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Inclusão ou Exclusão Digital

Eliane de Oliveira Farah & Patrícia Maria Magalhães Saavedra

INTRODUCTION

According to the Brahmana of the hundred ways, once upon a time there was dispute between gods and demons. One day the demons said: "to whom could we present our offer"? Then proceeded to pour every offering in their own mouths. The gods, however, poured theirs into each others'. Then Pradshapati, the Primordial spirit, gave itself to the gods. (Buber, 2009, p.79)

From the steam engine of the 18th century, through the post-world war 2 technological transformations to the development of digital electronics, the Industrial Revolution and its phases brought deep changes in the world's social and economic sectors.

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Inclusão ou Exclusão Digital

Eliane de Oliveira Farah^o & Patrícia Maria Magalhães Saavedra^o

I. INTRODUCTION

According to the Brahmana of the hundred ways, once upon a time there was dispute between gods and demons. One day the demons said: "to whom could we present our offer"? Then proceeded to pour every offering in their own mouths. The gods, however, poured theirs into each others'. Then Pradshapati, the Primordial spirit, gave itself to the gods. (Buber, 2009, p.79)

From the steam engine of the 18th century, through the post-world war 2 technological transformations to the development of digital electronics, the Industrial Revolution and its phases brought deep changes in the world's social and economic sectors.

While in the first phase the splurge was about the substitution of human manual labor by the machines, in the current phase, the splurging is about the proximation of every person in every corner of the world, realizing McLuhan's Global Village idea to whom the TV, maybe a preview of the Internet, would be the paradigm.

If on the one hand this revolution has brought unquestionable betterment of the people's quality of life, like advances in the field of medicine, transport and telecommunications, the rise in the production and consuming capabilities, on the other, has also brought unquestionable loss, such as the negative impact on the environment and the fact that it is not only not enough to eradicate hunger and poverty, but it frequently contributes to the perpetration of both.

Pioneering the study in cultural and social transformation created by the technological revolution, MacLuhan discourses about how Information technology historically affects people's cognitive organization.

What stands out in regards to this paper, in the book *The Gutenberg galaxy* (1962), is the fact that MacLuhan presents the idea that the alphabet advent altered not only the culture and the social relations but also human's own physiology. In a way, we could say the alphabet shapes the way we "see" reality.

An interesting study, presented in the aforementioned work, shows an african tribe's habitant's literal impossibility to seeing images of people and objects that appeared in a movie about teaching hygiene habits. The conclusion in that study points to the fact that illiterate people perceive reality differently from literate individuals.

Even more interesting is the affirmative that the illiterate utilize their own cognitive organization system, which does not mean being incompetent by principle, but incapable of comprehending a different system. According to MacLuhan, it is quite the contrary.

The written word, so to speak, transformed the dialogue: from the common exchange of ideas and purposes to trading packaged information, a mobile and portable production asset (1962, p.205)

Another aspect of McLuhan's work that contributes to our argumentation is presented in the book *Understanding Media: the extensions of man* (1964), in which he coins the phrase: the media is message, which relates to the fact that the media affects the society in which it plays a role in not by the contents it convey, but by the media's characteristics in itself.

In the referred book, the author indicates the human need to extend beyond its own physical limits as the source to the development of all technology, which paradoxically diminishes the

individual's importance once technology creates its own environment.

The electrical speed mixes prehistoric cultures with the debris of industrial marketers, the illiterate with the semi literate and the post-literate. Nervous and mental exhaustion crises in the most variable degrees, constitute the very common result of the detachment and flooding provoked by the new information and the new and endless informational structures (p. 24 e 25).

From what has been shown so far and paraphrasing MacLuhan we ask the following questions: Once the technology media creates the environment, who is inside and who is outside the Global Village? Is this environment made of people or objects?

We are living in full Digital revolution in which many of us live like the Jetsons, a TV animated series from the sixties in which a family enjoyed great technological advances while others lived in the stone age like the Flintstones, another animated series from the same time in which the characters lived in a prehistoric modernity.

The production of fake news, named nowadays "disinformation", indicates serious distortions on the power of communication networks, not forgetting the existence of the illiterate or the functionally illiterate.

It's obvious that the Industrial Revolution, today in its digital phase, brought great benefits, but only the incorrigible romantics still believe it aimed quality of life as a priority. Nonetheless, it's obvious that the people's well being is a side effect of production and profit.

In the wake of the digital advances we have a movement to computerize official files as well as all the access to official departments. Websites and apps now replace the public service's service counters. Registrations, information, requisitions and complaints should be done by computers or mobile phones. A simple and agile flux of information, weren't the issue of the final beneficiary previously mentioned.

Today in Brazil there's much talk about digital inclusion, which says that everyone has to have access to digital media. While we still don't have official data from the 2022 demographic census, two years late on account of the Covid 19 pandemic and budget cuts by the government at the time, we can predict that the illiteracy index and that of residencies with no electric energy is still significantly high.

There is no question that digital inclusion is a fundamental necessity in a connected world. However two critical questions should emerge: who has the basic conditions to be included and what happens to the excluded when they can't access these computerized public departments?

The answers to such questions demand the integration of lots of knowledge and mainly of what we call "political will" which unfortunately, as pointed out before, historically, puts the individual in last on the chain of interests.

Countless concepts can be applied to the discussion of these questions in the attempt to shed some light in such a nebulous issue.

In what's been said in this article, up until now, two concepts present themselves very relevant for consideration. The first is Martin Buber's Dialogic Relation and the second is Fritjof Capra's systemic conception.

In 1923, Martin Buber, in the book I and Thou, describes relationships between people as being of two kinds: the I-Thou or subject-subject relationship and the I-It or subject-object relationship.

The I-Thou relationship refers to the intersubjectivity, that is, to the human capacity for interrelationship, for recognition of our peers as our similars and the responsibility of both in what happens to each one, what Buber calls dialogue and turning toward another. The human relationship seen as otherness, as reciprocity.

The I-It relationship is not characterized by any of the aspects present in the I-Thou relationship, there's no dialogue, not even relations, seeing as what is imposed is an objective approach in which

at least one of the parts addresses the other as a means to an end.

The sine qua non condition for the dialogue is that there exists a dialogical approach between both parties, without which there's no relationship.

Going back to McLuhan's Global Village idea, we can question if the flux of global information runs towards another or to an object.

Addressing the other as an equal implies a genuine concern with what happens to them, while addressing the other as media means using them with the goal to get to an objective, in this case production and consumption.

Buber 1965^a, apud Hycner (1995), states:

The inclusion occurs when the person, "without neglecting any aspect of the perceived reality in the activity, at the same time lives the common event from the other's point of view"

Buber (2009), indicates that in principle, there's no notion that the I-Thou relationship is ideal and the I-It relationship is inadequate, both are appropriate to a plethora of situations in life. While the I-It relationship is more objectifying and, therefore, better applied to the business world, the I-Thou relationship is more subjectifying and better applied to intimate relationships. Thus there's no prevalence in the I-Thou relationship over the I-It relationship, since each one involves a distinct purpose.

For example: the parents' attitude toward their children is commonly a dialogical approach, and it should be suspended many times so that the position of authority, necessary for the condition of person responsible to be fulfilled. On the other hand a businessperson that treats their employees as spare parts is doomed to have some kind of loss.

The problems arise when there's prevalence of one approach over the other, which means there's a disagreement between an approach and the declared purpose.

Our questioning, in this case, involves the use of the term INCLUSION for the fact that when the

use of the media does not involve an immediate concern with the person's conditions of access, there's no true dialogical approach.

And with all the gravity of the truth, listen: *man cannot live without the It, but he who lives only with the It is no man.* (Buber, 2009 P.63)

Back to the Global Village subject, we can review Capra's (1982) perspective about the systemic conception which sees the world in terms of relationship and system interdependence. Social, ecological and economic systems are all living and interdependent systems.

Still according to Capra, in the same work: *the undifferentiated growth tends to walk hand in hand with fragmentation, confusion and general collapse of communication* (1982 p.387), comparing the process to cancer, whose excessive growth ends up destroying the organism.

This means that when economic interests don't include concerns with the people and the environment's health, they sacrifice people and eliminate themselves.

The author describes the economic problems as systemic in nature and resulting from the dissociation of economy from the ecological context.

The undifferentiated economic, technological and institutional growth is still seen by the majority of economists as a sign of a "healthy" economy, although it's been causing ecological disasters, generalized corporate crime, social disintegration and the ever-growing probability of nuclear war. (p.380).

The systemic conception proposes a change in the linear, simplistic and unrealistic theoretical model of the conventional economists to a circular interdependence perspective of the systems.

It's interesting the fact that Capra indicates an idea from Bateson that is very similar to the conclusions from the study on african tribes stated by MacLuhan and commented previously on this article.

The linear relationships of cause and effect only occur very rarely in these ecosystems, and the linear models are no very useful to describe the functional interdependence of the social and economic systems inserted in them and their technologies. The acknowledgement of the non-linear nature of every system dynamics is the very essence of ecological conscience, the essence of “systemic wisdom”, as Bateson calls. This kind of wisdom is characteristic of the traditional, non-literate cultures, but sadly it’s been neglected in our super-rational and mechanistic society.

Therefore, the digital inclusion or exclusion approach goes through the analysis of a set of barriers that surpass the absence of electronic equipment or the lack of comprehension in handling the digital language.

Digital exclusion presents itself as one of the biggest challenges of our time and it constitutes one more side of social inequality, thus the importance of democratizing access to the internet and to the new information tools.

Thatiane Menezes da Rocha Pinto (2023), in a recent dissertation about access to justice focusing in homeless people, in her law post-grad, clarifies that there is exclusion by specific socioeconomic issues, predictable in a country with extreme social inequality like Brazil. It is a barrier that “comes with the absence of other more elementar rights and services like the right to health, housing, education, nourishment and basic sanitation.”

It’s important to highlight that the postmodernity reveals itself as a phenomenon in which the current society is immersed and it’s related to the “acceleration of living”, in other words, paradigms do not survive for long the creation of other paradigms, turning human life into a broth of uncertainty, insecurity and new demands at every moment, product of the flooding of information brought by the technological advances, especially the internet and the social media advent as the preponderant mass relationship tool.

It should be emphasized that it’s a culture facing the increase of individualism, where even tho there are many options to choose from, there’s

also the loss in critical view about the assets and values that surround us. Lipovetsky (2005) highlights the “culture of personality”, of total individualism and, therefore, “the postmodern society is that in which indifference of the masses reigns, in which the feeling of repetition and stagnation dominates, in which the particular autonomy advances by its own, where the new is accepted the same way as the old...” (Lipovetsky, 2005, preface XIX).

Lipovetsky (2005) identifies postmodernity as the “age of emptiness” and highlights the general problem: “the weakening of society, of the way of living, of the contemporary individual from the age of mass consumption, the emergence of a new way of socializing and individualizing, in a rupture from what’s been instituted in the 12th and 13th centuries.” (2005, prefácio).

José Aparecido Celório e Lúcia Maria Vaz Peres (2013), in their study about existence and imagination, state that we cannot deny science advances and the benefits generated by its discoveries, however, the responsibility for humanity’s progress and autonomy of its individuals has been attributed to reason, and “the affective and imaginary dimensions were banished to the basement of our history” (2013, p.377).

Gisele Mara Durigan e Nádina Aparecida (2013) state that the popularization of the internet largely increased the quantity and speed of information, which created an information overload, “with the virtual world significantly interfering with the real world.” (2013, p.100).

The information overload to which man is exposed in postmodernity drives him to try and “search and absorb, in as little time as possible, the highest amount of information in his reach, without having the condition to manage the excess in adequate fashion. Thus creating a feeling of physical and mental wearing, fatigue, frustration and, in more serious cases, emotional stress.” (2013, p.100).

It’s important to remember that in a globalized context, the volume of information available on the web becomes an indicator of the capacity to

influence and position populations in the future of society.

The society in which we live is that of knowledge and according to Elisabeth Gomes (2002), advisor to Anatel's presidency, "in this new society, knowledge is a fundamental driver to increase productivity and global competition." The recent collapse of the telecommunications and technology market, a shrinking of global investment in innovation and a big effort on privatization caused the deprivation of access to the advantages and benefits brought by the new nesta nova sociedade, o conhecimento é um "driver" fundamental para aumentar a produtividade e a competição global." O recente colapso do mercado de telecomunicações e de tecnologia, um encolhimento dos investimentos globais para inovação e um grande esforço nas privatizações provocaram a privação do acesso às vantagens e aos benefícios trazidos pelas novas ICT (Information and communication technology).

Upon treating digital inclusion as a living system it's possible to walk towards digital universalization, promoting what is called digital literacy, in other words, as Gomes (2002) clarifies that "capacitate the people in utilizing the numerous media according to their necessities, considering that intellectual capital is increasingly more essential for citizens to be inserted in the job market."

The internet is a means and not an end, and according to Rodrigo Assumpção from Sampa.org. quoted by Gomes (2002): "Digital inclusion is giving the opportunity for communities to be inserted society of information as agents. Knowledge is the key for programs that have been successful."

There are many initiatives for a big part of the society excluded from the digital process to take notice of the resources available, however, according to Gomes (2002) we need to define strategies that integrate state actions so that the needs of the society are met and it is also necessary to know these needs, so as to make

inclusion effective, not only regarding the format of the services, but also their content.

According to Lília Bilati de Almeida and others (2005), the people that live on the margins of computerized society have more difficulty, or even feel prevented from executing tasks made simple by using services based on new technology.

In an age like this one, "digital exclusion has a big impact in the lives of people that for numerous reasons do not utilize such technology. There can be used as an example a simple and usual fact that happens when trying for professional placement and being required to have minimal knowledge in computers."

The impossibility in utilizing the Internet prevents some communities from obtaining more knowledge and exchange of information, which would enrich them culturally, socially and economically.

Thereby, the digital exclusion "can be seen from different angles, both by the fact of not having a computer and not knowing how to use it (be able to read) or even yet by lacking minimal knowledge to manipulate the technology with which we coexist on a daily basis." (Almeida, 2005).

In a more comprehensive way, "people digitally excluded can be considered those that have difficulty to even utilize a mobile phone's functions or set the clock in the VCR, noting that the digital exclusion depends on technology and on the devices utilized." (Almeida, 2005). Digital exclusion can also be conceptualized as a state in which an individual is prevented from utilizing information technologies, whether by insufficiency of access means, or by lacking knowledge or interest.

The socioeconomic exclusion triggers digital exclusion, and at the same time digital exclusion deepens socioeconomic exclusion.

Digital inclusion should be the product of public policy with budget allocation in order for actions to promote inclusion and the equivalence of opportunities to all citizens, as stated by Almeida (2005). Individuals with low education levels, low

income, physical and age limitations must be taken into consideration.

In this society, a person with no computer knowledge is seen frequently as disqualified for work, seeing as even in small companies or offices, information systems are present. Almeida (2005) states that “consequently low income and unemployment is created and the cycle of poverty and hunger becomes more intense, which leads to the economy cooling down and the consequent shocks before exterior market competitors, not to mention internal aggravating factors, like the proliferation of shanty towns, the increase in violence and market prices.”

Social exclusion and digital exclusion are mutually cause and consequence. Citizens that fit in one or more types of social exclusion previously seen can be inhibited from following the technological evolution, becoming members of the digital exclusion, creating what is called “digital apartheid”.

Pierre Levy, french philosopher and thinker in the technology and society area, quoted by Gabriela P. Vesce, in an article for Info Escola (Info School) (2023), stated that “every new technology creates its excluded”. The statement does not aim to attack technology, but remind “that, for example, before phones there were no people without phones, in the same way that without the alphabet there wouldn’t be illiterates.”

Thereby, “people that due to illiteracy or low income do not utilize technological tools can be considered digitally excluded. On the other hand people that, despite having a favorable financial condition and school education, are resistant to the changes and don’t get involved with new technologies, become outdated and become members of the society of digital exclusion and consequently of the social exclusion, seeing that they begin to have a harder time getting jobs, developing their careers, doing school research, etc. (Almeida, 2005)

The solution to the digital exclusion problem goes beyond the implementation of telecenters and making available terminals of public access. Both digital and social exclusion need to be faced

together, “analyzing the social and economic characteristics that impact the process of digital inclusion and being aware that the non-participation of individuals in the technological process affects the country socioeconomically.” (Almeida, 2005)

Thus, we understand that true digital inclusion, the true Global Village, can only happen when the economy, the technology and the institutions are treated as living and interdependent systems in which people are not seen only as objects to be utilized for exclusive purposes.

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Educational Practice in the Sierra Tarahumara: Challenges and Expectations before the New Mexican School

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ABSTRACT

Indigenous education in Mexico has been a great challenge within political agendas, due to the difficulty in closing the abyss between the goals pursued and the achievements achieved. The purpose of this contribution is to present a diagnosis made on the teaching practice in primary education of the Indigenous Education subsystem in the Sierra Tarahumara of Chihuahua, Mexico, based on visions and meanings constructed by participating actors: – parents – as well as teachers and directors responsible for this task; In a second moment, they were analyzed within educational policies generated to address this educational modality: proposals, achievements and challenges still in force at the beginning of the third millennium. At the state level, between 2013 and 2015, 294 questionnaires were applied to teachers or directors of indigenous education and during 2016-2017, 16 in-depth interviews were conducted with: directors or teachers and parents of rarámuri children.

Keywords: education, indigenous, teachers, sierra tarahumara.

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Educational Practice in the Sierra Tarahumara: Challenges and Expectations before the New Mexican School

La Práctica Educativa en la Sierra Tarahumara: Retos y Expectativas Ante la Nueva Escuela Mexicana

Josefina Madrigal Luna^α, Celia Carrera Hernández^σ & Martha Vergara Fregoso^ρ

ABSTRACT

Indigenous education in Mexico has been a great challenge within political agendas, due to the difficulty in closing the abyss between the goals pursued and the achievements achieved. The purpose of this contribution is to present a diagnosis made on the teaching practice in primary education of the Indigenous Education subsystem in the Sierra Tarahumara of Chihuahua, Mexico, based on visions and meanings constructed by participating actors: – parents – as well as teachers and directors responsible for this task; In a second moment, they were analyzed within educational policies generated to address this educational modality: proposals, achievements and challenges still in force at the beginning of the third millennium. At the state level, between 2013 and 2015, 294 questionnaires were applied to teachers or directors of indigenous education and during 2016-2017, 16 in-depth interviews were conducted with: directors or teachers and parents of rarámuri children.

Keywords: education, indigenous, teachers, sierra tarahumara.

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RESUMEN

La educación indígena en México ha sido un gran reto dentro de las agendas políticas, por la dificultad para cerrar el abismo entre los fines perseguidos y los logros alcanzados. Este aporte tiene como propósito presentar un diagnóstico realizado sobre la práctica docente en educación primaria del subsistema de Educación Indígena en la Sierra Tarahumara de Chihuahua, México, partiendo de visiones y significados construidos por actores participantes: – padres de familia–, así como maestros y directores responsables de este quehacer; en un segundo momento, se analizaron las políticas educativas generadas para atender esta modalidad educativa: propuestas, logros y retos aún vigentes en los inicios del tercer milenio. A nivel estatal entre el 2013 y 2015 se aplicaron 294 cuestionarios a maestros o directores de educación indígena y durante el 2016- 2017, se realizaron 16 entrevistas en profundidad a: directores o maestros y a padres de niños rarámuris.

Palabras clave: educación, indígena, profesores, sierra tarahumara.

I. INTRODUCTION

The purpose of this work is to present the results of a diagnosis carried out on the exercise of educational practice in the Sierra Tarahumara in Mexico, in the field of indigenous primary education; Here we analyze the prevailing conditions in these processes through which the Indigenous Education Subsystem concretizes the right to education of indigenous communities. Likewise, an approach is made to some

government educational policy proposals for indigenous education in basic education throughout the 20th and early 21st centuries; Some of their approaches, achievements achieved, and the challenges currently faced as part of the pending agenda identified today are highlighted.

