DECENTRALIZED EDUCATION IN RURAL AREAS WITHOUT INTERNET ACCESS

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Education under equal conditions for rural schools without internet access, training young people with their mobile devices, through a Wi-Fi hotspot network of mined content on smartphones with blockchain architecture, accessing content provided offline, preparing them for a more sustainable future.

Team: Equipo Omaguaco – Propuesta EduChain

Team members

Juan Veron, Francisco Milhas, Natalia Medina Serrano

Members roles and background

Juan Veron

18 years old, about to achieve degree as a computer technician at the IPETyM School No. 69 "Juana Manso de Noronha" and about to enter Information Systems Engineering at the UTN FRC University, consider someone creative and eager to learn related to digital technologies.

Natalia Medina Serrano

Solution Details

Solution description

A solution for content distribution for school education in communities without internet access, in a similar model to the Blockchain architecture where the opportunity is to transport mined educational content on mobile devices that replicate portable servers, taking advantage of the cell phones of travelers who travel from connected cities to rural regions periodically.

Mobile app that identifies the lack of infrastructure and internet services in remote communities, which allows content to be transferred via Wi-Fi hotspot using push technology, where the request to send data originates from the mobile server by geo-referencing the rural location visited. The student's mobile computer that today does not have an internet connection can make use of these portable servers by browsing their contents through Wi-Fi hotspot, updating the readings, videos and exercises, being able to monitor and control the course work and the student's results. The portable server records whether the student is progressing or not. By encrypting the content and the traceability of their activities, the student's progress is inviolable and is updated every time a student with her cell phone approaches a hotspot in the system.

We want to reach the 3,400 rural educational institutions of the National Route N40 with better access to education through digital technology, providing knowledge on measures to limit the effects of climate change, on job opportunity in the energy sector renewables and social and environmental awareness showing the opportunities offered by a more sustainable development. These contents can be provided by foundations, ONG´s, CSR, existing Mooc content, as well as testimonial conferences from people working in these sectors. The idea is to generate this access to education for the most disadvantaged students by reducing this inequality of the access to information.

Solution context

Today we are facing a health crisis and measures that have had an impact on those who do not have

access to distance education. Students from urban areas (connected) can obtain higher educational results (results and performance) than students from rural areas, this may be due in part to the lack of infrastructure, access to digital tools and connectivity, without libraries, internet cafes, and homes without internet connection. (see cf: Educational map of Argentine secondary school).

 Previously, the difficulty of accessing expensive servers that can provide the necessary infrastructure to maintain a connection network in areas of difficult access (maintenance problems, etc.) has also been verified. Taking as an example the difficulties encountered in terms of government programs "Educate Equality".

Globally 42% of users do not have access to the internet, specifically in the Andean region internet access may be less than 10%, and penetration in the use of smart phones is higher than 103% globally (cf: information link El pais, La Vanguardia).

The mobile world will continue to grow, and with a penetration higher than internet connections, cell phones reach remote destinations where the internet does not reach. On the other hand, smartphones are leaving computers and laptops behind. Before, they were considered a secondary device; now, it is the main one, smartphones have become an educational tool.

The main reasons for the inequality in Internet connection are related to the lack of economic resources: developing countries do not have an adequate telecommunications infrastructure (especially in rural areas), 90% of the people without internet access live in developing countries and are our main target group.

But what would be the meaning of blockchain encryption of education content? The concept is to have universal and incorruptible content with quality values and certainties for all communities, content that is born from the consolidation, certification and community assessment, nurtured by everyone, by anyone, open to everyone and can be valued, modified and edited by anyone. The certainty of the quality of the content is given by the community assessment.

Solution target group

The program is aimed at secondary school students in rural areas without technological infrastructure and without stable internet access in Latin America, especially in the Andean region where access is limited and where there is less government presence. In the same way, speaking of transferability, this system can also be applied in any region of the world where the digital connection may be scarce but where there is indirect contact with people having this access in an itinerant way.

