of web-based games is a good combination for the beneficiary of this new situation. Especially the single screen design makes it very easy for online classes. students are able to follow instructions on the teacher's screen and experiment in a separate window in their own node. The teacher and students agree to use the game stage (scenario 3) for the final assessment of the practical part of the course. The students have to perform several actions such as hashing, signing, creating and checking transactions, as well as creating their own validated blocks on the blockchain. Assessment is based on blockchain data, which can be channeled to students by sending the address of the respective node with the hash of the transaction or action performed. The results are positive and allow a clear distinction between different levels of blockchain understanding.

Through experimentation and play, students will learn and understand the most basic components of an information system, how to transact on the blockchain. Although this is a very technical point of view, everyone can understand it through the presentation.

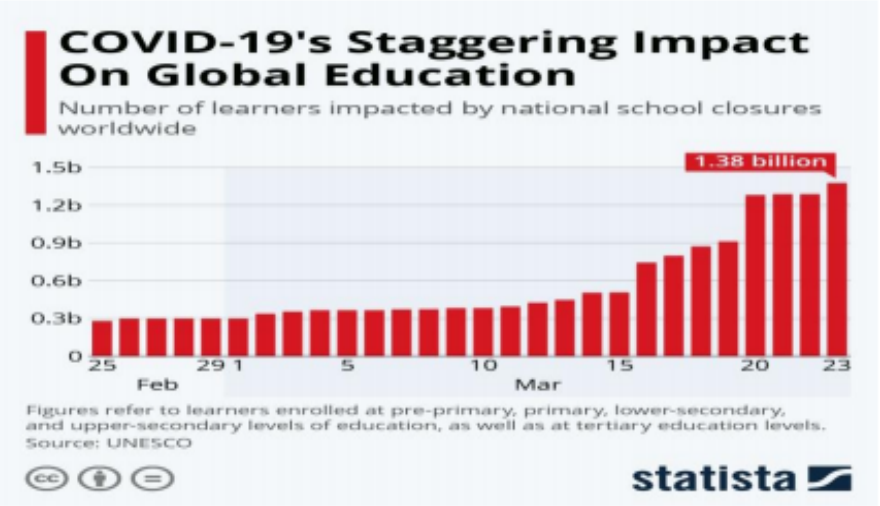
The second thing that students have to experience and encounter is the social and economic aspects of the public blockchain. To most people, the term "conventional algorithm" is very abstract. While playing, they can experience the interactive (social) roles served by convention conventions. Each player will feel how the actions of all participants determine the outcome of the game.

For teachers, these tools also provide many opportunities for discovery and experimentation. with the concept of a playground with transparent functions, without auto-checking or auto-filling.

2.2 Related Work

Almost all the countries having severe impact COVID-19 closed schools and colleges to prevent the expansion of infection [14] [15]. Lots of research articles have been published to cover various aspects of COVID19 starting from drug discovery, detection procedures, testing process etc. COVID-19 created impact on physical as well as mental level [16]. Cases of depression and suicides increased during this period [17] [18]. Authors [11] in the paper discussed issues raised in the medical curriculum of undergraduate students due to pandemic. They mentioned the challenges in delivery of clinical and practical knowledge through online mode. Authors [13] in paper analyzed the gaming behavior of college students and found an increase in gaming behavior due to the stress of examination. Authors [6] in paper made a study on final year medical students of the UK and analyzed the impact on confidence, training and placement activities [19] [20]. Final conclusion of their work showed that medical students had a bigger impact at different levels of confidence, training and the transition from student to doctor was most critical under these scenarios. Authors in [21] paper discussed the impact on learning of undergraduate and postgraduate students due to COVID-19. Study found that 70%

of students were dependent on e-learning content and faced challenges. Authors in paper discussed impacts on psychological factors of medical students in the context of Pakistan. Authors in paper [22] discussed learning novel traditions of teaching and assessment and showed issues due COVID-19 on undergraduate dermatology education. Authors in paper discussed the mental health of college students and performed longitudinal analysis [14] [23]. Literature is showing us ways to locate the pin points in terms of analysis and solutions. In the next section we are going to discuss the concerns, parameters of study under results and analysis section. Further conclusion and future work section is written to summarize the work and to indicate future possibilities [24] [25]. Figure 1. showing the impact of COVID-19 on global education [26].