This contribution becomes relevant, because there are few studies or diagnostic exercises on the educational practice of indigenous primary education in contexts with the original Rarámuri population, which are developed taking into account visions and meanings that the participating actors themselves give to this process, -parents, teachers and managers, -. It is equally important, as the study focuses more on the search for meanings or the meaning assigned to experiences lived in the daily educational practice within Indigenous Primary Education in the Sierra Tarahumara, than on statistical results.

Según Gómez (2008, p. 3), “La práctica educativa es una actividad compleja que está determinada por una multiplicidad de factores, entre ellos: las características de la institución, las experiencias previas de los alumnos y profesores, así como la capacitación que han recibido estos últimos” (2008, p. 3). Desde el punto de vista de este autor, la práctica educativa es una actividad sumida en la complejidad, porque en ella se entremezclan un conjunto de elementos: juega un papel esencial la institución, por la cultura escolar que sustenta; las experiencias previas de los alumnos, con gran valor, si se considera que la solidez de saberes previos, propicia la construcción de aprendizajes significativos; esto mismo aplica para los maestros, los saberes previos adquiridos a lo largo de su formación inicial y continua, se constituyen en herramientas pertinentes para facilitar a sus alumnos la consecución de nuevos aprendizajes, implementando metodologías innovadoras y diversas formas de enseñanza.

Por su parte Badía (2019), denomina práctica educativa al conjunto de las actividades desarrolladas por el profesor, aquellas que pueden estar vinculadas de manera directa o indirecta, a procesos de enseñanza - aprendizaje y evaluación de los contenidos curriculares: “a) El diseño y/o planificación de la enseñanza. b) La

actividad-interacción educativa dentro del aula (profesor, contenidos, alumnos). c) La reflexión posterior sobre la docencia en el aula.” (p. 2).

La práctica educativa, en el ámbito de la educación indígena es un quehacer ya presente a la llegada de los españoles, eran prácticas culturales comunes en formas de vida de algunos grupos originarios de México como los aztecas o mexicas. Más tarde, en el transcurso del proceso colonizador, esta tarea la ‘asumen’ los encomenderos y misioneros. Inicialmente se genera con el propósito de cristianizar y/o alfabetizar los grupos originarios; pero en esencia, el fin que se persigue en la mayoría de los casos es lograr una dominación cultural, ideológica y laboral (Madrigal, 2022):

En el siglo XVI y XVII, aparte de los encomenderos - quienes más que educar, explotaban a los indígenas-, la alfabetización de los pueblos originarios estuvo esencialmente a cargo de los misioneros, los cuales realizaban sus prácticas sin una legislación específica que tuviera la intención de orientar de manera genérica este trabajo en la Nueva España. (p. 25)

Sin embargo, en México ya en los inicios del siglo XX, es un hecho que la educación indígena constituye un renglón considerado en las agendas políticas gubernamentales. Dentro de las primeras legislaciones que emergen al respecto, está el decreto de creación de las Escuelas Rudimentarias (1911), que en el Art. 2º puntualiza: “Las escuelas de instrucción rudimentaria tendrán por objeto enseñar principalmente a los individuos de la raza indígena a hablar, leer y escribir el castellano; y a ejecutar las operaciones fundamentales y más usuales de la aritmética”, sin embargo, los resultados de esta legislación no fueron muy alentadores por la crisis social y económica prevaleciente y los pocos recursos asignados a ello, pero estos son sólo los inicios. Posteriormente aparece la política educativa de la “Escuela Rural Mexicana”, la cual dio continuidad a la educación de los pueblos originarios, en donde no se trabajó la educación indígena de manera separada, sino que fue una propuesta que atendió a la par grupos originarios y mestizos

habitantes de zonas rurales marginadas, una icónica experiencia fue el trabajo que Moisés Sáenz (Sáenz, 1936), desarrolla en Carapan en el estado de Michoacán.

Pero en esencia, la valía de la Escuela Rural Mexicana, es que aparece en ese entonces la iniciativa de conformar una estrategia para atender de manera específica a los pueblos autóctonos, con ese propósito se crea “La Casa del estudiante Indígena” en el Distrito Federal, que ofreció educación a jóvenes originarios provenientes de diversos grupos indígenas del país, que al regresar a sus contextos habrían de ser los catalizadores de la Educación Indígena, pero que como otros proyectos no tuvo el impacto esperado (Vergara, 2021).

De ahí en adelante emergen instancias ex profeso de atender o impulsar la educación indígena; por mencionar algunas: en 1948 el Instituto Nacional Indigenista, en 1978 se crea la Dirección General de Educación Indígena y en el 2001 la Coordinación General de la Educación Intercultural y Bilingüe. Desde esta perspectiva, el Sistema Educativo Mexicano se reconoce como una de las mayores ofertas de educación indígena en América Latina. Pero pese a los esfuerzos, los logros no han estado a la altura de los fines perseguidos, los problemas educativos en atención a grupos autóctonos, son los mismos del siglo XIX (Muñoz, 2004).

Los lineamientos creados con el afán de orientar la educación indígena, son pautas que marcan rumbos delineados con la finalidad de impulsar el desarrollo de los grupos humanos originarios de México a quienes están dedicados. Empero, el proceso de transición de ley a práctica educativa no es un trabajo sencillo. Al reconocer que la práctica educativa es un fenómeno histórico social multidimensional, se hace necesario revisar sus antecedentes contextuales, conformados por circunstancias que se acercan a ella de manera transversal o tangencialmente; elementos a favor, pero también en contra, que es precisamente lo que se analiza en este documento.

Uno de los aspectos que ha frenado esencialmente el avance de la educación indígena, son las

condiciones de miseria en que viven los pueblos originarios latinoamericanos desde inicios de la colonia y que actúan a manera de pesadas cadenas que vienen arrastrando y les impide avanzar; se les privó de sus mejores tierras y se les obligó a realizar trabajos forzosos sin recibir el pago justo. La situación histórica de miseria, explotación y enajenación que se ejercía sobre estos pueblos, no ha cambiado del todo en el momento actual; se siguen identificando prácticas explotadoras y ejercicios de manipulación que tienen el afán de continuar sometiéndolos en beneficio de diversos grupos hegemónicos (Madrigal, 2022).

De acuerdo al Instituto Nacional de Estadística Geografía e Informática (INEGI), en México asciende a 23.2 millones el número de personas de tres años y más que se autoidentifican como indígenas, lo cual corresponde a un 19.4 % del total de la población del país (2022):

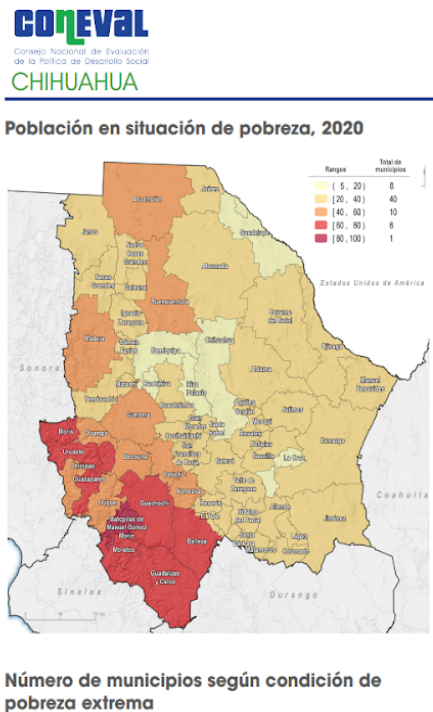
Con base en los resultados del Cuestionario Ampliado del Censo de Población y Vivienda 2020, se estimó que, de acuerdo con su cultura, 23.2 millones de personas de tres años y más se autoidentificaron como indígenas. De estas, 51.4 % (11.9 millones) fueron mujeres y 48.6 % (11.3 millones), hombres (INEGI, 2022, p. 1).

Sin embargo, dicha población, vive en condiciones de alta marginalidad; de acuerdo al programa Nacional de Pueblos Indígenas 2018-2024, basado en datos del INEGI, se especifica que en México del 2010 y 2015, la situación de pobreza entre la población hablante de lengua indígena asciende al 77.6%, a diferencia del 41% que corresponde al porcentaje nacional. De igual manera, entre los hablantes de lengua indígena se identifican los más altos índices de pobreza extrema, al alcanzar en este mismo lapso un 34.8%, en contraste al porcentaje nacional de solo el 5.8%.

En un análisis por estados sobre los índices de pobreza extrema, Chihuahua se encuentra entre aquellos con menores porcentajes, - menor o igual al 3.8% - (Coneval, 2023_a). Sin embargo, en un examen minucioso, es posible percatarse de la situación contrastante hacia su interior. En este

estado se encuentra Batopilas, uno de los municipios con más alto rango de pobreza a nivel nacional, que va del 80 al 100%. Se identifican además otros ocho municipios que al igual,

presentan un alto rango de pobreza, oscilando del 60 al 80%; estos municipios son: Moris, Uruachi, Guazapares, Maguarichi, Morelos, Guachochi, Guadalupe y Calvo, y Balleza (Coneval, 2022, p. 78).



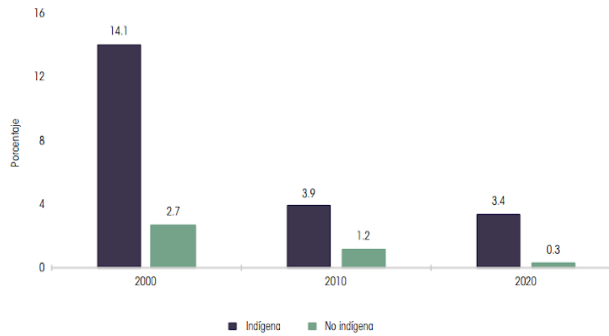
La situación es preocupante, si se considera de acuerdo a información del Instituto Nacional de Pueblos Indígenas (INPI), que los municipios del Estado de Chihuahua anteriormente mencionados con altos rangos de pobreza, son a su vez, los habitados por un alto porcentaje de población indígena de la etnia tarahumara o rarámuri sobre la cual se desarrolla este estudio (INPI, 2015). Por lo que se puede afirmar que los grupos indígenas en este contexto, viven en situación de rezago social, lo cual frena la tarea educativa.

En un análisis realizado por el Consejo Nacional de Evaluación de la Política de Desarrollo Social (Coneval, 2022, p. 22), sobre las condiciones del analfabetismo en México, se visualiza de manera ilustrativa la situación que guarda la educación indígena en el momento actual. Recurriendo a un comparativo de la tasa de analfabetismo, en el 2000 entre la población no indígena se encuentra en un 2.7%, mientras que entre la población indígena asciende al 14.1%; en el 2010, el analfabetismo en la población no indígena bajó al 1.2%, de la misma manera, el analfabetismo entre la población indígena tuvo una disminución

considerable, presentando una tasa del 3.9%; por último, para el 2020, la tasa de analfabetismo entre la población no indígena había disminuido al .3%, mientras que entre la población indígena tuvo una disminución, pero relativamente menos significativa, pasando de 3.9% del 2010 al 3.4% en el 2020.

Si bien, la diferencia en la tasa de analfabetismo de una década a otra entre la población indígena y no indígena va en decremento; se observa que la población indígena avanza a pasos más lentos hacia el logro de la alfabetización universal.

Gráfica 1. Tasa de analfabetismo en jóvenes de 15 a 24 años, según condición étnica, México 2000, 2010 y 2020



Fuente: elaborado por el CONEVAL con base en CEPAL (2014: gráfico IV.17) e INEGI (2021).

Del mismo modo, tomando en consideración informes de la Secretaría de Educación Pública (SEP), quien presenta indicadores de educación básica avalados por la Dirección General de Planeación, Programación y Estadística Educativa en el ciclo 2021 – 2022; puede afirmarse que en este lapso el nivel de educación primaria a nivel nacional alcanza una eficiencia terminal del 97 % (SEP, 2022, p. 25). En un análisis a nivel estatal, en el Estado de Chihuahua la eficiencia terminal alcanza el 100% (SEP, 2022, p. 89). Información estadística satisfactoria, pero que carece de punto de referencia para conocer el aprovechamiento escolar. De manera extraoficial, existe información que por cuestiones de pandemia por Covid 19, se da indicaciones al profesorado de disminuir los índices de reprobación.

Una situación grave, si se toma en cuenta que la contingencia sanitaria incuestionablemente alteró la práctica educativa cotidiana, provocando un caos que ralentizó estos procesos. En informe de la Comisión Nacional para la Mejora Continua de la Educación (MEJOREDU, 2021), donde se analizan Indicadores Nacionales de la Mejora Continua de la Educación en México, Cifras del ciclo escolar 2019-2020; se realiza un análisis de las condiciones contextuales que antecedieron el desarrollo de la práctica educativa en tiempos de pandemia en zonas aisladas y en aquellas con alta densidad de población indígena:

En localidades de menos de 2 500 habitantes, 86.4% de las viviendas no contaba con computadora o tableta, y 9 de cada 10 no tenían alguno de estos dispositivos junto con conexión a internet. En los hogares indígenas los porcentajes fueron similares; 85.5% no tenía computadora o tableta, y 9 de cada 10,

además, no disponían de internet. En zonas de alto y muy alto rezago social la disponibilidad de estos recursos en las viviendas con población en edad escolar fue mínima; 6.2% tenía computadora o tableta, y apenas 3.3%, internet. (MEJOREDU, 2021, p. 38).

Actualmente es reconocido que la población indígena constituye un grupo importante de la población mexicana:

...grupo en el que históricamente se han presentado los mayores porcentajes de población en situación de pobreza y con carencias sociales. En regiones del país como la Tarahumara (sur de Chihuahua), del Gran Nayar (sur de Durango y norte de Nayarit), la Huasteca (sureste de San Luis Potosí, norte de Hidalgo), de la Montaña y Costa (este de Guerrero), en la región de la Mixteca, de la sierras, Papaloapan e Istmo (todas en Oaxaca) y en las fronteras conjuntas de Yucatán y Quintana Roo hay municipios en los que al menos el 80 % de la población es indígena. (Coneval, 2022, p. 19)

Lo cual se constituye en evidencias, para afirmar que los grupos indígenas en México, actualmente enfrentan situaciones de alta vulnerabilidad económica, y de rezago social; lo que los pone en desventaja respecto a los fines educativos, que, por otra parte, son extraños a su cultura. Los propósitos educativos se presentan en el marco de un currículo creado desde una visión occidental del conocimiento, altamente indiferente a los saberes de las culturas originarias. Por tanto, es entendible que al momento en que los alumnos de educación primaria indígena se enfrentan a

procesos de evaluación nacional, obtengan los niveles más bajos de aprovechamiento escolar.

Un ejemplo de ello, se encuentra en la evaluación nacional del 2018 sobre aprovechamiento escolar de los alumnos de 6º. Grado de primaria en Matemáticas que, el Instituto Nacional para la Evaluación de la Educación (INEE) realiza dentro del Plan Nacional para la Evaluación de los Aprendizajes (PLANEA). En el Nivel I, que es el más bajo, el mayor porcentaje lo obtienen alumnos de 6º. Grado de las escuelas primarias del subsistema indígena ascendiendo a un 77.5 %; las comunitarias casi en igual proporción que el caso anterior, alcanzan un 76.6 %; las generales públicas presentan un 60.9% y en el caso de las privadas, el porcentaje desciende a un 30.9 %.

A diferencia, en el Nivel IV, el porcentaje más alto en aprovechamiento escolar con el 22%, lo obtienen las escuelas primarias particulares; en orden decreciente, las escuelas primarias regulares llegan al 7.1 %; las primarias indígenas presentan un 2.6 %, sólo ligeramente más arriba que las comunitarias, las cuales sólo alcanzaron un 1.8 %, (INEE, 2018). Lo cual corrobora, que los grupos indígenas, presentan de igual manera al igual que un rezago social, un rezago educativo.

No obstante, a que, la prueba PLANEA presenta una visión reducida de la realidad educativa estudiada, da elementos para entender la situación crítica, de desventaja y grandes retos que enfrentan los grupos indígenas en su intento de acceder a las propuestas educativas que se ofrecen desde los parámetros de la educación regular.

En la actualidad, en la práctica educativa de la Sierra Tarahumara que se desarrolla con el grupo originario rarámuri, como en todo fenómeno de la realidad, concurren infinidad de elementos. La importancia de este artículo estriba esencialmente en su énfasis por identificar desde diferentes perspectivas, - normatividad, padres de familia, maestros y directivos - ¿Cuáles son los logros, tareas pendientes, problemáticas sentidas y vividas por los agentes educativos implicados en la educación indígena?, entender, además, ¿Cuáles son los alcances y tropiezos de la

educación indígena en la segunda década del siglo XXI?

A partir de este estudio, emerge un diagnóstico de la situación que guarda la educación primaria indígena en el momento actual, como punto de referencia para los hacedores de políticas públicas, profesionales de la educación o investigadores interesados en entender esta problemática, o bien, transformadores sociales que anhelan contribuir a un cambio de la realidad educativa que este estudio presenta.

II. CONSIDERACIONES METODOLÓGICAS

El presente diagnóstico se desarrolló a partir de la investigación “La educación intercultural desde la voz de los agentes educativos. Un estudio en Jalisco, Chiapas, Chihuahua y Guanajuato”, con el propósito de ofrecer un panorama de la práctica educativa que se desarrolla en este caso de manera específica en escuelas primarias indígenas que atienden niños rarámuris en el estado de Chihuahua. El estudio es financiado por el Fondo Sectorial de Investigación para Educación, convocatoria SEP/SEB-Conacyt, con número de referencia 175995.¹

Este estudio es cualitativo; por el tipo de investigación se considera esencialmente naturalista, al analizar el objeto de estudio tal cual sucede en la realidad. En tanto que, para el análisis de datos recabados en el trabajo de campo, se utiliza el método fenomenológico, porque resulta ser el más apropiado para analizar la experiencia de vida, que en este caso es de sujetos que viven inmersos dentro de la cotidianidad de la práctica educativa indígena, y que paulatinamente van dando sentido a sus experiencias. A propósito de ello, la fenomenología “Considera que los seres humanos están vinculados con su mundo y pone el énfasis en su experiencia vivida, la cual aparece en el contexto de las relaciones con objetos, personas,

¹ La investigación fue coordinada a nivel nacional por la Dra. Martha Vergara Fregoso, en Guanajuato por la Dra. Rosa Evelia Carpio Domínguez, en Chiapas por la Dra. Nancy Leticia Hernández y en Chihuahua por la Dra. Josefina Madrigal Luna. En este último estado también colaboran en el proyecto la Dra. Yolanda Isaura Lara García, Dra. Celia Carrera Hernández y la Lic. Adelina Hernández Ayala.

sucesos y situaciones” (Álvarez-Gayou, 2003, p. 86).

El proceso de investigación se desarrolló en dos fases: la primera de ellas de 2013 al 2015, en donde se aplicó un cuestionario a 294 maestros y directores, que en ese tiempo se desempeñaban en la práctica pedagógica de educación primaria indígena en el contexto de la Sierra Tarahumara, atendiendo niños del grupo originario rarámuri. El proceso de toma de datos contó con el apoyo del Departamento de Educación Indígena del Estado de Chihuahua, quien contribuyó con la distribución de los cuestionarios para que fueran contestados por docentes y autoridades educativas; del mismo modo, una vez llenado el instrumento, lo hizo llegar nuevamente al equipo de investigación responsable, investigadores de la Universidad Pedagógica Nacional del Estado de Chihuahua (UPNECH). En un segundo momento, durante el 2016- 2017, se efectuaron visitas a escuelas de educación primaria indígena, donde se realizaron 16 entrevistas en profundidad, respectivamente, a padres de familia, maestros y directivos de cuatro escuelas indígenas visitadas en la región de Guachochi, Chihuahua. Los maestros y autoridades fueron contactados por los inspectores a quienes se les informó de la visita de los investigadores, mientras que los padres de familia fueron invitados por los docentes o directores de las escuelas participantes.