Solution impact

It seeks to bring equality of educational knowledge in rural areas for the training of young people in secondary school.

Inclusive governance mechanisms through digital tools positively influence the reduction of inequalities in access to education. The new opportunities of access to distance education for populations that will not have the means to attend certain face-to-face training courses / workshops, may reduce the journeys of both students and teachers, since this mechanism may be used not only to generate supplementary content but can also be used as a support tool for the education program in general.

The program provides access to content to raise awareness of sustainable development, using local training content as well as internationally. It would allow the generation of environmental awareness through its content and in turn a collaborative network with the agents that would allow the transfer of this content.

There are currently 5.190 million unique users on mobile devices, this covers 67% of the world's population. The most interesting thing about this is that there are more than 7.950 million telephone numbers, this covers 103% of the population. Latin America is the fourth largest mobile market in the world with a population of 650 million inhabitants, in 2018 there were 492 million smartphones, approximately 76% of the population, which does not match the number of inhabitants with internet access.

Solution tweet text

Social Network where every member of the community with a smartphone can be a mobile server for the distribution of climate impact educational content in rural towns without internet

Solution innovativeness

Our DAPP is an application with a decentralized concept that uses the 'blockchain' architecture model so that users interact directly with each other and close agreements without there being a central entity that manages the service. Each one of the users of the dapp is a node of a decentralized network in which all the members act together as a collective notary of any movement that takes place on the platform.

Mainly the encryption helps to have the hotspot open, it allows to open and transfer the data to the students as if it were an encrypted VPN, with the peace of mind that this open door is not a possibility of vulnerability of our equipment and data.

Solution transferability

EduCHAIN is transferable and replicable anywhere in the world, with a licensing system and a replicable method modifying the content depending on the region. The application technology will be the same, through mobile devices being able to select and upload the formations adapted to the territory. However, it is necessary to have internet access to update the data and content at least once a week.

The applications will be available through the stores (eg: apple store, play store ...) with updates and version improvements.

The transferability of the system is fulfilled once the app is installed and the conditions are accepted, no one must expressly consent to each data transaction, but everything works automatically and the system itself is in charge of corroborating the validity of each interaction through smart sharing. The model is replicable in the different mobile devices almost without the user noticing it. This allows the carrier to have no more responsibility than just having the app installed and keeping it updated between connected cities and rural towns without internet.

Solution sustainability

The initial process of the project will be carried out through a pilot test in the Andean area of

northwestern Argentina, where one of the team members has experience and knowledge of the area.

For the implementation one of the possibilities is to be able to work with the school's cooperators, directed by parents that pool resources to achieve different objectives under a monthly fee. In the short term, start using equipment present in schools as well as mobile phones in each family or belonging to young people.

One way of being able to finance this content and the development of the application may also be through the same institutions that provide data so that they can provide and make use of the content (eg: Fundación Telefónica). In this same way, we can make a call for the social responsibility of large companies present in these territories (offset carbon, donations through NGOs).

Important care of personal information: encrypted information

Every time there is a new operation, the information on the platform is updated in each node, where a copy of the entire history of the progress of the students is stored, so that each user contributes to keeping the application standing with the resources of their cell phone. In addition, this distributed nature of a blockchain guarantees that in the event that a node disappears, there are many other "backup copies" in other members who visit the community.

Solution team work

We formed an interdisciplinary team where we were able to unite our knowledge in order to unite different points of interest for a common goal: an education for all, under equal conditions for a more sustainable development. It is possible to continue developing our idea and working in a group since the project is highly attractive, and at the same time scalable at a regional and international level.

From the virtual meeting that we participated, we were able to provide additional information in order to carry out this project, in which great things can be done, and get to connect unimaginable places and help disadvantaged populations.

The team works efficiently, in less than a day of work we achieve the essential concepts for the development of the proposal, this is a precedent for the efficiency in the execution of a larger project. We believe that we will achieve the objectives.