Picture 1. COVID-19 Impact on Global Education

3. Results and Analysis

We are comparing offline and online examination processes to extract research insights. Let's have a look on basic structures of both process and compare the pros and cons

- Offline Examination

  Offline examination process is the conventional practice in universities and colleges throughout the world. Let's focus on the main components of offline examination planning. There are following components required in offline examination.

  1. Examination schedule design
  2. Classroom to student mapping
  3. Examination paper to allocation journey
  4. Invigilator's allocation and management
  5. Exam sheet evaluation
  6. Result declaration and fair evaluation

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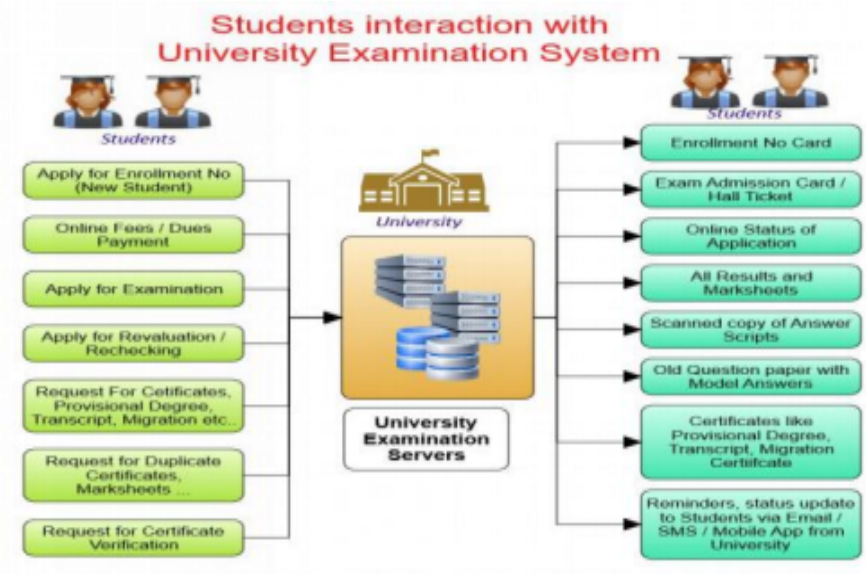


Picture 2. Examination System And Student's Interaction

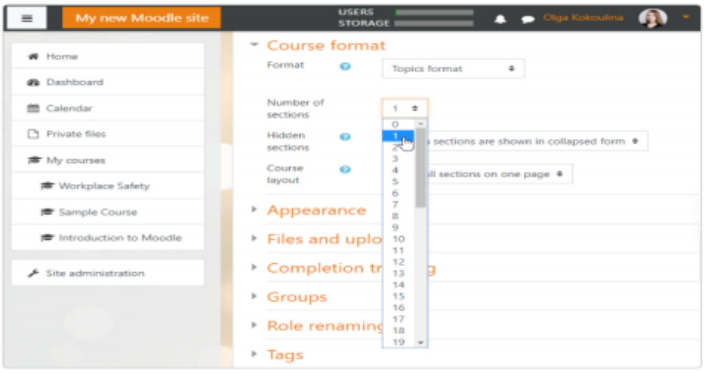
Examination system is so vast that it will help students at all levels. Figure 2. explains in detail the benefits of the offline examination system. There are few challenges also in the offline examination system like fairness in evaluation, conduction of reexamination is a lengthy process, large human resource need, and overall fairness of the system. Let's have a look at the online examination system and then compare the features [17] [27].