III. PRESENTACIÓN DE RESULTADOS: LA EDUCACIÓN PARA EL PUEBLO RARÁMURI

3.1 Los rarámuris de la Sierra Tarahumara en Chihuahua, México

3.1.1 El refugio rarámuri, la Sierra Tarahumara

Los tarahumaras o rarámuris, son un grupo originario del norte de México, habitante de la Sierra Tarahumara. Este espacio montañoso constituye una parte importante de la Sierra Madre Occidental, la cual nace en el vecino Estados Unidos, y se prolonga atravesando el estado de Chihuahua, además de Sonora, Durango, Zacatecas, Aguascalientes, Nayarit, hasta culminar en Jalisco. La Sierra Tarahumara abarca un espacio geográfico de aproximadamente 60 mil kilómetros cuadrados,

ubicados en el cuadrante suroeste del estado chihuahuense y conformado por diversos municipios que tienen en común altos porcentajes de habitantes de pueblos originarios, donde predominan los rarámuris que viven dispersos en pequeñas rancherías y poblados pertenecientes a los municipios de Balleza, Batopilas, Bocoyna, Carichí, Chínipas, Guachochi, Guadalupe y Calvo, Guazapares, Guerrero, Maguarichi, Morelos, Moris, Nonoava, Ocampo, Temósachi, Urique y Uruachi (INPI, 2017).

La Sierra Tarahumara se ve enriquecida por las culturas originarias que en ella habitan - tarahumaras, tepehuanes, pimas, guarojíos y mestizos -; además por la majestuosidad de sus paisajes de gran variedad climática y de grandes contrastes. Aquí se pueden encontrar bosques de altas montañas, donde resulta icónico el Cerro de Mohinora y las barrancas profundas reconocidas por su belleza a nivel internacional, entre las que se pueden enumerar las Barrancas del Cobre, de Urique, Sinforosa y de Batopilas. Por lo que aquí se encuentran climas cálidos en las barrancas, con diversidad de flora y fauna silvestre; el clima del bosque, rico en maderas, el cual presenta temperaturas frías durante el invierno y durante el verano suele estar templado y lluvioso; además se localizan regiones de grandes pastizales en municipios que cuentan con planicies, o propiamente con un clima denominado matorral o desierto, apto para la cría de ganado.

Del mismo modo, en esta región se identifican aspectos contrastantes de carácter social, grupos originarios como el rarámuri, viviendo sumidos en la pobreza o pobreza extrema, y amplios grupos de población, que gozan de un aceptable estado de bienestar (Coneval, 2023).

3.1.2 Los Rarámuris en la Actualidad

Los rarámuris inicialmente un pueblo nómada, que se desplazaba libremente entre llanuras y montañas viviendo de la caza, pesca y recolección, con la llegada de los españoles se ven impelidos a sedentarizarse al ser replegados, obligados a dejar sus mejores tierras y vivir generalmente en los lugares más inhóspitos de la sierra. En su contacto con los españoles mejoran sus ya iniciadas

técnicas agrícolas y la ganadería de subsistencia. Actividades que hasta el día de hoy son la base de su economía; cultivan esencialmente maíz, papa y frijol; crían aves de corral, borregas, cabras y en menor medida ganado vacuno; son además buenos artesanos: elaboran ollas de barro, petates, canastas de zacate, violines entre otros objetos, con lo cuales logran obtener algunos ingresos extra. Otra forma de obtener recursos, es la venta de madera de sus ejidos, del trabajo que desarrollan los hombres como obreros contratados en aserraderos, o por agricultores de la región, también se desplazan a otros lugares del estado a trabajar como albañiles o jornaleros en huertos de manzana, pizca de chile, cebolla por mencionar algunos; las mujeres se emplean como trabajadoras domésticas. Agregando que en los trabajos que desarrollan, es común que reciban un trato poco digno, cubriendo largas jornadas de trabajo, por un sueldo injusto en la mayoría de los casos.

Algo plausible de mencionar, es que, con el fortalecimiento de la educación indígena a nivel nacional, este grupo originario ha encontrado en el magisterio, o en instancias gubernamentales como la Coordinación Estatal o en el Instituto Nacional Indigenista, nichos laborales a través de los cuales obtiene una mejor forma de vida.

Sin embargo, a partir del análisis de las evidencias empíricas tomadas en torno al contexto en que se inserta la práctica educativa de educación primaria indígena del grupo de docentes que trabajan en esa región, se puede constatar la situación crítica prevaleciente; crisis social que ha ido acentuándose hasta el día de hoy. Por mencionar un caso, una maestra entrevistada comenta que dejó de estudiar porque mataron a su esposo, fue una situación muy traumática para la familia, eso le provocó temor y la desanimó a continuar en el programa.

En una de las visitas a las escuelas para la realización de las entrevistas en profundidad se escuchan disparos, al parecer de una metrallera. El maestro que participa en la entrevista comenta “No se asuste, maestra, esto por acá es muy común”. Con el tiempo, se han normalizado las luchas de las mafias por el control del territorio a

plena luz del día, poniendo en riesgo a estudiantes, maestros y toda persona no implicada que esté cerca del lugar del conflicto.

Al convertirse la Sierra Tarahumara en una zona insegura e impredecible, se generó el deterioro de la vida cotidiana, la inseguridad en el traslado de un lugar a otro a horas de la madrugada o muy noche, mantienen a los padres preocupados por sus hijos cuando se desplazan a hacer tareas o a reuniones con amigos. Poco a poco las comunidades se han tenido que acostumbrar a vivir en la zozobra y estar en una constante alerta. Lo que ha interrumpido en varias ocasiones la continuidad de la práctica educativa.

En una gran parte de la población rarámuri, de unos años a la fecha las condiciones de vida se han empeorado; si bien, con antelación los indígenas ya participaban con los mestizos en la siembra y cultivo de estupefacientes (Granados, 2006); ahora se torna más difícil la situación por la incidencia de grupos delictivos violentos, que captan por la fuerza jóvenes indígenas para obligarlos a delinquir o iniciarlos en el consumo de drogas. Estos delincuentes además saquean las riquezas ejidales tomándolas como si fueran propias, generalmente haciendo un uso irracional de los recursos forestales.

La falta de empleos, baja productividad agrícola, cambio climático, despojo territorial, trabajo mal remunerado, hambre (INI, 1988), desnutrición por falta de recursos y una mala cultura alimentaria, han provocado la migración de familias indígenas completas a las ciudades.

Una maestra precisa, “*Las fuentes de trabajo faltan; eso ha sido toda la vida. Los padres se van en enganches a trabajar en huertos de manzana, chile o a buscar trabajo. Se llevan a los niños, pierden su cultura*”. A lo que se agrega la presión ejercida por las mafias, “*Tenemos ocho días que no tenemos clase por el ataque de los mafiosos a una familia de la comunidad*”.

3.2 Aspectos Teleológicos Subyacentes a la Educación Intercultural Indígena

La dimensión teleológica alude a los fines que subyacen a toda actividad que desarrolla el

hombre, quien a diferencia de los animales se involucra en proyectos con plena conciencia de los fines que persigue. La educación intercultural como toda propuesta educativa, se ve impelida por las intencionalidades de aquellos que la plantean. “El sujeto que se traza fines es un ser activo, dotado de fuerzas que existen en él como capacidades, como impulsos” (Yurén, 2008:25). La propuesta curricular de la educación intercultural, tiene tras de sí una larga historia de luchas y legislaciones a favor de una educación incluyente y equitativa (SEP, 2006), en la cual se favorezca el diálogo, el rescate de los conocimientos provenientes de los diversos grupos culturales que confluyen en el aula clase, considerándolos significativos e igualmente válidos; rompiendo así con posturas etnocentristas, que infunden la existencia de conocimientos universalmente válidos, en detrimento de otros. En esencia, la educación intercultural plantea la necesidad de promover la capacidad de cuestionamiento de los procesos histórico sociales, fortaleciendo así una actitud crítica.

Pero no es una tarea sencilla concretar la propuesta de la interculturalidad, porque al docente de educación primaria indígena y a todo aquel que se involucre en su concreción, se le exige adquirir una formación curricular que responda a las exigencias de tal propuesta. Lo cual es todo un reto, porque no solo existen interrogantes sobre cómo trabajarla, sino, además, existe confusión de cómo entenderla.

La interculturalidad es un concepto polisémico, por lo que, al momento de hablar de ella y de su forma de trabajar, se entra en un terreno movedizo. La educación intercultural, -al menos en teoría-, vino a sustituir las tendencias asimilacionistas que caracterizaron las propuestas de educación indígena hasta la década de los noventas del siglo XX.

Los orígenes del término interculturalidad (Dietz, 2017), se identifican en los discursos antropológicos latinoamericanos en la década de los cincuenta del siglo XX, que desaparecen de escena, y posteriormente regresan nuevamente a América Latina a finales del siglo, entremezclados

con posturas interculturales europeas y estadounidenses.

En México, la propuesta de la Educación Intercultural Bilingüe (EIB), o Educación Bilingüe Intercultural (EBI), se instaura en los años noventa del siglo XX; en este contexto, los recursos obtenidos de ventas de empresas del pueblo por las políticas neoliberales de este lapso, y la ayuda ocasional que se le dio a los desamparados, hizo pensar que todo iba por buen camino, pero no fue así. La educación intercultural no es compatible con modelos económicos neoliberales, que entraron en escena de forma paralela a la emergencia de la educación intercultural. Aun cuando la educación intercultural continúa vigente en los discursos gubernamentales, y en la agenda de los dirigentes políticos, en el terreno de la práctica se observa un esfuerzo poco destacado para llevarla al terreno pedagógico (Madrigal, J., Carrera, C. y Lara, Y. I., 2017).

Actualmente cuando se habla de interculturalidad, se da por sentado que se comparte una visión común sobre ello; empero, aun cuando estas sean muy cercanas, no existe consenso entre los investigadores, ni actores de la educación de lo que se entiende por educación intercultural. Al dar por hecho que ya se ha entendido el término en toda su esencia, hace que se postergue todo análisis serio, profundo, crítico, lo cual disminuye las posibilidades de transformación.

La interculturalidad:

...se presenta como un proyecto social amplio, una postura filosófica y una actitud cotidiana ante la vida. Es una alternativa para repensar y reorganizar el orden social, porque insiste en la interacción justa entre las culturas y las lenguas como figuras del mundo (Villoro, 1993) y porque recalca que lo decisivo es dejar espacios y tiempos para que dichas figuras se conviertan en mundos reales [SEP, 2006, p. 23].

Es posible que no exista plena conciencia en los grupos segregados del significado de la interculturalidad, al ser ignorada por los pueblos

originarios, prolongan estoicamente los procesos de dominación a los que han sido sometidos desde los inicios de la conquista. O bien, es común que aun cuando la educación intercultural es una propuesta educativa que encierra las mejores intenciones hacia los otros y hacia el propio pueblo; es aceptada en los discursos, pero al momento de exigir y luchar por ello, por ser una lucha que emerge de los oprimidos, es sofocada por el poderoso.

Taylor (2001), postula que la propuesta que se reconozca como intercultural, está obligada a trabajar para disminuir la desigualdad social entre los pueblos; luchar por un mundo más igualitario: “...rompiendo de esta forma la asimetría perjudicial, permitiendo que la coexistencia dialógica determine las relaciones dinámicas de la sociedad, de modo permanente, dando lugar a una participación real de los distintos sectores que conforman el espacio democrático” (p. 3).

En un análisis minucioso de lo que los actores de la educación entienden como interculturalidad, se encuentran visiones muy ligadas al concepto de multiculturalismo:

...multiculturalidad se entiende como la coexistencia de diversas culturas en un determinado territorio, en donde está presente el reconocimiento del otro como distinto, lo que no significa necesariamente que haya relaciones igualitarias entre los grupos. Por el contrario, en este escenario la diversidad se traduce en (o es sinónimo de) desigualdad [SEP, 2006, p. 22].

Así se identifica un amplio grupo de padres de familia y maestros que consideran que la interculturalidad se limita a la coexistencia; un maestro afirma *“la interculturalidad considera la diversidad en grupos: diferentes formas de pensar, de actuar y sentir, no sólo en la educación indígena”*. Se desgaja a la interculturalidad de todo sentido crítico de las relaciones de dominación y de sus fines transformadores, reduciéndose a un folklorismo; *“...entender a todas las culturas y lenguas, atender a la diversidad, la convivencia en sus celebraciones”*, *“...interacción de varias culturas*

y pueden interactuar entre ellas, representando sus costumbres y tradiciones de cada una”.

Otras posturas conceptuales se aproximan a lo que la interculturalidad aspira, ofrecer una educación equitativa e incluyente, aunque desgajándola de su valor crítico.: *“...una educación pensada desde ellos, con oportunidades iguales, sin discriminación a la educación indígena”*, *“...debe ser una educación de calidad, que cubra sus necesidades y no exista la corrupción y sea para unas minorías”*, *“...toma en cuenta toda la diversidad de ideas, creencias, formas de pensar, formas de vida para enseñar a los niños, sin desvalorizar las propias”*, *“...conociendo otras culturas y considerando lo mejor de cada una”* y como *“...el intercambio de conocimientos entre culturas”*.

Respecto a los fines que persigue la educación intercultural, en varios casos prácticamente se le asignan los mismos fines que a la educación indígena propia del siglo XX: que ayude a *“...hablar la lengua del niño”*, *“Rescatar la lengua indígena”*. Otros fines asignados son poco más avanzados, inclinados a la búsqueda de cambios sociales: *Que responda a sus necesidades, a lo que a ellos les interese”*, *“...conviviendo y practicando sus conocimientos entre niños de varias culturas”*, *“Para no batallar, para leer y escribir, para vender mejor su cosecha y sus animales, para buscar mejor trabajo”*.

Los maestros abrigan nobles ideales, el lograr para la niñez del pueblo indígena una educación semejante a la que tienen acceso estudiantes pertenecientes a grupos menos segregados:

Desearía que mis niños se especializaran profesionalmente, una educación a nivel superior, cerca de sus comunidades; si hubiera una educación con equidad, que se respete la cultura, que haya universidades para indígenas, no tan caras, entonces sí sería bueno. Pero lo más que se puede estudiar es el bachillerato; desertan; los niños rarámuri no terminan (E.M. Mayo, 2017).

Cuando hablan de los logros, algunos afirman que han sido elementales como los propios de la educación indígena no intercultural: *“...sí, porque*

a veces si les enseñan a los niños de su propia cultura”, “...hablar en su lengua”, “...aprenden a leer y escribir”.

Unos afirman que, si les ha ayudado la educación intercultural, porque es una herramienta para relacionarse con los otros de manera más equitativa y justa, ofrece... *“Una nueva forma de pensar y ver la vida. Mejorar su forma de trabajar y defender sus derechos”*, una madre de familia puntualiza, *“...es muy bonito aprender y saberse defender”*, otro padre comenta cuando se le pregunta en qué beneficia la educación intercultural a su hijo: *“Para no batallar, para leer y escribir, para vender mejor su cosecha y sus animales, para buscar mejor trabajo”.*

Los beneficios han sido pocos, persiste la dominación del pueblo rarámuri, un maestro afirma que los beneficios *“... no son tantos, está todo descontextualizado, siempre es como ha sido, para que trabajen para otros”, “...hasta cierto punto, pero existe mucha gente olvidada con pocos beneficios”.* En sus discursos afirman que sigue la dominación y manipulación de los indígenas por los poderosos: *“...muchos han sido segregados, se les toma sólo en cuenta en las campañas políticas”,* o bien, se afirma que no se alcanzan los fines educativos por la visión del mundo y de la vida que ostenta el rarámuri, una visión no capitalista: *“...no se han beneficiado la mayoría de ellos, tal vez porque ellos ven la vida de otra manera, viven de otra manera, tal vez para ellos es sólo aprender a escribir”.* Otras opiniones afirman que la educación intercultural con base a un currículo occidentalizado, incluso daña la cultura tarahumara: *“No ha ayudado, porque el niño tiene su cultura arraigada, llega a la escuela con su lengua, su vestimenta, distinta forma de comer y la modifican; a lo mejor se van a burlar de él, por su lengua, su comida”,* otra madre reafirma, *“Ya tengo aquí con los indígenas rarámuris casi 23 años y casi no hay beneficios como fiestas tradicionales, ya las están perdiendo; la misma comunidad no se organiza”.*

En una de las participaciones se opina *“...yo creo que, sí ha habido muchos beneficios, si hay muchos que sí han terminado sus carreras”,* un maestro indígena comenta *“Hasta cierto punto,*

tal vez si yo no hubiera estudiado, no tendría este trabajo, pero existe mucha gente olvidada con pocos beneficios”, algo que se sustenta por otro comentario *“no es mucho, es un beneficio muy coartado, muy politizado, de 20 o 30 niños, solo dos o tres terminan una carrera”.* Es una realidad, para una gran mayoría de los rarámuris siguen estando presentes infinidad de retos en el acceso a la educación intercultural. Los maestros y padres de familia coinciden al afirmar que algunos alumnos no avanzan, se quedan en el camino, desertan por la lengua o problemas económicos, porque desde la visión de uno de ellos, la educación intercultural no se ofrece con equidad, *“...las universidades son caras y están lejos de las zonas indígenas”,* a lo que se agrega *“La falta de fuentes de trabajo digno”* y el clima de violencia prevaleciente.

3.3 Dilemas propios de la práctica educativa de Educación Indígena en Chihuahua

A los retos contextuales en el desarrollo de la educación indígena en Chihuahua que se han venido trabajando en este aporte, hay que agregar otros; los que competen directamente a los procesos de concreción de las políticas educativas en la práctica educativa. Entre ellos, uno de los dilemas más acuciantes están los de *formación docente, de infraestructura, curriculares y actitudes de los actores involucrados.*

Respecto a la *formación docente,* puede afirmarse que aun cuando en el perfil de formación magisterial al momento de acceder al Subsistema de Educación Indígena se le exige que hable la lengua originaria, hasta hace poco no se respetaba este criterio y se admitían docentes sin hablar la lengua, en un afán de alcanzar la cobertura educativa.

De acuerdo a la Ley de Derechos de los Pueblos Indígenas del Estado de Chihuahua (2013), en el artículo 20, se expresa que:

Los integrantes de los pueblos y las comunidades indígenas tienen derecho a recibir educación en su idioma. Asimismo, a diseñar, implementar y a recibir una educación que garantice la revitalización, permanencia y desarrollo de sus idiomas,

cosmovisiones, saberes tradicionales y culturas, sin más restricciones que las que dicten las demás leyes en la materia.

El ideal normativo rebasa la realidad, de acuerdo a los hallazgos, de los 294 profesores a quien se les aplicó el cuestionario, el 91% son originarios de la sierra Tarahumara; sin embargo, no necesariamente forman parte del grupo rarámuri. De ellos, 144 reconocen hablar menos del 60% de la lengua rarámuri; 74 tienen un dominio del 60% al 80% y solo 46 afirman dominarla en más del 80%. Si un maestro reconoce hablar la lengua rarámuri, se reconoce como indígena, muestra orgullo por su cultura, y tiene altas posibilidades de influir de manera positiva en su rescate. De otra manera, el maestro que no habla la lengua indígena, o la niega, sin proponérselo, contribuye a la progresiva desaparición de la cultura.

A últimas fechas, ha aumentado la exigencia en la asignación de plazas al profesorado de educación indígena, se les demanda hablar la lengua originaria. Sin embargo, en Chihuahua, los esfuerzos gubernamentales en la formación de maestros no han sido suficientes para concretar sus políticas educativas. No se identifican escuelas normales indígenas que ofrezcan a jóvenes de grupos originarios una formación inicial en docencia. Solo se ofertan algunas licenciaturas o maestrías en educación intercultural, con tendencias profesionalizantes, más que en el énfasis en una formación pedagógica, a lo que se agrega que en ninguna de ellas se oferta en lengua originaria. La carrera de la docencia en el subsistema indígena en muchas ocasiones es algo circunstancial, oportunidades esporádicas que son aprovechadas por jóvenes rarámuris; por lo que muchos docentes ingresan al servicio con una insuficiente formación pedagógica, y se van formando ya en la práctica. (Madrigal, J., Carrera, C. y Lara, Y. I., 2017).

Respecto a los dilemas *de infraestructura*, se encuentra que, de los 294 maestros encuestados, 185 puntualizan que las malas condiciones en que se encuentran las escuelas y mobiliario, afectan el logro de los fines de la educación indígena; además, 197 maestros aseguran que, para el

tiempo en que se lleva a cabo la investigación, carecían en sus escuelas de material en lengua indígena tanto para maestros como para alumnos.

En cuanto a los dilemas *curriculares*, 187 docentes señalan que los contenidos del programa están fuera del contexto cultural, porque se elaboran desde la visión de la educación regular, ignorando la cultura del pueblo rarámuri. Pero también en la forma que el docente se enfrenta al currículo, 160 reconocen que tienen dificultad para adecuar los contenidos al contexto; en el caso de 184 maestros, consideran que su formación profesional es insuficiente para enfrentar los desafíos educativos, 176 coinciden en que les faltan conocimientos didácticos para enseñar los contenidos: “...conocer bien los métodos, igualmente las estrategias para los diferentes grados”, un maestro expresa, “...en cuanto a matemáticas y español, se nos dificultan las formas, estrategias de cómo enseñarles”. Y, sobre todo, se les dificulta brindar atención a niños con necesidades educativas especiales.

Por otra parte, algo que impide el logro educativo se visualiza desde ciertas *actitudes de los actores involucrados*, que tienen que ser reconsideradas, porque para que avance la educación, se tienen que sumar esfuerzos entre los diversos elementos que intervienen en el proceso.

Un total de 234 maestros enumeran entre los dilemas actitudinales que interfieren en el logro educativo, la indiferencia de los padres: “...la participación de los padres, a veces no les interesa la educación de sus hijos”, “...falta interés de los padres, para apoyar al niño y a la escuela”. Por lo cual es entendible el poco compromiso observado en el alumnado de educación primaria indígena ante la escuela; 262 docentes señalan que se enfrentan al agudo problema del ausentismo infantil. Lo cual termina irremediablemente por afectar el aprendizaje, por lo que el aprovechamiento escolar es marcado por 209 como otro de los problemas serios que se enfrenta en el ámbito de la educación indígena.

Sin embargo, posiblemente este no sea sólo un problema de indiferencia o de poca predisposición a la tarea educativa. Los problemas estructurales a

veces son más fuertes, al obligar a las familias a migrar en busca de sustento a causa del desempleo, llevando consigo a sus hijos o lo que es muy común, las madres solteras y algunos padres los dejan con los abuelos, quienes no siempre los envían a la escuela.

En el caso de los docentes, también se hace alusión a cuestiones actitudinales; En 191 casos, expresan los docentes que la falta de responsabilidad que ellos asumen ante la práctica educativa, impide el logro educativo. Y, por último, 143 de ellos, ven el problema educativo como una resistencia al cambio por parte de los docentes: *“hay que echarle ganas y tratar de mejorar”*.

En México, con la gestión del Lic. Andrés Manuel López Obrador se abren nuevas vías en la atención a los pueblos indígenas. En el Diario oficial de la federación del 6 de julio de 2020, se publica el Programa Sectorial de Educación 2020-2024, el cual en el apartado de glosario se reconoce la interculturalidad como:

Criterio de la educación que promueve la convivencia armónica entre personas y comunidades sobre la base del respeto a sus diferentes concepciones, opiniones, tradiciones, costumbres, modos de vida y del reconocimiento de sus derechos, en un marco de inclusión social.

Lo cual implica que, la educación ha de ser la vía a través de la cual el gobierno apoye a los pueblos indígenas mediante procesos equitativos, para que puedan acceder a nuevas formas de vida, de derecho, y justicia social. Lo cual es todo un reto, porque la desigualdad social es evidente, y mientras no mejoren significativamente los aspectos estructurales, la educación intercultural seguirá siendo una utopía.

Actualmente en esta gubernatura se considera a los pueblos indígenas y otros grupos en desventaja, como población que tiene prioridad en la atención de sus necesidades. Por lo que, para promover una educación más equitativa, se están otorgando becas a niños y jóvenes de los pueblos originarios para que puedan acceder a la educación. Esto implica una gran ayuda, pero

todavía ellos tienen que enfrentar los retos propios de la realidad social donde se inserta su existir.

IV. CONCLUSIONES

En este estudio se reconoce al Estado de Chihuahua como un lugar de grandes contrastes sociales y naturales; aquí coexisten grupos humanos que gozan de un aceptable estado de bienestar, con otros como los rarámuris, que se ven obligados a luchar día a día para poder subsistir. Este estado de México, por ser rico en ambientes naturales y culturas originarias, ha logrado un reconocimiento a nivel internacional.

Pero desgraciadamente, los grupos originarios en Chihuahua, a más de un siglo de normatividades que luchan por protegerlos de las prácticas de explotación a que se han sometido desde la llegada de los españoles y ofrecerles justicia social, aún siguen viviendo en las mismas condiciones de desventaja. Cuestión que se agrava, porque a últimas fechas la agricultura y ganadería de autoconsumo enfrenta condiciones climáticas inusitadas; de grandes sequías que disminuyeron las cosechas, y en algunos lugares de la Sierra Tarahumara, prácticamente las hacen inexistentes.

En cuanto a la práctica educativa en educación primaria indígena, el rezago educativo se hace evidente en zonas de alta etnicidad; aquí confluyen paralelamente rezago económico y educativo. Por otra parte, hay que agregar que el fenómeno de la pandemia y el aumento de grupos delictivos, también han contribuido paralelamente al estancamiento económico y educativo del pueblo rarámuri.

Por otra parte, el profesorado de la región rarámuri, y padres de familia valoran fuertemente los fines de la educación intercultural para los pueblos indígenas, algunos consideran que les han otorgado herramientas para defenderse de la explotación, y vivir en términos más igualitarios. Sin embargo, es una idea muy generalizada el que aún tiene tareas pendientes; no se ha rescatado la esencia de la educación intercultural, sigue asumiéndose desde una visión folklórica, y ha

dejado de lado el ofrecer una educación más igualitaria, con universidades y escuelas creadas para los indígenas y cerca de sus hogares o pueblos; de igual modo, no ha logrado romper con los esquemas de dominación, se siguen explotando los rarámuris y manipulando políticamente por candidatos o gobernantes sin escrúpulos.

Los maestros por su parte, en la encuesta que se les aplica, reconocen que el avance en la práctica educativa indígena se ve interrumpido por problemas de: *formación docente, falta de conocimientos didácticos y la lengua originaria; deterioro de la infraestructura de los edificios escolares y falta de material en lengua indígena; problemas curriculares en su dominio y contextualización de los aprendizajes. Por último, se alude a las cuestiones actitudinales de los actores involucrados, falta de compromiso de los maestros o apatía ante la educación por parte de padres y alumnos. Sin embargo, termina por considerarse que es posible que, en el caso de los padres de familia, su apatía a la escuela, se deba en gran parte no a problemas actitudinales, sino a problemas estructurales que les obligan a priorizar sus necesidades de subsistencia.*

En síntesis, la promesa de mejora de la educación indígena sigue siendo un desafío que hasta la fecha se ha dado más en los discursos que en la realidad socioeducativa. Actualmente, aun cuando hay grupos hegemónicos que bloquean el avance de la educación intercultural a pueblos indígenas, como el derecho a la entrega de los libros de texto gratuito que fueron secuestrados por el gobierno actual de Chihuahua en este ciclo escolar 2023-2024, y que no se entregó al alumnado de la escuela primaria regular ni indígena; existen altas expectativas, que en la propuesta de la Nueva Escuela Mexicana se avance en la mejora educativa y en la justicia social para los grupos originarios.

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India's New Education Policy: A Paradigm Shift in the Educational Landscape

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INTRODUCTION

In 2020, India unveiled its New Education Policy (NEP), signaling a monumental shift in the nation's approach to education. Coming after more than three decades since the last policy framework was laid out, the NEP aims to meet the changing dynamics of the socio-economic environment, technological advancements, and global best practices in the domain of education. Intending to rejuvenate the nation's educational structure, the policy reflects a blend of tradition with modernity, guiding the country's youth towards a future resonant with the ideals of a global citizen yet deeply rooted in Indian ethos.

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India's New Education Policy: A Paradigm Shift in the Educational Landscape

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I. INTRODUCTION

In 2020, India unveiled its New Education Policy (NEP), signaling a monumental shift in the nation's approach to education. Coming after more than three decades since the last policy framework was laid out, the NEP aims to meet the changing dynamics of the socio-economic environment, technological advancements, and global best practices in the domain of education. Intending to rejuvenate the nation's educational structure, the policy reflects a blend of tradition with modernity, guiding the country's youth towards a future resonant with the ideals of a global citizen yet deeply rooted in Indian ethos.

At the heart of the NEP is the aspiration to cultivate an innovative, research-centric, and holistic educational system that fosters critical thinking, creativity, and a strong sense of identity. The framework is not merely a revision of the syllabi or the introduction of new subjects, but a comprehensive rethinking of how education should be delivered, evaluated, and experienced in India.

As India strides forward in the 21st century, grappling with a rapidly changing global scenario, the NEP stands as a testament to the country's commitment to nurturing an educated, informed, and empowered generation. This journal seeks to explore the nuances of this policy, delving into its objectives, potential impacts, and the challenges that lie ahead in its implementation.

Keywords: policy, education, challenges, multidisciplinary, higher, approach.

Historical Context:

The story of India's education policies is deeply interwoven with its rich history and the journey of its nation-building process. To fully grasp the significance of the New Education Policy (NEP) 2020, it's essential to trace back to the policies that laid the foundational stones of the country's educational landscape.

1. *Pre-Independence Era*

Prior to colonial rule, India boasted a vibrant tradition of education, with renowned centers of learning like Nalanda and Taxila attracting scholars from across the world. However, the advent of British colonial rule transformed the indigenous system, replacing it with a Western model primarily geared towards administrative and clerical roles, suited to the needs of the Empire.

2. *Post-Independence Reforms*

Post-1947, a newly independent India grappled with the challenges of nation-building. The need for a cohesive and inclusive education system was palpable. The University Education Commission (1948-49) and the Secondary Education Commission (1952-53) were some of the first steps taken towards reshaping education in the country.

3. *The Education Policy of 1968*

The first official policy on education in India came in 1968, inspired by the report of the Kothari Commission (1964-66). The policy emphasized the importance of 'science' and 'technology' and promoted research and development. The '10+2+3' structure, which became widely recognized, found its origins in this policy.

4. The 1986 Policy and Modifications in 1992

In response to the challenges of the 1980s and the need to address the aspirations of an evolving India, the National Policy on Education (NPE) was formulated in 1986, with a revision taking place in 1992. This policy put greater emphasis on "System Renewal", "Special Constitutional Obligation", and "Early Childhood Care and Education".

Key Highlights of NEP 2020:

Holistic and Multidisciplinary Education

The New Education Policy (NEP) 2020 seeks to revolutionize the way students learn, emphasizing a holistic and multidisciplinary approach. This pivot marks a departure from the traditional siloed methods of education that compartmentalized knowledge. Here's an in-depth look at this aspect of the NEP:

1. Conceptual Foundation

The idea behind holistic and multidisciplinary education is to ensure that students develop a well-rounded perspective on various subjects. It encourages the convergence of arts, humanities, sciences, and professional fields, promoting intellectual exploration, creativity, and critical thinking.

2. Breaking Down Silos

Traditionally, Indian education has been divided into distinct streams like "arts", "sciences", and "commerce". NEP seeks to dismantle these rigid boundaries, allowing students to choose subjects across disciplines. A student, for example, could opt to study physics alongside music, or computer science with ancient Indian history.

3. Flexibility in Course Selection

The policy proposes significant flexibility in selecting subjects, ensuring that students aren't confined to predetermined subject combinations. This aims to cater to individual interests and talents, leading to a more personalized educational experience.

4. Emphasis on Critical Thinking and Creativity

By merging different disciplines, students are more likely to think critically and approach

problems with a creative mindset. They'll learn to see connections between disparate fields, fostering innovative thinking and problem-solving skills.

5. Implementation Challenges

While the shift is commendable, it also brings forth challenges. Traditional teaching methodologies, infrastructure, and evaluation systems have to adapt to this new approach. Teachers will need training to handle multidisciplinary classes, and institutions must update their resources and infrastructure.

6. Implications for Higher Education

Higher educational institutions will also witness a transformation. Undergraduate programs will become more integrative, and the rigid distinction between "professional" and "academic" courses will blur. Institutions like IITs will move towards more holistic and multidisciplinary education with more arts and humanities embedded within.

7. Preparing for a Globalized World

A holistic and multidisciplinary education aligns with global educational trends, preparing students for international opportunities and collaborations. As the world becomes more interconnected, professionals who understand and appreciate multiple disciplines will be in high demand.

New Pedagogical Structure

One of the most significant shifts proposed by India's New Education Policy (NEP) 2020 is the introduction of a new pedagogical and curricular structure for school education. This new structure is more aligned with the developmental needs and cognitive stages of students as they progress through their school years.

1. The 5+3+3+4 Structure: The new framework transitions from the conventional 10+2 system to a 5+3+3+4 structure. This corresponds to the age groups of 3-8 years, 8-11 years, 11-14 years, and 14-18 years, respectively.

2. Foundational Stage (5 years)

- Ages 3-6 (3 years of pre-primary education): This is recognized as a crucial period for cognitive development. Hence, the NEP

emphasizes early childhood care and education (ECCE) during these years, typically encompassing playschool, nursery, and kindergarten.

- Ages 6-8 (Grades 1 and 2): This forms the latter part of the foundational stage, focusing on building basic skills in literacy, numeracy, and fostering curiosity.

2. Preparatory Stage (3 years)

- Ages 8-11 (Grades 3 to 5): This stage introduces more formal classroom learning, emphasizing foundational literacy and numeracy. It combines play-based learning with a more structured academic curriculum.

3. Middle Stage (3 years):

- Ages 11-14 (Grades 6 to 8): Subjects become more specialized at this stage. Students are introduced to the core concepts of subjects, and experiential learning becomes pivotal. Skills like critical thinking, creativity, and collaboration are given importance.

4. Secondary Stage (4 years):

- Ages 14-18 (Grades 9 to 12): This is a more multidisciplinary phase, where students can pick and choose subjects across streams, breaking the conventional separation between arts, commerce, and science. This stage prepares students for higher education and professional fields.

- 5. *Flexibility in Curriculum:* Throughout these stages, the NEP emphasizes flexibility, allowing students to choose subjects according to their interests and aspirations. Traditional barriers between academic, vocational, and extracurricular activities are reduced, ensuring a holistic learning environment.

- 6. *Assessment Reforms:* The policy also proposes a shift in assessment methods. Board exams for Grades 10 and 12 will be made more holistic, testing core concepts and skills rather than rote memorization. Additionally, the policy introduces regular school-based assessments to reduce the high-stakes nature of board exams.

- 7. *Significance:* This pedagogical restructuring is designed with the understanding that a child's cognitive and emotional development evolves in stages. By tailoring education to align with these stages, the NEP aims to ensure better comprehension, retention, and application of knowledge.

Mother Tongue as Medium of Instruction

The emphasis on mother tongue as the medium of instruction is one of the notable features of India's New Education Policy (NEP) 2020. Here's a comprehensive examination of this aspect:

1. *NEP's Directive:* The NEP 2020 proposes that, wherever possible, the medium of instruction up to at least Grade 5, and preferably up to Grade 8 and beyond, should be in the child's mother tongue, regional language, or local language. This principle seeks to uphold the importance of understanding and comprehension in the foundational years of a child's education.

2. *Scientific Rationale:* Research has shown that children grasp foundational concepts more effectively when taught in their native language, especially during their early years. Cognitive skills, including the ability to absorb and process information, are enhanced when instruction is in a familiar language.

3. *Preservation of Cultural Identity:* By promoting mother tongues, the NEP also aims to preserve India's linguistic diversity and rich tapestry of languages. It strengthens the bond between culture, language, and learning.

4. *Potential Benefits*

- *Better comprehension:* Complex concepts, especially in subjects like mathematics and science, become more accessible when explained in a child's native language.
- *Reduced dropout rates:* When children understand lessons more clearly, they're more likely to stay engaged and continue their education.
- *Inclusive education:* Children from various linguistic backgrounds, especially those from tribal and remote areas, will feel more integrated and included.

5. Challenges in Implementation

- **Resource Constraints:** One of the major challenges is the lack of quality educational resources, including textbooks and digital content, in many regional languages.
- **Teacher Training:** Teachers may need to be retrained to deliver lessons effectively in the mother tongue, especially if they've been teaching in a different language.
- **Diverse Classrooms:** Urban centers and cosmopolitan areas often have children from diverse linguistic backgrounds in one classroom, making it difficult to choose one mother tongue as the medium of instruction.
- **Transition to English:** Given the prominence of English in higher education and many professional fields in India, there's a concern about when and how students transition from mother tongue instruction to English proficiency.

6. **Balancing Act:** The policy does not dismiss the importance of English or other languages. Instead, it promotes multilingualism, ensuring that students achieve proficiency in at least three languages by the end of their schooling, one of which would be English.

National Mission on Foundational Literacy and Numeracy

The National Mission on Foundational Literacy and Numeracy (NMFNL) is one of the flagship initiatives of the New Education Policy (NEP) 2020. Recognizing that a solid foundation in literacy and numeracy during a child's early years is paramount to subsequent academic and life success, this mission is crafted to ensure that every child in India achieves foundational literacy and numeracy by the end of Grade 3.

1. **Objective of the Mission:** The primary goal of the NMFNL is to ensure that every child attains the necessary skills in reading, writing, and arithmetic by the end of Grade 3. This would ideally set the stage for enhanced cognitive skills, comprehension, and learning ability in subsequent academic years.
2. **Why the Focus on Foundational Literacy and Numeracy?** Several studies have pointed out

that many students in the higher grades lack basic reading and arithmetic skills, which significantly impede their ability to grasp complex subjects. This foundational gap is a significant reason for high dropout rates and poor academic performances. Addressing this gap at the foundational level can have cascading positive effects on a child's entire educational journey.

3. Strategies and Actions Proposed:

- **Teacher Training:** One of the mission's cornerstones is to equip teachers with the necessary skills and knowledge to impart foundational literacy and numeracy effectively.
 - **Resource Allocation:** Dedicated funds to procure essential resources, including books, learning aids, and digital tools tailored for foundational education.
 - **Curriculum Redesign:** Revamping the curriculum for the foundational years to make it more interactive, engaging, and effective in imparting literacy and numeracy skills.
 - **Technology Integration:** Use of apps, digital platforms, and AI to personalize learning experiences and to assist teachers in identifying and addressing learning gaps among students.
 - **Community Engagement:** Mobilizing communities, including parents, to create an environment that supports and emphasizes the importance of foundational literacy and numeracy.
 - **Monitoring and Assessment:** Implementing mechanisms to regularly monitor and assess the progress of students to ensure the effectiveness of teaching methods and to make necessary adjustments.
4. **Implementation Timeline:** The mission proposes a five-year timeline for its implementation, aiming to provide foundational literacy and numeracy skills to all children by 2025.

5. Challenges:

- **Diverse Linguistic Landscape:** Given India's linguistic diversity, creating standardized resources that cater to every regional language can be a challenge.
- **Infrastructure Constraints:** Especially in rural and remote areas, where access to digital tools and quality resources might be limited.
- **Scalability:** While pilot programs might achieve success, scaling them to cover the vast expanse of India's student population will be a challenge.

Higher Education

The New Education Policy (NEP) 2020 proposes radical reforms in India's higher education sector. These reforms aim to transform India's higher educational institutions into world-class hubs of research, innovation, and multidisciplinary teaching. Here's an overview of the key reforms in higher education proposed by the policy:

1. Multidisciplinary Approach

The NEP 2020 advocates the creation of multidisciplinary higher education institutions. By 2040, the aim is for all higher education institutions to become multidisciplinary entities, allowing students greater flexibility and choice in their curriculum.

The rigid boundaries separating arts, sciences, humanities, and professional subjects will be dissolved to encourage comprehensive learning.