- Online Examination

  Online examination is the process of conducting exams virtually with the facility of appearing in the exam from anywhere and anytime. First of all, let's look at the essential components for the conduction of online exam:

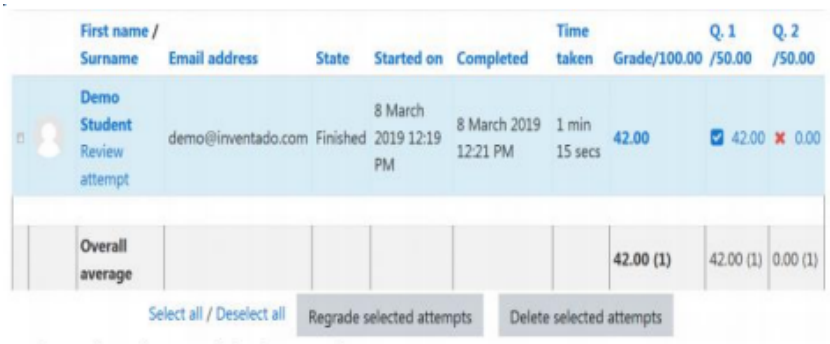
  1. Examination Preparation,
  2. Examination System,
  3. Examination Monitoring
  4. The Auto Grading System

In picture 3. a snapshot of Moodle is shown where a user is in the process of preparing paper for the students. Moodle provides several options to users such as course format, course layout and review options, setting schedule of exam, response format (HTML or any other) among others.



Picture 3. Examination preparation through Moodle [28]

Moodle is one of the popular and widely used open learning management systems (LMS) for conducting online exams worldwide. Monitoring is one of the important functions of the examination process [29] [30]. A snapshot for monitoring of students is shown in figure.4. We can capture different types of details regarding the student exam such as useful name, affected user, event context (admin or user), component (logs), event name, description such as what activity is performed by a user, origin(web) and the IP Address of the computer used for accessing the exam.



Picture 4. Auto Grade System through Moodle

In picture 4. Unlike conventional/traditional exam Moodle provides the auto evaluation system in the form of auto grade where auto evaluation is done after finishing the exam. This feature saves time and effort on the part of the evaluator. Table 1: shows comparative analysis of online and offline examination systems.

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Table1. Online and Offline Examination Comparison

S.No.	Online Examination	Offline Examination
1	Less human resource required	More human resource required
2	May increase Academic dishonesty if exam is running at home	Academic dishonesty chances are less
3	Easy evaluation	Comparatively tough
4	Easy to manage large crowd at a time	Comparatively tough to manage large crowd
5	Easy to generate analytics of exam	Takes time
6	Less reliable in terms of transparency	More reliable in terms of transparency
7	May be best with advance surveillance	Surveillance requires here human resource

4. Future Work

We need both systems i.e., online as well offline for improving the performance of a learner. These two systems are complementing each other and not replacing one another. Online learning system has affected each one of us including faculty and students equally. As a future work, we plan to work in the direction of how the online teaching-learning process has severely impacted the health, especially physical, mental and psychological, of a learner and how can this impact be alleviated? Furthermore, our future work also involves finding ways as to how the teaching learning process can be further improved by integrating online and offline learning systems.

5. Conclusion

In this paper, we provided a comprehensive analysis between online and offline examination systems with respect to examination design, Classroom to student mapping, Examination paper to allocation journey, Invigilator's allocation and management, Exam sheet evaluation, Result declaration and fair evaluation. On one hand the online examination system helps in saving time and effort which results in fast evaluation of answer sheets and quick declaration of results. This also helps in the placement of students as many times a student is not able to appear due to non-declaration of result. On the other hand, the offline examination system ensures that the exams are conducted free and fair. Hence, we conclude that the online system can complement the offline examination system in several ways such as teaching learning through an online learning system, assessing a learner through quiz and assignment among others. As we have

seen that online learning system such as Moodle has completely replaced offline system during COVID however, post COVID we can continue to use such learning management system as a supporting means in order to ensure that examination process is performed in a speedy manner and the process of evaluation is carried out well on time in the best interest of students.

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