2. Increased Access and Inclusion

The policy targets increasing the Gross Enrollment Ratio (GER) in higher education to 50% by 2035. Measures will be taken to support underrepresented groups in higher education, ensuring equity and inclusion.

3. Holistic and Flexible Curriculum

An academic bank of credits will be established, allowing students to transfer credits, thereby providing flexibility in choosing their academic path and pace. Multiple exit options will be introduced. For instance, a student could exit a Bachelor's program after one year with a

certificate, after two years with a diploma, or after completing the full course duration with a degree.

4. Research Emphasis

The establishment of a National Research Foundation (NRF) is proposed to promote a culture of research in the country. The NRF will fund outstanding research projects across all academic disciplines.

5. Quality Assurance and Accreditation

The National Higher Education Regulatory Authority (NHARA) will be established as a single, overarching higher education regulator for the entire sector, except for medical and legal education. Accreditation processes will be reformed, and higher education institutions will be empowered to have autonomy based on their accreditation status.

6. Globalization of Education

The policy encourages the top 100 global universities to establish campuses in India. Likewise, Indian higher education institutions will be motivated to collaborate with foreign institutions, paving the way for mutual knowledge exchange and research collaborations.

7. Teacher and Faculty Development

Steps will be taken to recruit the best talents as faculty and continuously support their professional development. Faculty not possessing a Ph.D. will be required to undertake a Ph.D. by training in pedagogy and other essential aspects.

8. Restructuring of Higher Education Institutions

The policy envisions consolidating universities and colleges to evolve into larger multidisciplinary universities or institutions. The aim is to have HEIs that are either autonomous degree-granting colleges or full-fledged multidisciplinary universities.

Vocational Education

The New Education Policy (NEP) 2020 accords substantial importance to vocational education, recognizing it as a critical aspect for enhancing employability, promoting entrepreneurship, and ensuring India's youth is equipped with the skills necessary for the 21st century. Here's a

comprehensive breakdown of the policy's approach to vocational education:

1. *Integration with School and Higher Education*
 - Vocational education will be integrated with mainstream schooling, starting from the secondary level. By 2025, at least 50% of learners through the school and higher education system will have exposure to vocational education.
 - This will help students understand and appreciate the value of vocational subjects and their practical applications.
2. *Focus on Skill Development*
 - The curriculum will be aligned with the National Skills Qualifications Framework (NSQF) to ensure standardization and relevance to industry needs.
 - There will be an emphasis on developing both hard (technical) and soft (communication, teamwork) skills.
3. *Partnerships with Industries*
 - The NEP 2020 proposes collaborations with industries to offer internships and on-the-job training to students. This practical exposure will be invaluable in bridging the gap between theoretical knowledge and its real-world application.
 - Industries can provide insights, ensuring the curriculum remains relevant to current market demands.
4. *Flexibility in Learning*
 - Students will be allowed to choose vocational subjects as part of their mainstream education. This flexibility ensures that students do not have to pigeonhole themselves strictly into academic or vocational streams.
 - Credits acquired from vocational courses can be integrated into academic credits, making it seamless for students to transition between vocational and academic education.
5. *Teacher and Instructor Training*
 - A robust mechanism will be put in place to train vocational education instructors,

ensuring they are equipped with the latest industry-relevant skills and pedagogical tools.

6. *Promoting Local Art and Craft*
 - Special emphasis will be given to local arts and crafts in vocational education. This not only promotes indigenous industries but also ensures the survival and propagation of local crafts and skills.
7. *Vocational Labs*
 - Setting up of vocational labs in schools will ensure that students have practical exposure and hands-on experience.
8. *Career Guidance and Counselling*
 - Schools and colleges will incorporate career guidance and counselling sessions to guide students on the potential opportunities and career paths in the vocational sector.

Digital Education

The significance of digital education has never been more pronounced, especially in the backdrop of global challenges like the COVID-19 pandemic. Recognizing this, the New Education Policy (NEP) 2020 proposes a comprehensive framework to incorporate technology seamlessly into the education system, ensuring accessibility, equity, and quality. Here's an outline of the policy's stance on digital education:

1. *Digital Infrastructure*
 - Efforts will be made to provide every classroom with digital boards and e-content, especially in disadvantaged regions.
 - The creation of a dedicated unit for building digital infrastructure, e-content, and capacity building is suggested to ensure nationwide availability of technology.
2. *National Educational Technology Forum (NETF)*
 - The policy proposes the establishment of the NETF as an autonomous body to provide a platform for the free exchange of ideas on technology usage, facilitating decision-making on the induction, deployment, and leveraging of technologies.

3. *Digital Literacy*

- Teachers and students will be trained in digital literacy, ensuring effective use of available technological resources for teaching and learning.
- The focus will not only be on functional digital skills but also on online etiquette, digital safety, and responsible use.

4. *Online and Digital Education*

- Steps will be taken to expand online education, ensuring it's accessible to the most disadvantaged sections of the population.
- Online courses will be developed, primarily in regional languages, to ensure reach and inclusivity.

5. *Virtual Labs*

- In subjects and skills that require practical experience, virtual labs will be developed, providing students with the chance to conduct experiments and activities in a simulated digital environment.

6. *E-Content Creation*

- Diverse e-content will be developed, especially in regional languages, ensuring comprehensive coverage of topics.
- Emphasis will be given to creating interactive content, which can adapt based on learner responses, using technologies like Artificial Intelligence.

7. *Assessment and Analytics*

- Digital technology will be used to streamline the assessment process, making it more transparent and efficient.
- Analytics will be employed to track students' progress, identify learning gaps, and offer tailored interventions.

8. *Differential Learning*

- With the aid of technology, differential learning strategies can be employed, providing custom-tailored educational pathways based on individual student needs and capabilities.

9. *Equity and Accessibility*

- Provisions will be made to support differently-abled students with assistive technologies.
- Steps will be taken to ensure that digital tools, resources, and technologies are available and accessible to all students irrespective of their socio-economic status.

10. *Open and Distance Learning*

- The policy recognizes the importance of online and distance education in increasing the Gross Enrollment Ratio (GER) and proposes a regulatory framework to ensure the quality of education delivered through these modes.

Potential Impacts:

Greater Flexibility:

The NEP 2020 heralds a transformative shift in the Indian education landscape by championing the principle of "greater flexibility." This principle acknowledges that every learner's journey is unique, and the traditional rigid pathways of education may not cater to all. The policy's flexibility aspect is designed to empower students, allowing them to tailor their educational experiences based on interests, capabilities, and evolving aspirations.

For instance, gone are the days where students had to strictly choose between science, commerce, and arts streams. Under the new paradigm, a student could seamlessly integrate subjects like mathematics with music, or chemistry with creative writing. This multidisciplinary approach nurtures holistic development and fosters a broader understanding of the world, breaking down the artificial silos that limited educational creativity and exploration in the past.

In essence, the flexibility enshrined in the NEP 2020 aims to make education more learner-centric, promoting curiosity, creativity, and lifelong learning, while acknowledging and respecting individual aptitudes and aspirations.

Preservation of Cultural and Linguistic Heritage

The New Education Policy (NEP) 2020 underscores the profound importance of India's

rich tapestry of cultural and linguistic diversity. Recognizing that languages are not just communication mediums but repositories of culture, tradition, and indigenous knowledge, the policy emphasizes their preservation and promotion in the educational landscape.

A pivotal recommendation is the introduction of mother tongue or local language as the medium of instruction, at least until Grade 5, but preferably longer. This approach, rooted in numerous studies, suggests that children learn and grasp concepts most effectively in their native languages. More than just aiding comprehension, this initiative also fortifies the child's connection with their cultural and linguistic roots, promoting self-esteem and identity.

Furthermore, the policy encourages the teaching of classical languages and literature, folk arts, and local crafts, ensuring the younger generation is well-acquainted with and takes pride in their rich heritage.

In essence, the NEP 2020 positions education as a bridge — one that connects the wisdom of the past with the promise of the future, ensuring India's cultural and linguistic legacy continues to thrive in the hearts and minds of its future citizens.

Inclusion

Inclusion stands as a cornerstone in the New Education Policy (NEP) 2020, emphasizing that education must be accessible and equitable for all students, irrespective of their socio-economic, cultural, or physical backgrounds. Recognizing the diverse tapestry of the Indian student population, the policy strives to eliminate barriers that could hinder the learning process for any student.

A key tenet of the NEP's inclusive approach is to provide customized support for students from disadvantaged backgrounds, ensuring they receive the requisite resources and attention to level the educational playing field. This extends from offering scholarships and financial aids to creating specialized teaching methodologies for differently-abled students.

Furthermore, the policy underscores the significance of teacher training in inclusive education. Educators will be equipped with the skills and knowledge to cater to a diverse set of learners, ensuring no student is left behind due to unique learning needs.

In essence, the NEP 2020 champions an educational ethos where every student, irrespective of their starting point, is given an equal opportunity to thrive, learn, and achieve their fullest potential. This inclusive vision resonates with the broader ambition of crafting an equitable, just, and cohesive society.

Challenges

While the New Education Policy (NEP) 2020 presents a visionary roadmap for the transformation of India's educational landscape, its implementation comes with its own set of challenges.

A primary concern is the vastness and diversity of India's educational ecosystem, comprising various state boards, languages, and socio-economic disparities. Ensuring uniformity and standardization across this diverse milieu, without compromising regional and cultural nuances, is a monumental task.

Resource allocation is another significant challenge. The policy's ambitious endeavors, from digital infrastructure enhancement to teacher training programs, demand substantial financial investment. With competing national priorities and budgetary constraints, mobilizing the required funds can be a hurdle.

Moreover, while the policy emphasizes a shift towards a more holistic, student-centric approach, changing deep-rooted societal mindsets about education, especially regarding assessment systems and rote learning, is not an overnight task.

In essence, while the NEP 2020 sketches a promising picture of India's educational future, the road to its realization is dotted with challenges that require concerted effort, collaboration, and persistence from all stakeholders.

II. CONCLUSION

The New Education Policy (NEP) 2020 represents a landmark moment in India's educational journey, envisioning a system that combines traditional values with contemporary global practices. Rooted in inclusivity, flexibility, and the preservation of cultural heritage, it seeks to transform India into a global knowledge superpower. However, while its objectives are laudable, the success of the NEP lies in its effective implementation. Addressing the challenges, fostering collaboration among stakeholders, and ensuring that the policy's benefits permeate to the last student will be crucial. If executed well, the NEP 2020 has the potential not only to reshape India's educational landscape but also to nurture a generation that's equipped for the 21st century while being firmly anchored in its rich cultural ethos.

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Review of Blockchain Technology in Managing Waqf (Endowment)

Nur Hidayah Laili, Khairil Faizal Khairil & Rosnia Masruki

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ABSTRACT

Waqf in Islam has historically been a vital institution in fulfilling religious needs and social welfare. Its effectiveness in medieval and modern Islam is evident. Yet, this institution is seemingly not without inefficiencies. Agency problem and idle, even dilapidated assets are commonplace, besides financial constraints and poor human resources are also cited as key impediments. Thus, public trust and contribution are becoming low due to the opacity of the accounting and accountability system. As such, scholars propose the adoption of blockchain technology to mitigate these issues. This paper aims to review the waqf and its types, as well as blockchain technology and its models. The review makes clear that implementation of blockchain technology in managing waqf endowment is pertinent by using a smart contract. The article raises important issues in addition to its caveats pertaining to waqf based on blockchain, which offers solutions in the current problems for its effective implementation for waqf management. This study contributes to the field of waqf endowment as it highlights the use of blockchain technology in managing waqf, which could be useful for Mutawalli (trustee) of waqf towards the sustainability of Islamic social finance.

Keywords: blockchain technology, waqf management, Islamic social finance.

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I. INTRODUCTION

Together with zakat and donations, waqf is regarded as the main instrument of charity in Islam. Its practice dates to the early years of Islam—though some claim that its concept has been somewhat practiced by the Hellenes, Romans, and Byzantines, among others (Çizakça,

2000; Singer, 2008). Waqf is a popular solution for poverty alleviation (Sadeq, 2002; Yahya, 2008) and micro financing (Abdullah & Ismail, 2017; Shaikh, Ismail, & Mohd Shafiai, 2017), and less notably as a conservation mechanism (Khalfan & Ogura, 2012; Yaakob et al., 2017), in past and modern-day Islam. Certainly, this trend has become even more manifest since the renaissance of the Islamic spirit post-colonialism, as indicated by the prodigious volume of research on the subject.

Of course, this institution is not without critics. It was reported that the database of Islamic Religious Council on Waqf assets are not sufficient, which detail and important information are not available. This affects the process of developing waqf lands. Lack of professional and technical expertise in developing Waqf asset, there are also lack of professional resources and expertise in the aspect planning and developing of waqf land thus causing many inefficiencies in their management.

Kuran's contention illustrates the two fundamental threats to proper governance: expropriation by controlling shareholders or managers (waqf: *mutawalli*), or by the state (Lamoureaux, 2009). However, Kuran's concern about the agency problem should not be conflated with Islamic law—by no means does the dishonesty of an administrator is an indication of its shortcoming. Rather, this issue must be dealt by both jurists and state alike by designing control mechanisms and laws that deter managers from favoring their own interests.

In 1826, Ottoman Turkey established *Evkaf-ı Humayun Nezareti* to centralize waqf administration and introduce accountability and accounting principles, while Egypt instituted *Diwān al-Awqāf* to centralize the control and

accounting of waqf entities. Both served as check-and-balance mechanisms to deter waqf administrators from unethical practices. Yet, at the same time, these policies were inspired by political and economic motivations, as waqf assets were flourished with revenues (Melčák, 2010; Yayla, 2011). An illustrative example was the attempts by soviet colonialists in Turkestan to reform waqf and transfer its administration, and accordingly revenues, to the state. One such bid was the enactment of a Central Waqf Administration (GVU) to contest the jurisdiction of the the Shari'ah court, resulting in a turf war between both (Pianciola & Sartori, 2007). Regardless, state intervention has continued to the present day in the form of Ministries or Departments of *Awqāf* in Islamic nations, including Turkey, Egypt, Palestine, Kuwait, Malaysia, Brunei, and Indonesia, and in a few non-Muslim-majority countries like Singapore. It is important to note that the state should not be so powerful so as to expropriate the rights of waqf properties. The cases of *Maghrib* and *Mashriq* at once illustrate the imperativeness of check-and-balances in waqf governance between private administrators and state supervision to allow better upholding of the waqf terms.

Moving to the allegations of Landes et al. (2012), limited allocational flexibility is not a familiar feature of most waqf institutions. Only certain subsets, like *al-waqf al-khāṣṣ* (specific waqf) and *al-waqf al-ahli* (family waqf), possess this peculiarity. In most cases, waqfs are targeted for social or religious purposes, often with a socioeconomic slant, for instance the poor and needy. Other times, such qualifications would be absent, and so the waqf object becomes a public good. Mosques, public fountains, water supplies, hospitals are commonly endowed without specific beneficiaries (Layish, 2008). Entire villages or cities were likewise made mortmain, such as the case of Sarajevo, whose facilities—mosque, *madrasah*, library, *ḥammām* (public bath)—are the waqfs of Isa-beg Ishaković and Gazi Huzrev Beg (al-Arnā'ūt, 2005; Smolo, 2019).

Even for family waqfs, the usufruct will be redeemed to the public—or poor relatives of the founder, if extant—once the named beneficiaries

are extinct (Abbasi, 2012; Ibn Qudāmah, 1992). This form of waqf, incidentally, constitutes only but a small part of waqfs. In fifteenth- and sixteenth-century Edirne, charitable waqf made up 80 percent of the endowments of the rich, lending the conclusion that family waqf was used only minorly for safeguarding purposes; in eighteenth-century Aleppo, it was only 40 percent of total waqf, the remainder of which was either charitable or mixed (Gerber, 1983, and Öztürk, 1995, in Çizakça, 2000). Moreover, any circumvention of the inheritance law was blocked by legal reforms. The codification of the Egyptian Waqf Law 1946 and Lebanese Waqf Law 1947, as well as the judicial verdict of equating waqf to bequest, limiting it to only one-third of total inheritance, were some attempts to close the loophole (Layish, 1997). Of course, there are recorded instances where the sons were named as beneficiaries of the family waqf, while the daughters were excluded. But such practices were absent during the times of the Prophet and his Companions. Jurists therefore decree that family waqf should be apportioned equally among the founder's children or in harmony to inheritance fractions (Abbasi, 2012).¹

History therefore chronicles the organically changing administration of waqf and its institutions. This is of course an established case, considering that the interpretation of Islamic law itself is a subject of continual change and reform (Brown, 2014). Legal maxims such as *lā yunkar taḡhayyur al-aḥkām bi taḡhayyur al-azmān* and *al-aṣl fī al-mu'āmalah al-ibāḥah* also illustrate the necessity to revise and adapt to the social, technological, political, or similar customs prevailing in a society, so long as they remain within the boundaries of Shari'ah. The first maxim declares that the rule of law may adjust to the change of time, place, condition, etc., whereas the second maintains that transactions in Islam

¹ It should be mentioned here that Islamic inheritance law is compulsory only in the absence of agreement between the heirs. If they instead decide to apportion the inheritance according to mutually agreed terms, *takharruj*, then the inheritance law can be neglected in favor of this arrangement (al-Ḥaṣrī, 1992; al-Ṣabūnī, 1995). However, this argument does not apply to waqf because the apportionment was made by the founder before his death.

are fundamentally permissible in the absence of a proof (*dalīl*) that denies their legitimacy.

Nevertheless, the arguments of the above critics cannot be rejected outright; doing so would only injure the long-term effectiveness and sustainability of waqf institutions. Certainly, there are evidences for unproductive, mismanaged, misappropriated, expropriated, or neglected waqf properties. The reasons for these are various—conflicts, colonialism, poor legal protection, financial constraints, individual or state expropriation, or unqualified *mutawallī* (Abd Mutalib & Maamor, 2016; Gamon & Tagoranao, 2018; Ismail, Salim, & Hanafiah, 2015; Khalfan & Ogura, 2012; Moh'd, Mohammad, & Saiti, 2017; Mohamad, 2018; Musae, Muhammad Abbas, Kamal Mujan, & Sidik, 2014; Noordin, Haron, & Kassim, 2017; Shatzmiller, 2001; Sulaiman & Zakari, 2019; Zilli, 2018).

To this point, modern scholars, waqf administrators, social and for-profit entrepreneurs, and other such stakeholders have continuously looked for new ways to further enhance the effectiveness of waqf assets. Traditional administration cannot be expected to remain efficient in this technologically advanced era. Furthermore, the ever-intensifying scrutiny of the public eye and wealth of information on traditional and new media increase the pressure on *mutawallī* to properly discharge their accountability and report the impact of the waqf assets. Otherwise, public trust on waqf institutions will be low, which in turn leads to low contribution and loss of effectiveness (Abd Jalil, Yahya, & Pitchay, 2019; Abdul Shukor et al., 2019; M. Ahmad, 2019; Alias, 2014).

Accountability, transparency, and socioeconomic and socioreligious impacts are thus important subjects for waqf. These have lent to the proliferation of research and recommendations on waqf accountability principles (Masruki & Shafii, 2013; Nahar & Yaacob, 2011; Siswanto, Rosdiana, & Fathurahman, 2018), waqf performance indicators (Masruki, Mohd Hanefah, Aryani, & Bunyamin, 2019; Noordin et al., 2017), and novel or improved waqf concepts e.g. waqf bank (Ab Aziz, Yusof, Johari, Ramli, & Sabri,

2014; Gabil, Bensaid, Tayachi, & Jamaldeen, 2020; Mohammad, 2011), waqf share (Abdel Mohsin, 2013; Suhaimi, Ab Rahman, & Marican, 2014), waqf-funded *takāful* (Mikail, Ahmad, & Adekunle, 2017; Wan Ahmad & Ab Rahman, 2011), cooperation-waqf model (Pitchay, Mohd Thas Thaker, Mydin, Azhar, & Abdul Latiff, 2018), waqf-*īstīṣnā'* (Noor & Yunus, 2014), waqf-*muzāra'ah* (Moh'd, Omar Mohammed, & Saiti, 2017), waqf-*mushārakah mutanāqīshah* (Md Zabri & Mohammed, 2018), and so forth, limited only by Sharī'ah and imagination.

Among these innovations is a new waqf channel that is gaining tract, no doubt due to the glut of cryptocurrencies over the past decade: blockchain technology (Abojeib & Habib, 2019; A. Ahmad & Habib, 2019; Elasrag, 2019; Rashid, 2018). It is generally lauded for its innate transparency and traceability because any changes, contributions, or expenditures made in a blockchain would be recorded and distributed to its participants—a decentralized ledger. It is usually said to be tamper-proof, frustrating any deliberate modification of records (Alam, Gupta, & Zamani, 2019; Salmon & Myers, 2019). This review will take a closer inspection to waqf and provides a brief description of blockchain. Accordingly, it will explore the possibility of transacting waqf on a blockchain.

II. TYPES OF WAQF

Waqf in *fiqh* nomenclature is the relinquishment of private goods (*mawqūf*)—movable, immovable, liquid, illiquid, productive, unproductive—and the transference of their usufruct, benefits, rights, or all three at once, to specific beneficiaries (*mawqūf 'alayh*) named by the founder (*wāqīf*) in a clear and implicit or explicit expression of offer (*ṣīghah*). Those four elements form the integral components of waqf, the absence of any of which will render invalid the contract and its legal consequences.

While the Sharī'ah itself makes no distinction about the categories of waqf, in practice academics and states have done so. These distinctions may be made according to at least five perspectives (Table 1).

Table 1: Typical Classification of Waqf

Beneficiary	Mawqūf (endowed assets)	Motive	Mutawallī (trustee)	Temporality
Family	Fixed	Charity	Individual	Permanent
Khayri	Movable	Wealth preservation	Institution	Temporary
Mushtarak	Rights	Succession planning		
		Protection from abuse and expropriation Unlawful confiscation		
		Political gain		

Based on Table 1, by no means are these divisions and their respective constituents exhaustive. Waqf can be classified by its beneficiaries, Mawqūf, motive, mutawalli and temporality. Details of each basis are discussed as follows:

2.1 Beneficiary of Waqf

Sorted by beneficiaries, there are three main categories of waqf. *First* is *al-waqf al-ahli*, *al-dhurrī*, or *al-awlād*, which is the endowment of funds or assets to family members. The designated recipients are of variety, though most often are children and grandchildren. Rarely, siblings, poor family members, or non-legal heirs, who cannot receive any inheritance, such as adopted children, are appointed as beneficiaries (Layish, 1997, 2008). The founder of this waqf generally aims to ensure effective succession planning and prevent prodigality of wealth upon his passing (Mohamad, 2018).

The *second* is *al-waqf al-khayrī* or *al-waqf lillāh*, which is for public causes or religious purposes, such as endowments targeted to orphans, students, the poor and destitute, and the handicapped. It may take the form of public institutions e.g. mosques, cemeteries, hospitals, and schools; public rights e.g. irrigation rights and roads; or benefits e.g. allowances and social assistances. *Al-waqf al-khayrī* is waqf in its most basic form. The *third* is *al-waqf al-mushtarak* (Alias, 2014; Ihsan & Hameed 2011), which is an amalgamation of the first two purposes: the

benefits, rights, or usufruct of the waqf assets are shared between public and private beneficiaries. The proportion for each is to the discretion of the founder.

2.2 Mawqūf (Type of Endowed Assets)

Waqf may also be classified according to the type of endowed assets. The *first* is fixed assets, such as lands, farms, buildings, or other such properties. These are conventional waqf assets permitted by all legal schools. The *second* is movable assets, such as vehicles, currency, books, and so on. Here, there are some controversies, though jurists largely allow their endowment (Abdel Mohsin et al., 2016). The *third* is rights or usufructs, like irrigation rights and patents. All three groups may either be cost-incurring or revenue-generating. For the former are all properties that do not generate income but require constant upkeep, such as mosques and cemeteries; the latter are those to the contrary, such as rental buildings and farmlands. Typically, a founder would endow both at the same time so that the latter sustains the former.

2.3 Motive of Waqf

According to motive, one may group waqf into social or religious charity, wealth preservation, succession planning, protection from abuse and expropriation, unlawful confiscation, and political gain. Such motives are dedicated to the beneficiaries of waqf to whom may either be

specified (*khāṣṣ*) or not (*‘āmm*). These motives have been alluded to previously.

2.4 *Mutawallī (Trustee) of Waqf*

The *mutawallī (trustee), acting as an administrator of waqf* may either be an individual or institution. In the early days of Islam and before the establishment of state waqf supervisory agencies, a founder would typically entrust his waqf to certain individuals. Often, he would also name the replacement for the first *mutawallī*. Though in no rare occasions, the founder may appoint himself the *mutawallī*, so that he may enjoy the benefits or usufruct of the property. After his passing, the role will be assumed by a *mutawallī* specified by the founder or appointed by an Islamic judge (*qāḍī*). This lenience is the stance of Ḥanafī jurists (Abbasi, 2012; Layish, 1997). Alternatively, Shāfi‘ī and Ḥanbalī scholars only allow the founder’s self-appointment if he expresses so in his declaration (*ṣīghah*), while Mālikī jurists completely deny its permissibility (al-Qarāfi, 1994; al-Shayrāzī, 1976; Ibn Qudāmah, 1992). Institutional (including corporate) *mutawallī* is more prevalent today. In Malaysia, the sole *mutawallī* is the State Islamic Council, but it may concede certain waqf assets to authorized institutions. Or it may also partner with other institutions to manage waqf assets or projects. For example, Waqf Annur Corporation Berhad, under Johor Corporation (JCorp.) was granted the status of *mutawallī* by the Johor State Islamic Council (Majlis Agama Islam Johor, “MAIJ”).

2.5 *Temporality of Waqf Assets*

Waqf generally has three inherent features: irrevocability, perpetuity, and inalienability. However, most Mālikī scholars and a few jurists from other schools permit temporal waqf. Mālikī jurists hold that the declarator, who is the donor of waqf may limit the waqf to a certain period, after which the property returns to his or his heir’s possession (Al-Dardīr, 1995; Jafri & Mohd Noor, 2019). Waqf, therefore, can temporally be classed into perpetual or temporary.

The perpetuity of waqf assets is also a subject of lengthy debate among scholars. Typically, this

revolves around the permissibility of cash waqf. This is discoursed below due to its current preponderance.

Another easy and flexible type of waqf is widely used known as cash waqf. It had been legitimized by the Ottoman courts in the fifteenth century before becoming ubiquitous within the Empire in the following century. But its implementation before and after that period, including the modern times, has faced serious objections (Mandaville, 1979). Oppositions mostly come from conservative scholars, who hold that the object of waqf (*mawqūf*) should be physically perpetual, as in the case of land and building. This the view of some Shāfi‘ī, Ḥanbalī, and Ḥanafī jurists (al-‘Imādī, 1997; al-Sharbinī, 2000; al-Shayrāzī, 1976). Accordingly, certain Muslim communities that adhere to those schools hold that belief, hence the illiquidity of their waqfs. Nevertheless, its practice has been widely legitimized in most Islamic states.

Another source of its unpopularity is the low awareness, and even less knowledge, of Muslims about cash waqf. This poor awareness likely stems from their misconception of waqf—that it is only for perpetual assets and strictly for religious or social causes (Rahaman, Fahmi, & Faisal, 2011). Adeyemi, Ismail, and Hassan (2016) hypothesizes that a community’s poor understanding of a phenomenon may lend to their low awareness about it, much less its implementation. Certainly, they found empirical evidence that Malaysian Muslims exhibited poor awareness of cash waqf due to the lack of understanding and promotion, as well as the influence of social norms. Further promotion of cash waqf and the introduction of convenient contribution channels, such as monthly salary deductions, collection agents, and online payments, can increase contributions from Muslims. The success stories of the Waqf Fund Scheme and Waqf Share of the Penang State Religious Council (MAINPP) and Selangor Waqf Corporation (PWS) demonstrate the effectiveness of these approaches (Sanusi & Mohd Shafiai, 2015; Suhaimi et al., 2014).

III. BLOCKCHAIN TECHNOLOGY

The inflating price of Bitcoin over the past decade and subsequent mushrooming of alternative cryptocurrencies have sparked the rising popularity of blockchain technology. Evidently, research on the subject seems to take off since the mid-2010s (Fosso Wamba, Kala Kamdjoug, Epie Bawack, & Keogh, 2019). Proposals for its use case covers a diverse industries, such as logistics and supply chain (Abeyratne & Monfared, 2016; Tieman & Darun, 2017), construction (Li, Greenwood, & Kassem, 2019), healthcare (Mettler, 2016), automotive (Fraga-Lamas & Fernández-Caramés, 2019), and oil and gas (Lu, Huang, Azimi, & Guo, 2019). It is especially regarded as a disruptive financial technology (FinTech) that can potentially transform the commercial and finance spheres (Fanning & Centers, 2016).

3.1 Mechanism and Characteristics of Blockchain

Blockchain is simply a decentralized network of nodes—servers, laptops, computers connected to the blockchain—that verify, record, and store data blocks that are interlinked by chains. Each block contains multiple transactions records. Each record is identified with a hash, a fixed-length alphanumeric string generated from a string of characters using a mathematical function. This hash details the specific record for each transaction, including sender, recipient, other participants, date, time, and other such details as coded into the blockchain algorithm (Brito & Castillo, 2013; Salmon & Myers, 2019). After the block has been forged, it is also “stamped” with a hash, which connects it to the preceding block. This is the “chain”. This hash also stores the transaction hashes recorded inside the block. Each block is added to the chain subsequent to the verification of the network participants of its authenticity, which is proven using a consensus

mechanism² (Zile & Strazdiņa, 2018). This entire process continues indefinitely, and theoretically there is no limit to the number of blocks on the network.

Transaction on the blockchain is carried out using public and private keys (asymmetric-key cryptography) that are owned by all participating nodes. The private key is used to encrypt information, effectively “signing” the transaction. The key is hashed to generate a public key, which the counterparty then uses to authenticate that (a) this transaction request indeed comes from the original sender and (b) the content has not been tampered with. Conversely, it is possible to encrypt information using one’s public key; it can then only be decrypted using that person’s private key. A public key may also be hashed to generate an address, which is not unlike a house address or bank account number. The private key must be kept confidential and safely; if misappropriated, it can be used to sign fraudulent transactions; if lost, the user will lose all digital assets associated to that key. Recovering the key is computationally infeasible (Yaga, Mell, Roby, & Scarfone, 2019; Zheng, Xie, Dai, Chen, & Wang, 2017).

The entire database is recorded on nodes and is regularly updated. Blockchain allows the nodes to transact with one another even with the absence of trust and an intermediary, hence its attribute as a trustless, low-cost peer-to-peer (P2P) network (Christidis & Devetsikiotis, 2016). Because the network essentially exists on several distributed nodes in various locations, there is no central authority or point of failure, so the risk of losing the entire database is minimized (Alam et al.,

² There are numerous mechanisms/algorithms, though the most prevalent are proof-of-work (PoW) and proof-of-stake (PoS). In PoW, the requesting node is required to solve a computational problem, which is then verified by the network; correct solutions will reward the node with a coin. This is known as mining. In PoS, instead of solving a puzzle, a node stakes its coins to ensure its chance of being selected as the one to forge the block, which rewards it with coin. This is a transaction fee, not mining. Coins are rewarded to disincentivize dishonest nodes. In a closed network, where nodes are known and authorized, they are unnecessary. Some blockchains use tokens to transact (see note 3). The transaction is then authenticated by validator nodes, and the tokens will exchange hands (Bach, Mihaljevic, & Zagar, 2018; Christidis & Devetsikiotis, 2016).

2019; Raval, 2016). But by the same token, transactions are irreversible, rendering payments made to the wrong address as vanished, unable to be recovered. Frauds, equally, cannot be reversed, unlike in conventional bank transactions. The records stored in the network are open to the public and can be accessed in a matter of seconds. For this reason, it is most familiar with the description of a decentralized, distributed ledger.

Blockchain is considered immutable and secure because any alteration to a block would require the rebuilding and rehashing of the subsequent blocks (Hileman & Rauchs, 2017). For instance, slightly modifying the information, even a character, contained in the seventh block of a 10-block network would produce a new hash for the altered block. This will cause the block to disconnect from the original eighth block, since the latter identifies the original seventh block by its hash. Effectively, modifying the seventh block transforms the network into a seven-block chain. To cover this clandestine deed, one must update the remaining three blocks so that they generate new hashes that can continue this new chain. If he fails to do so, or because the majority of the nodes in the network have verified the original chain to be the true chain that connects to the genesis block (the first block in a chain), this altered seventh block becomes an extinct or orphan block, and this new chain ends there (Decker & Wattenhofer, 2013). There are now two forks in the blockchain network, one leading to the now abandoned seventh block, and the other is the consensually agreed correct path. Without the collusion from the majority of the nodes—an expensive and resource-intensive undertaking—any attempts to alter information in a blockchain is effectively unfeasible (Bonneau, 2019).

The advantages of using blockchains can be summarized into the following points:

- Traceability, auditability, and transparency of data and transactions, every one of which are “stamped” and verified.
- Public-private key enables participants to sign and authenticate transactions, preventing tampering or fraudulent requests.

- Transactions can be carried out without any intermediaries, and they will be automatically registered into the blockchain. Both cost and time can be minimized.
- It has no central point of failure because the database is constantly distributed to and verified with participating P2P nodes.
- No central authority also means that no one entity has the power to shut, erase, alter, or add any information to the network. But this also means that transactions are irreversible; lost or stolen private keys (and accordingly digital assets) cannot be recovered.
- Information stored in the network is secure and immutable from deliberate alterations.
- Any forks introduced into the chain are automatically corrected into a mutually accepted chain.

3.2 Types of Blockchain

The narrative thus far, however, pertains mostly to public permissionless blockchain, implemented in the very familiar cases of Bitcoin and Ethereum. However, the scenarios discussed above may not necessarily be applicable to closed models. The differences between the models primarily lie with the authority to read, write or commit information into the blockchain, though the general mechanism is about identical (Table 2).

Table 2: Blockchain Models

			Read	Write	Commit	Immutability	Centralized	Efficiency
Block-chain types	Open	Public permissionless	Anyone	Anyone	Anyone*	Virtually impossible to tamper	No	Low
		Public permissioned	Anyone	Authorized participants	All or subset of authorized participants	Possible to tamper	Partial	Medium
	Closed	Consortium	Restricted to authorized participants	Authorized participants	All or subset of authorized participants	Possible to tamper	Partial	High
		Private permissioned (enterprise)	Fully private or restricted to a set of limited authorized nodes	Network operator only	Network operator only	Possible to tamper	Yes	High

*Notes: *Requires significant investment either in mining hardware (proof-of-work model) or cryptocurrency itself (proof-of-stake model).*

Read: right to access the network and see transactions; **Write:** right to generate transactions and send them to the network; **Commit:** right to update or commit transactions to the network (by adding a block to the blockchain)

Sources: Hileman and Rauchs (2017); Zheng et al. (2017)

Referring to Table 2, the permissibility for anyone to read blockchain records is only in a public network, as in the case of Bitcoin. One may also write into its blockchain, but this must be verified with a consensus algorithm. Malicious nodes may also force commit a record if it has sufficient resources, affording it higher chances to self-validate transactions, but this is an extremely costly endeavor (Bonneau, 2019). Honest behavior in this chain is promoted with the rewarding of coins, more specifically payment coins (or cryptocurrencies).³ On the Ethereum

blockchain, for instance, the rewards would be Ether (ETH).

In lieu of coins, some models typically issue security or utility tokens.⁴ The former represents the underlying external (off-chain) asset owned by the node, not unlike a share or a deed. For example, a company may crowdfund for a certain project, with the promise of sharing the profits with investors. They may issue security tokens to do so. These can be traded on the secondary market. Since there are no intermediaries, transactions can be completed quickly. Utility tokens, on the other hand, are akin to loyalty points or amusement park tickets: they are without any intrinsic value and cannot be used as currency outside of the store or theme park. Holders may use them to redeem a product or service offered by the issuer (Doe-Bruce, 2019; Liu & Wang, 2019; Oliveira et al., 2018). It bears mentioning that tokens are not a necessary feature of blockchains. Private network often operates without any tokens, verifying each transaction based on certain algorithms and protocols (Jeong, Youn, Jho, & Shin, 2020). In this case, the blockchain merely acts as a distributed ledger database.

³ Currency (coin) and token are dissimilar. Currency is a native feature of a blockchain that is used to incentivize the blockchain participants and used as a medium of exchange, much like conventional currency. Token, alternatively, is created on top of a blockchain; it is created and governed by a smart contract, to be used only within a blockchain network (Massey, Dalal, & Dakshinamoorthy, 2017; Oliveira, Zavolokina, Bauer, & Schwabe, 2018). On the Ethereum blockchain, for instance, the currency is Ether, while its token is that which is created, traded, or gifted only on the Ethereum platform e.g. Vechain.

⁴ There are also other token archetypes: cryptocurrency, equity, funding, consensus, work, voting, asset, and payment. See Oliveira et al. (2018).

In the public permissioned model, writing is only for authorized nodes, while commitment can be carried out by either all or part of them. For closed systems, certain actions may only be carried out by a specific party. Transparency and auditability of a closed blockchain is an enduring issue, especially because the participants, especially organizations or corporations, are legally and morally required to uphold confidentiality. Even if sensitive information is withheld, it is still possible to reveal or reasonably estimate a participant's identity through his transaction patterns or other methods (Biryukov, Khovratovich, & Pustogarov, 2014; Meiklejohn et al., 2013). To mitigate this issue, some academics e.g. Kosba, Miller, Shi, Wen, and Papamanthou (2016) suggest the use of public blockchains with zero-knowledge proof to enable the validator to verify a transaction without the requirement to disclose any sensitive information.

Security for closed models come within and without the blockchain, such as legal contracts and threats, but immutability may not entirely apply. The risk of collusion is still possible, especially if the participating nodes are small and the validators cooperate in the scheme (Hileman & Rauchs, 2017; Schrepel, 2019).

3.3 Blockchain Smart Contracts

Smart contracts are lines of codes embedded into the blockchain algorithm that are “deployed using cryptographically signed transactions on the blockchain network” (Yaga et al., 2019, p. 32). It functions as an if-else statement, that is, the fulfilment of a condition will immediately trigger the resulting action. Theoretically, they may supplement or fully substitute traditional legal contracts (Alam et al., 2019; Raval, 2016). Smart contracts can also be used to create tokens (Oliveira et al., 2018).

To illustrate its execution: suppose the smart contract holds the condition that the release of a sum of payment to the seller is subject to the arrival of the item. Sequel to its confirmation by the buyer, the smart contract automatically executes the consequent action. In this instance, the services of a third party are rendered

unnecessary, and the transaction can be executed quickly at minimum cost. In actual practice, smart contracts would be even more complex, encompassing terms and conditions that involve multiple parties.

By their own nature, smart contracts are deterministic, that is, a similar output will always be produced for the same input. But it may also be non-deterministic if it requires off-chain information from external parties, a service termed oracle (or data feed). Because it is incorporated into the blockchain, it is possible for all authorized nodes (or anyone if it is a public blockchain) to inspect its code in detail. Similarly, it is possible to trace all operations of the contract because it is recorded on the blockchain (Christidis & Devetsikiotis, 2016).

IV. BLOCKCHAIN FOR WAQF MANAGEMENT

There are some Shari'ah disputes surrounding cryptocurrencies, principally due to the ambiguity of its category—is it a currency or an asset (*māl*)? Some scholars consider them *ḥarām* as a currency due to (a) their volatile value, creating elements of speculation and gambling; and (b) the fact that they are not issued by the state. Others deny their permissibility as an asset because they have no intrinsic value. Conversely, some allow their use as currency seeing as (a) fluctuation of value is also present in fiat money, and (b) it is accepted by the contracting parties as a medium of exchange (Alam et al., 2019; Beik, Zaenal, & Rizkiningsih, 2019; Zubaidi & Abdullah, 2017). It bears mentioning that conventional law systems also face the predicament of classifying and regulating cryptocurrencies (Salmon & Myers, 2019).

Regardless, blockchain is a neutral technology. Much like a pen, it is but a tool. Proper implementation of a blockchain, accounting carefully for the elimination of usury, *gharar*, *maysir*, and incorporating elements of transparency and accountability, would certainly not be illegal in Islam. For reason of prudence (*iḥtiyār*), cryptocurrencies should be avoided. Additionally, since the intention to develop a

blockchain is to crowdfund, not merely recording, the enterprise waqf model cannot be implemented. This leaves two models: (a) a public permissioned or (b) private permissioned blockchain. In a waqf blockchain, the network can grant a token to the founder as proof of his contribution, akin to waqf deeds.

There have been several proposals for the development of waqf chain. Before discussing them, it is best to illustrate an implemented example with FINTERRA's Waqf Chain. This platform is built on top the company's Galactic Blockchain, which can interact with external platforms like Ethereum (FINTERRA, 2018b).

The chain has several stakeholders, including a waqf board, fund manager (e.g. an Islamic bank), insurer, auditor, constructor, asset manager, and contributors. The entire process involves several steps:

- The board identifies a viable waqf asset (or project) and requests its concession from the *mutawalli* e.g. State Islamic Council. The board then drafts the prospectus, detailing the specificities of the project, such as investment period, administrator, property, expected returns, and so forth.
- The prospectus is reviewed by an external auditor.
- After its approval, both the board and auditor appoint a fund manager, who then produces a project portfolio and publishes it to the blockchain.
- Participants contribute to the project using either one of four instruments: cash waqf, *qard hasan*, sukuk, or *muḍārabah*. For the last two, the contributors will earn investment returns.
- When the crowdfunding goal has been met and after all due diligence requirements are satisfied, the smart contracts (according to the respective instrument and project) are automatically initiated.
- The smart contracts will create project-specific utility tokens (FIN) to the contributors as representation for their stake in the project.
- The fund manager appoints a contractor to develop the waqf asset.

- Once completed, the asset is transferred to the asset manager.
- Proceeds from sukuk and *muḍārabah* will be distributed to investors.

During the entire process, the insurers hedge such risks as fund manager insolvency and project delivery risks.

The contributors themselves are pre-qualified to ascertain that the principles of Know Your Customer (KYC) and Anti Money Laundering (AML) have been met. They are also assigned a certain credit score to determine their capacity to contribute to the project. Participants are only allowed to contribute sequel to their success in this screening.

The FIN tokens can only be used within the Waqf Chain network. Participants that intend to contribute to the project may do so by exchanging their cryptocurrencies, for example Bitcoin (BTC) or ETH, to FIN. This way, as well, FIN can be traded in the secondary market i.e. cryptocurrency exchange platform. Transacting FIN to a given project will trigger the execution of the smart contract peculiar to that project, subject to the satisfaction of all conditions and due diligences (FINTERRA, 2018a; Management, 2018).

Other proposals for waqf-blockchain does not deviate much from this system. (These are not exhaustive). Abdel Mohsin and Muneeza (2019) conceptualizes a WaqfCoin as a token that represents the underlying waqf asset. This token is issued by a company listed on a waqf market through an Initial Coin Offering (ICO), and it may be traded in the secondary market. Beik et al. (2019) suggests three models: waqf-blockchain, waqf-crowd coin, and waqf-cryptocurrency. The first model only records the journey of the fund, and distribution is made off-chain. The second is identical to FINTERRA's model. The third is to donate cryptocurrencies produced through proof-of-stake algorithms (as they are more energy-efficient) toward waqf. This concept has been applied in conventional charity crowdfunding by such organizations as UNICEF, Cudo Donate, and Charity Mine. Unfortunately,

the employment of this system for waqf rests on the *fiqh* ruling of cryptocurrencies.

V. CONCLUSION AND RECOMMENDATIONS

This paper has reviewed an overview of waqf, blockchain technology and the integration of waqf into the blockchain ecosystem. Persistent issues in the management of waqf assets and institutions, especially misappropriation and neglect of properties, must be resolved to garner waqf donors' trust with mutawalli (trustee). One solution to this problem is through the application of blockchain technology using smart contract, enabling traceability, transparency, and compliance of waqf transactions and activities. FINTERRA has implemented waqf into a blockchain network, while others have suggested identical and dissimilar systems. Imagination, resources and Shari'ah are amongst boundaries of developing innovative waqf blockchains. Indeed, it is essential to outline numerous crucial points and caveats as follows:

First, it is important not to see any one technological concept as the magical solution for every issue. New and immature solutions are often seen as an infallible answer, especially to those unfamiliar with them. Therefore, frequent exposure is called for the positive aspects of a solution and ignorance to its weaknesses will leave the impression that it is unflawed. This is never the case.

Second, not all blockchain is equal. Transparency, security and immutability of information differ from a blockchain to another. Closed permissioned platforms, for instance, could allow collusion due to the small number of participants and validators. Further, information may also be opaque to some nodes, let alone the public external of the blockchain, because authorization is in the hands of a single or multiple nodes. Public trust in the waqf institution thus, cannot effectively be elevated if this is the case. Ignoring collusion, in an entirely honest closed blockchain, there is still the trade-off dilemma between security and transparency.

Third, to a certain extent, the use of smart contracts is congruent with the spirit of Islam of facilitation (*taysir*). They are written logically and precisely so as to remove non-deterministic executions (Christidis & Devetsikiotis, 2016; Mohamed & Ali, 2018). Additionally, its inalterability, not even by the author (Alharby & Van Moorsel, 2017), satisfies the Shari'ah requirement of fixed contract terms. Still, this could also pose problems if the contract is later deemed as contravening the Shari'ah, which necessitates the coding of a new smart contract. Moreover, the contracts are written in a programming language, which cannot be readily understood by non-specialists. Even experts have noted the difficulty in translating legal jargon into deterministic, unambiguous codes (Mik, 2017).

Fourth, under- or unqualified waqf managers are regarded as a key obstacle in waqf administration, and this problem may be enhanced with the adoption of new technology. This issue is not confined to them; other parties may also be unfamiliar with blockchain and its myriad concepts and nomenclatures. For those reasons, mutawalli (trustee), along with other stakeholders—lawyers, jurists, regulators, auditors, fund managers, insurers, users, and the public—must be made aware and educated on the subject. Additionally, the system must be accessible. Convenience afforded by a user-friendly and useful platform is correlated to the inclination of Muslims to make waqf donations (Mohd Thas Thaker, Mohd Thas Thaker, & Pitchay, 2018).

Fifth, while blockchain itself is neutral and *mubāh* (permissible), the transactions, contracts, and other activities taking place on the platform are not necessarily so. Regulators and Islamic scholars, are constantly playing catch-up to the rapidly advancing blockchain technology. Islamic scholars should therefore, be more cognizant of the specificities of these activities. Additionally, practitioners must involve them in every step of development to ensure their compliance with Shari'ah, perhaps via a Shari'ah committee not unlike that in Islamic financial institutions. Its function will be to ensure the compliance of the

real crowdfunded project as well as the digital transactions. Its scope is thus comprehensive.

Sixth, the effectiveness of a blockchain is conditional on the integrity and morals of the human actors themselves. Any wrong input will perfectly return an inaccurate or wrong output. Here, it is apt to invoke the adage of “garbage in, garbage out”.

Despite these caveats, there is much to be hopeful for with regards to waqf blockchain using smart contract. With a proper execution, it may very well fulfil its promise of transforming the Islamic social finance worldwide.

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Psychosocial Variables Affecting the Behavior of Street Inhabitants in Five Panamanian Shelters

Miguel A. Cañizales M^α & Francisco J. De León O.^σ

ABSTRACT

To test these hypotheses, we propose to conduct a quantitative study, with a non- experimental, cross-sectional and correlational design. The objective is to analyze the relationship between psychosocial factors and the behavior of homeless people in Panama, using observation, a structured interview, the MEC and a mental examination protocol as instruments. The sample will be composed of 160 homeless people from the John Paul II Center in Panama. It is expected to find a correlation between psychosocial factors and behavior, which would support the null hypothesis and reject the alternative hypothesis.

Keywords: street dwellers, psychopathological behaviors, psychosocial factors, drug use and mental health status.

RESUMEN

Para probar estas hipótesis, se propone realizar un estudio de tipo cuantitativo, con un diseño no experimental, transversal y correlacional. El objetivo es analizar la relación entre los factores psicosociales y la conducta de las personas en condición de calle en Panamá, utilizando como instrumentos la observación, una entrevista estructurada, el MEC y un protocolo del examen mental. La muestra estará compuesta por 160 personas en condición de calle del Centro Juan Pablo II en Panamá. Se espera encontrar una correlación entre los factores psicosociales y su conducta, lo que apoyaría la hipótesis nula y rechazaría la hipótesis alterna.

Palabras clave: habitantes de la calle, conductas psicopatológicas, factores psicosociales, consumo de drogas y estado de la salud mental.

I. INTRODUCTION

In this article we identify the psychosocial variables that affect the category of -appearance and behavior- of people living in street situations in Panama. By psychosocial variables we mean those factors that affect the emotional and social well-being of people, as well as their ability to adapt to the environment. Likewise, we analyze the behavior of street dwellers as an expression of social vulnerability, which are complex and multidimensional phenomena, impacting both the material conditions and the subjective perceptions of people, who assume an adaptation to their low self-esteem and precarious living conditions (such as addictions, lack of health care and poor self-control).

Patrício et al. (2019) point out that street dwellers are a vulnerable population facing multiple adversities (such as poverty, exclusion and discrimination) and violence in their daily lives. They also present high levels of psychological problems such as depression, anxiety, stress, suicidal ideation, loss of meaning in life, insomnia, social isolation, drug use and sexual abuse. This contributes to the presence of psychopathological factors in street dwellers. A social problem observed in many cities is that of street people, who are pejoratively referred to as "pedreros" (in Panama). These people usually have a neglected and marginalized appearance, which makes them the target of discrimination and rejection.

With this research we intend to explore some emotional and social factors that may influence the psychopathological behavior of street dwellers. This situation is detrimental to them and to those around them.

This study will make visible and raise awareness about some psychological and social risks that deteriorate the quality of life of street dwellers.

II. METHODOLOGY

2.1 Sample

We investigated the social and psychological profile of the people housed in this center. For this, we will use the non-probabilistic purposive sample, composed of 160 adults who have been housed in a period from May 18, 2018 to May 18, 2023 (five years), within the five shelters that the institution has had, located in: La Chorrera, Calidonia, Santa Ana, San Miguel and Río Hato.

2.2 Instruments

Three instruments were used to assess the degree of lucidity or compromise of consciousness, especially with regard to the difficulty in waking up and responding to external stimuli: A structured interview, Lobo's Mini Cognitive Examination, (1999) and a Mental Examination Protocol. These are detailed below:

2.3 Structured Interview

Includes: Place of birth, date of birth, age, schooling, place of residence, occupation, period of residence, reason for leaving, drug-related problems, start of drug use, last time of drug use, tolerance or dependence.

2.4 Mini-Cognitive Examination (MEC or MMSE)

In this category of instruments it was demonstrated that the constructive validity of the MMSE is good, when compared with other scales and diagnostic measures, such as the one performed with the Diagnostic and Statistical Manual of Mental Disorders DSM-IV (Diagnostic and Statistical Manual-IV, of the American Psychiatric Association, 2000).

2.5 Acosta, (2009, p. 322-324) Indicates:

"Short tests... usually yield important results on a specific population. In this case the population is the polydrug user, and its application was intended to establish the existence of a

deterioration in cognitive processes..... In summary, the Mini-Mental test is useful as a screening test because it yields results on the impairment of functions at a general level; however, in these cases, it is of vital importance to use an extensive neuropsychological evaluation battery to specifically determine the altered area".

In the same sense, Aznar, (1999): points out:

The experts now consulted also endorsed the "feasibility" and "content" validity of the SCM. The following previous existing data from the original Spanish standardization support the "construct" validity of the instrument: "concurrent validation" against psychometric instruments or independent clinical tests; discriminative capacity between "organic" and "non-organic" pictures; and validation against external parameters, including the EEG. The results of the test-retest reliability calculation of the SCM, under the demanding conditions of the study, were satisfactory. The majority of individuals fall in the high, normal, range of performance on the MEC, but there is sufficient scatter in the scores and the reliability coefficient was, for the MEC-35: $k_w = 0.637$ (95%CI = 0.596-0.678; $z = 12.655$; $p < 0.01$).

2.6 Mental Examination Protocol

In this evaluation it is necessary to perform a mental examination to obtain information regarding possible degrees of impairment of judgment, intelligence, memory, mood, and others. These are aspects that are part of the evaluation of the mental state of a person and it is necessary to know how to identify and analyze them.

This protocol discriminates according to the exploration of the mental status evaluation that reflects some characteristics of higher cortical functions, such as abstract thinking.

III. RESULTS

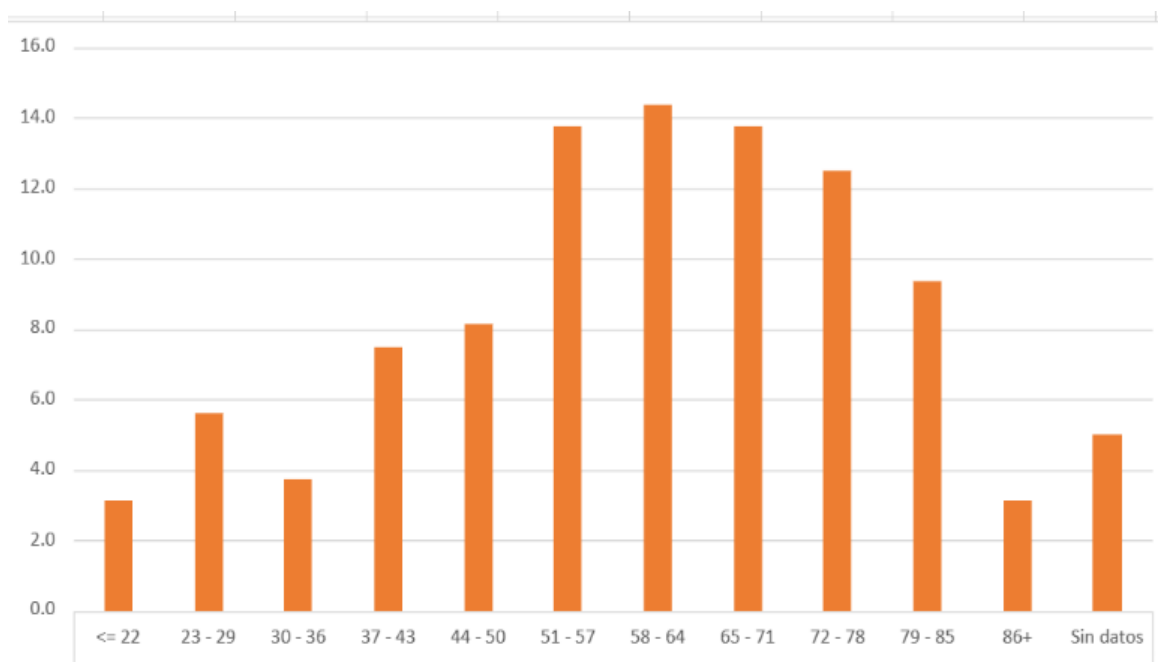
The results obtained from the data analysis are shown below.

3.1 Description of results obtained in the Structured Interview

Figure 1 shows the distribution of ages in a range of seven years, from the highest to the lowest number of statistical results, 58-64 years represented 23 people (14.4%), 51-57 years and 65-71 years represented 22 people (13.8%), 72-78 years represented 20 people (12.5%), 79-85 years represented 15 people (9.4%), age 44-50 represented 13 persons (8.1%), age 37-42

represented 12 persons (7.5%), no data represented 8 persons (5.0%), age 30-36 represented 6 persons (3.8%), age 23-29 represented 9 persons (5.6%), and age 86 and older and age 22 and younger represented 5 persons each (3.1%).

This indicates a higher percentage of people in the 51+ age range than in the 50+ age range in the shelters of the John Paul II Center.

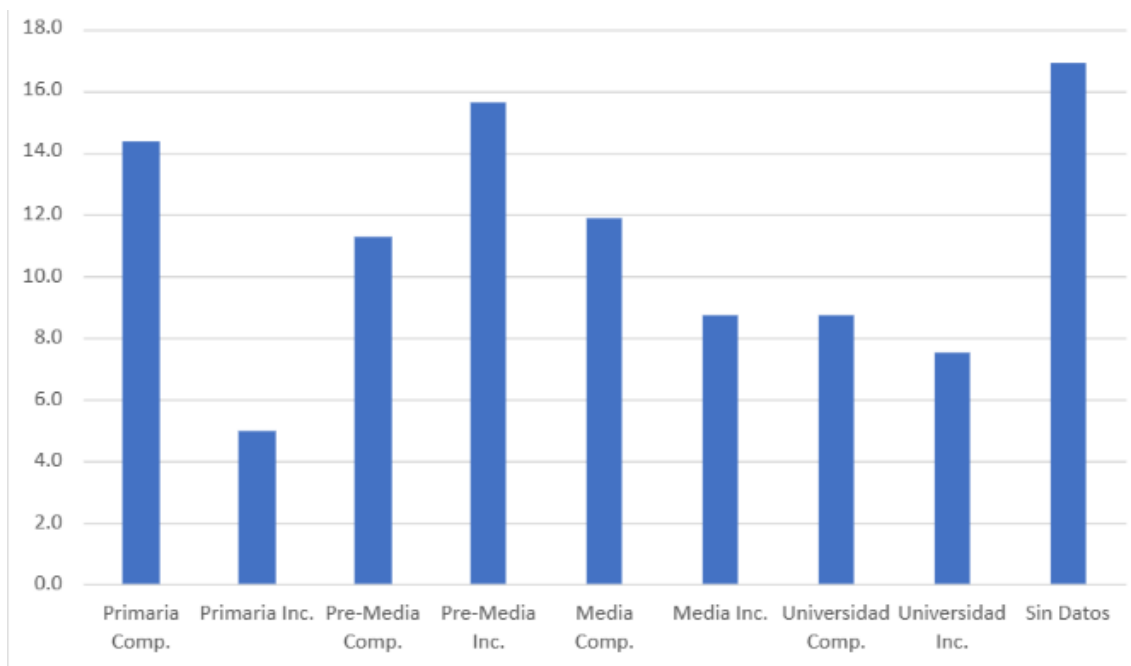


Source: Psychosocial Variables that Influence the Behavior of Street Inhabitants in Five Panamanian Shelters.

Figure 1: Graph of age distribution over a seven-year range

Figure 2 shows the distribution of the level of schooling from the highest to the lowest number, No data represents 27 persons (16.9%), in the level up to Pre-medium not completed it represented 25 persons (15.6%), in the level up to Primary completed it represented 23 persons (14.4%), in the level up to High School completed it represented 19 persons (11.9%), at the level up to Pre-media completa represented 18 people (11.3%), at the level up to Media no completo and Universidad Completa represented 14 people each (8.8%), at the level of Universidad no completo represented 12 people (7.5%), and at the level of Primaria no Completa represented 8 people (5.0%).

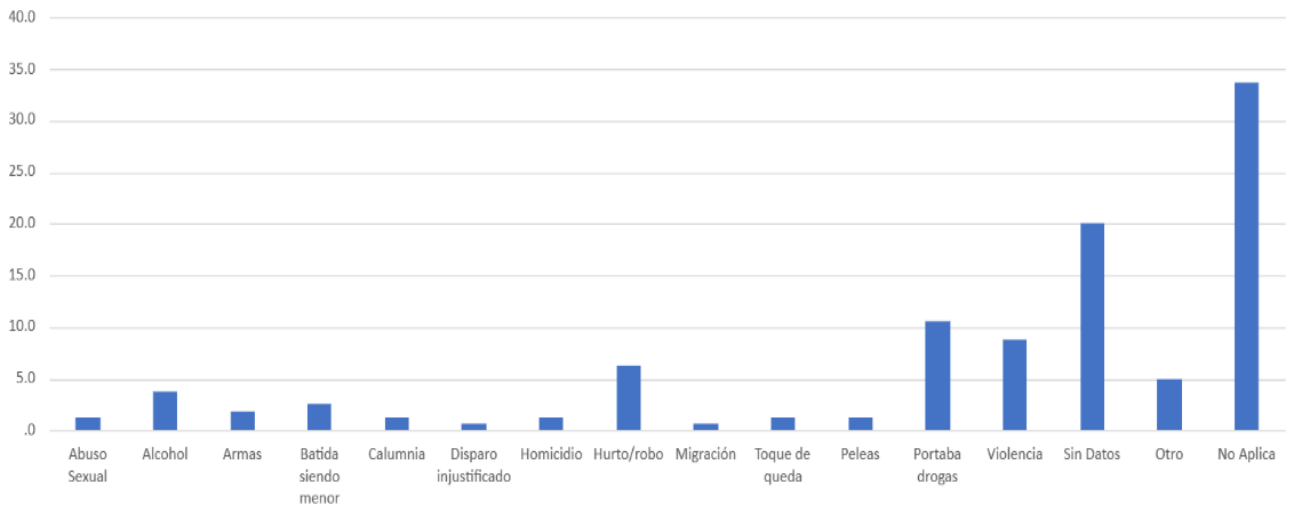
This indicates a high level of people who did not complete school. It is observed that the people in this sample have a very low level of schooling.



Source: Psychosocial Variables that Influence the Behavior of Street Inhabitants in Five Panamanian Shelters.

Figure 2: Graph of Schooling Level Distribution

Figure 3 shows the distribution of the reasons for arrest from highest to lowest number, with 54 persons not arrested (33.8%), 32 persons (20.0%) in the category of No data, 17 persons (10.6%) in the category of Carrying drugs, 14 persons (8.8%) in the category of Violence, 10 persons (6.3%) in the category of Robbery or Theft, 8 persons (5.0%) in the category of Other, 6 persons (3.8%) in the category of Alcoholism (3.8%), 4 persons (2.5%) in the category of Weapons Carrying (2.5%), 4 persons (2.5%) in the category of Raiding while under age (2.5%) in the category of Weapons Carrying (2.5%). 0%), in the category of Alcoholism corresponded to 6 persons (3.8%), in the category of Batida while under age corresponded to 4 persons (2.5%), in the category of Carrying Weapons corresponded to 3 persons (1.9%), in the categories of Sexual Abuse- Slander- Homicide- Pandemic Curfew-Street Fighting corresponded to 2 persons each (1.3% each category), and the categories of Unjustified shooting and Migratory Status corresponded to one person each (0.6%).



Source: Psychosocial Variables that Influence the Behavior of Street Inhabitants in Five Panamanian Shelters.

Figure 3: Graphs of the distribution of Reasons for Detention

IV. INFERENTIAL STATISTICS FOR THE CATEGORY "APPEARANCE AND BEHAVIOR". CORRELATION

Hypothesis:

Hypothesis Ho: There are no psychosocial factors that influence the behavior of a homeless person in Panama.

$H_i: r \neq 0$

Hypothesis Hi: There are psychosocial factors that influence the behavior of a homeless person in Panama.

$H_o: r = 0.$

- Statistical test: chi cuadrado
- Level of confidence: $\alpha 0.05$

Region of rejection:

- Reject H_o $p \leq 0.05$
- Accept H_o $p > 0.05$

Table 1: Appearance and behavior vs. diagnosed mental illnesses

Pruebas de chi-cuadrado			
	Valor	gl	Significación asintótica (bilateral)
Chi- cuadrado de Pearson	13.756 ^a	17	.684
Razón de verosimilitud	19.545	17	.298
N de casos válidos	147		

Source: Psychosocial Variables that Influence the Behavior of Street Inhabitants in Five Panamanian Shelters

Due to the inclusion and exclusion criteria, there were 160 data collected where 147 records of persons obtained were completed. According to the chi-square value of 13.756, with a degree of freedom of 17, and a p-value of 0.684, we observe that there is a negative correlation since its

significance level is greater than 0.05, so there is sufficient evidence to accept the Ho, which coincides with the fact that these psychosocial factors do not influence the behavior of a person in street conditions in Panama.

Table 2: Appearance and behavior vs. Alcohol tolerance

	Valor	gl	Significación asintótica (bilateral)
Chi- cuadrado de Pearson	3.628 ^a	2	.163
Razón de verosimilitud	3.586	2	.166
N de casos válidos	147		

Source: *Psychosocial Variables that Influence the Behavior of Street Inhabitants in Five Panamanian Shelters.*

Due to the inclusion and exclusion criteria, there were 160 data collected where 147 records of persons obtained were completed. According to the chi-square value of 3.628, with a degree of freedom of 2, and a p-value of 0.163, we observe that there is a negative correlation since its

significance level is greater than 0.05, so there is sufficient evidence to accept the Ho, which coincides with the fact that these psychosocial factors do not influence the behavior of a person in street conditions in Panama.

Table 3: Appearance and behavior vs. Cigarette tolerance

	Valor	gl	Significación asintótica (bilateral)
Chi- cuadrado de Pearson	2.536 ^a	2	.281
Razón de verosimilitud	2.506	2	.286
N de casos válidos	147		

Source: *Psychosocial Variables that Influence the Behavior of Street Inhabitants in Five Panamanian Shelters.*

Due to the inclusion and exclusion criteria, there were 160 data collected where 147 records of persons obtained were completed. According to the chi-square value of 2.536, with a degree of freedom of 2, and a p-value of 0.281, we observe that there is a negative correlation since its significance level is greater than 0.05, so there is sufficient evidence to accept the Ho, which coincides with the fact that these psychosocial factors do not influence the behavior of a person in street conditions in Panama.

Table 4: Appearance and behavior vs. Marijuana tolerance

	Valor	gl	Significación asintótica (bilateral)
Chi- cuadrado de Pearson	9.171 ^a	2	.010
Razón de verosimilitud	9.963	2	.007
N de casos válidos	147		

Source: Psychosocial Variables that Influence the Behavior of Street Inhabitants in Five Panamanian Shelters

Due to the inclusion and exclusion criteria, there were 160 data collected where 147 records of persons obtained were completed. According to the chi-square value of 9.171, with a degree of freedom of 2, and a p-value of 0.010, we observe that there is a positive correlation since its

significance level is less than 0.05, so there is sufficient evidence to accept the H_1 , which coincides with the fact that these psychosocial factors influence the behavior of a person in street conditions in Panama.

Table 5: Appearance and behavior vs. Cocaine tolerance

	Valor	gl	Significación asintótica (bilateral)
Chi- cuadrado de Pearson	5.830 ^a	2	.054
Razón de verosimilitud	6.343	2	.042
N de casos válidos	147		

Source: Psychosocial Variables that Influence the Behavior of Street Inhabitants in Five Panamanian Shelters.

Due to the inclusion and exclusion criteria, there were 160 data collected where 147 records of persons obtained were completed. According to the chi-square value of 5.830, with a degree of freedom of 2, and a p-value of 0.054, we observe that there is a negative correlation since its

significance level is greater than 0.05, so there is sufficient evidence to accept the H_0 , which coincides with the fact that these psychosocial factors do not influence the behavior of a person in street conditions in Panama.

Table 6: Appearance and behavior vs. Compulsive gambling

	Valor	gl	Significación asintótica (bilateral)
Chi- cuadrado de Pearson	7.824 ^a	2	.020
Razón de verosimilitud	8.477	2	.014
N de casos válidos	147		

Source: Psychosocial Variables that Influence the Behavior of Street Inhabitants in Five Panamanian Shelters

Due to the inclusion and exclusion criteria, there were 160 data collected where 147 records of persons obtained were completed. According to the chi-square value of 7.824, with a degree of freedom of 2, and a p-value of 0.020, we observe that there is a positive correlation since its

significance level is less than 0.05, so there is sufficient evidence to accept the H_1 , which coincides with the fact that these psychosocial factors influence the behavior of a person in street conditions in Panama.

Table 7: Appearance and behavior vs. Occupation

	Valor	gl	Significación asintótica (bilateral)
Chi- cuadrado de Pearson	37.874 ^a	40	.566
Razón de verosimilitud	46.363	40	.226
N de casos válidos	147		

Source: Psychosocial Variables that Influence the Behavior of Street Inhabitants in Five Panamanian Shelters.

Due to the inclusion and exclusion criteria, there were 160 data collected where 147 records of persons obtained were completed. According to the chi-square value of 37.874, with a degree of freedom of 40, and a p-value of 0.566, we observe that there is a negative correlation since its

significance level is greater than 0.05, so there is sufficient evidence to accept the H_0 , which coincides with the fact that these psychosocial factors do not influence the behavior of a person living on the street in Panama.

Table 8: Appearance and behavior vs. Cognitive impairment

	Valor	gl	Significación asintótica (bilateral)
Chi- cuadrado de Pearson	7.090 ^a	2	.029
Razón de verosimilitud	7.574	2	.023
N de casos válidos	147		

Source: Psychosocial Variables that Influence the Behavior of Street Inhabitants in Five Panamanian Shelters.

Due to the inclusion and exclusion criteria, there were 160 data collected where 147 records of persons obtained were completed. According to the chi-square value of 7.090, with a degree of freedom of 2, and a p-value of 0.029, we observe that there is a positive correlation since its significance level is less than 0.05, so there is sufficient evidence to accept the H_1 , which coincides with the fact that these psychosocial factors influence the behavior of a person in street conditions in Panama.

V. DISCUSSION

The statistical hypothesis establishes that there are psychosocial factors that influence the behavior of a homeless person at the John Paul II Center in Panama City.

Our findings contrast with those of De León and Cañizales (2021), who reported that most of the participants showed inadequate appearance and behavior. Likewise, we differ from the survey data of Ayano et al. (2017), which indicated that a high

percentage of people presented some psychotic or schizophrenic disorder.

The results of this research are related to those of Grandón et al. (2018), who noted in their studies that more people had dropped out of education. They also mentioned that the majority of homeless people with mental health problems did not recognize their condition. In addition, they coincide with those of Alvarado (2017), who found that street dwellers in the municipality of Facatativá were mostly people who had left school at an early age, and that most people were affected mainly by marijuana use, followed by other substances.

VI. CONCLUSION

This research has made it possible to analyze the factors that influence the behavior of people living on the streets who are cared for at the John Paul II Center. It has been found that tolerance to marijuana consumption, gambling habits and cognitive impairment are relevant factors that affect the appearance and behavior of these people; however, it has not been possible to establish a causal relationship between psychosocial factors and the category of Appearance and behavior- in a generalized way.

Within the sociodemographic variables, we also found that there is a high level of school dropout and There is a high frequency of people who have accepted to be housed in this institution, most of whom are over 51 years of age and older.

Since there is a higher percentage of people who do not have a mental diagnosis, it can be interpreted that this category of -diagnosed mental illnesses- does not influence the appearance and behaviors of these people.

Similarly, as there is a high frequency of people who do not apply (or do not consume) in alcohol tolerance, cigarette tolerance, cocaine tolerance and occupation are presented as not influencing the appearance and behavior of these people.

The results presented in this article are specific to the category of Appearance and behavior, so other items such as thought content process, mood,

thought processes and content, and others are not emphasized.

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The Bianchi Transform of the Minding Coil

Cheshkova Mira

ABSTRACT

The work is devoted to the study of the Bianchi transform for surfaces of constant negative Gaussian curvature. The surfaces of rotation of constant negative Gaussian curvature are the Mining top, the Minding coil, the pseudosphere (Beltrami surface). Surfaces of constant negative Gaussian curvature also include Kuens surface and the Dinis surface. The study of surfaces of constant negative Gaussian curvature (pseudospherical surfaces) is of great importance for the interpretation of Lobachevsky planimetry. The connection of the geometric characteristics of pseudospherical surfaces with the theory of networks, with the theory of solitons, with nonlinear differential equations and sin-Gordon equations is established. The sin - Gordon equation plays an important role in modern physics. Bianchi transformations make it possible to obtain new pseudospherical surfaces from a given pseudospherical surface.

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The Bianchi Transform of the Minding Coil

Преобразование Бианки катушки Миндинга

Cheshkova Mira

ABSTRACT

The work is devoted to the study of the Bianchi transform for surfaces of constant negative Gaussian curvature. The surfaces of rotation of constant negative Gaussian curvature are the Mining top, the Minding coil, the pseudosphere (Beltrami surface). Surfaces of constant negative Gaussian curvature also include Kuens surface and the Dinis surface. The study of surfaces of constant negative Gaussian curvature (pseudospherical surfaces) is of great importance for the interpretation of Lobachevsky planimetry. The connection of the geometric characteristics of pseudospherical surfaces with the theory of networks, with the theory of solitons, with nonlinear differential equations and sin-Gordon equations is established. The sin-Gordon equation plays an important role in modern physics. Bianchi transformations make it possible to obtain new pseudospherical surfaces from a given pseudospherical surface.

Using a mathematical package, the Bianchi transform for the Minding coil is constructed.

keywords: gaussian curvature, surface of rotation, the minding coil, bianchi transformations.

АБСТРАКТНЫЙ

Работа посвящена изучению преобразования Бианки для поверхностей постоянной отрицательной гауссовой кривизны. Поверхности вращения постоянной отрицательной гауссовой кривизны — это волчок Миндинга, катушка Миндинга, псевдосфера (поверхность Бельтрами). Изучение поверхностей постоянной отрицательной гауссовой кривизны (псевдосферических поверхностей) имеет большое значение для интерпретаций планиметрии Лобачевского. Установлена связь геометрических характеристик псевдосферических поверхностей с теорией сетей, с теорией солитонов, с нелинейными дифференциальными уравнениями и уравнениями синус-Гордона. Уравнение синус-Гордона играет важную роль в современной физике. Преобразования Бианки позволяют по данной псевдосферической поверхности получить новые псевдосферические поверхности.

Используя математический пакет, строятся псевдосфера и ее преобразования Бианки.

Ключевые слова: гауссова кривизна, поверхность вращения, катушка миндинга, преобразование бианки.

В евклидовом пространстве E^3 рассмотрим поверхность вращения M , полученную вращением плоской кривой вокруг оси. Обозначим через $k = (0, 0, 1)$ — орт оси, а через $e(v) = (\cos v, \sin v, 0)$ — радиус-вектор единичной окружности, расположенной в плоскости, ортогональной оси. Тогда поверхность M можно задать в виде:

$$r = ue(v) + f(u)k \quad (1)$$

где f — дифференцируемая функция, u, v — параметры.

Обозначим через n — орт нормали к поверхности M . Тогда

$$n = \frac{f'e-k}{\sqrt{(f')^2+1}} \quad (2)$$

Главные кривизны k_1, k_2 поверхности M имеют вид

$$k_1 = -\frac{f'}{u\sqrt{(f')^2+1}}, k_2 = -\frac{f''}{(\sqrt{(f')^2+1})^3}$$

Гауссова кривизна $K=k_1k_2$ равна

$$K = \frac{f'}{u\sqrt{(f')^2+1}} \frac{f''}{(\sqrt{(f')^2+1})^3}$$

Требуем $K = const$, получим решение

$$f(u) = \pm \int \sqrt{\frac{Ku^2-(c-1)}{c-Ku^2}} du, \quad (3)$$

где c — произвольная константа.

Поверхности вращения постоянной отрицательной гауссовой кривизны — это волчок Миндинга $0 < c < 1$, катушка Миндинга $c < 0$, псевдосфера $c = 0$ [1, с.100], [2, с.175].

Для $K=-1$, следуя Миндингу, $c=-a^2$, $u=ach(t)$, $a=1$.

Из (3) имеем

$$f(u) = \int \sqrt{1-sh(t)^2} dt, f(t) = 2(EllipticF(sh(t),i)-EllipticE(sh(t),i))+C, C=const,$$

где $EllipticF(sh(t),i)$, $EllipticE(sh(t),i)$ - эллиптические интегралы первого и второго рода, соответственно.

Предположим $C=0$, тогда

$$f(t) = 2(EllipticF(sh(t),i)-EllipticE(sh(t),i)).$$

Так как $1-sh^2(t) \neq 0$, имеем $t \in [-\ln(1+\sqrt{2}), \ln(1+\sqrt{2})]$.

Построим катушку Миндинга

$$M: r(t,v) = ch(t)e(v) + f(t)k, \quad t \in [-\ln(1+\sqrt{2}), \ln(1+\sqrt{2})], v \in [-\pi, \pi].$$

Положим $m=f(\ln(1+\sqrt{2}))$ и определим еще две секции катушки Миндинга

$$M_1: r(t,v) = ch(t)e(v) + (f(t) + 2m)k,$$

$$M_2: r(t,v) = ch(t)e(v) + (f(t) + 4m)k.$$

Построим три секции катушки Миндинга (рис. 1).

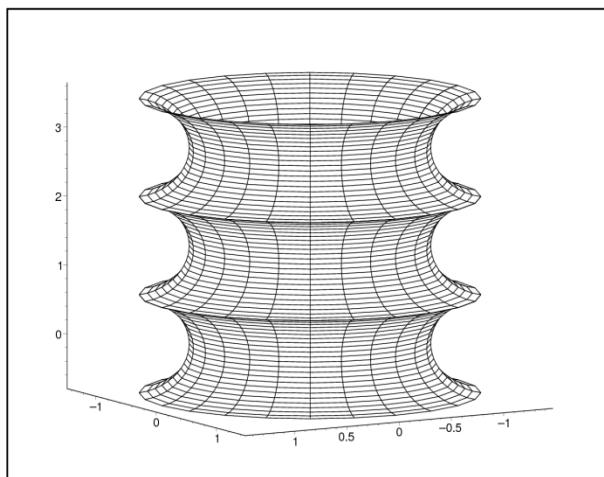


Рис.1: Три секции катушки Миндинга

Определим метрический тензор g_{ij} и символы Кристоффеля Γ_k^{ij} .
Имеем

$$r_1 = r_u = e(v) + \sqrt{1 - sh(t)^2} k, r_2 = r_v = ue'(v),$$

$$g_{11} = 1, g_{12} = 0, g_{22} = ch(t)^2, \quad (4)$$

$$\Gamma_{22}^1 = -sh(t)ch(t), \Gamma_{12}^2 = \Gamma_{21}^2 = th(t).$$

Остальные Γ_k^{ij} равны нулю.

Рассмотрим две гладкие поверхности M, \bar{M} и диффеоморфизм $f: M \rightarrow \bar{M}$. Касательные плоскости в соответствующих точках $p \in M, f(p) \in \bar{M}$ пересекаются по прямой $(p, f(p))$, образуя прямой двугранный угол, причем вектор $\overline{pf}(p) = \rho V_p$ где V_p — орт, $\rho = const$. Обозначим через n — орт нормали к поверхности M в точке $p \in M$. Тогда касательная плоскость к поверхности \bar{M} в точке $f(p) \in \bar{M}$ имеет вид $T_{f(p)}\bar{M} = \{f(p), n, V\}$. Теорема Бианки

утверждает, что если поверхность M имеет гауссову кривизну $K = -\frac{1}{\rho^2}$, то и поверхность \bar{M} имеет ту же кривизну.

Обозначим через r радиус-вектор поверхности M , а через R — радиус-вектор поверхности \bar{M} . Полагаем $K = -1$ и рассмотрим отображение $f: M \rightarrow \bar{M}$ [2, с. 489].

Имеем

$$R = r - V, V = V^s r_s$$

Из условия $\langle R_i, [n, V] \rangle = 0$ получим

$$r_i - \partial_i V = \omega(r_i) V + \alpha(r_i) n$$

Так как $\langle V, V \rangle = 1, \langle \partial_i V, V \rangle = 0$, то

$$\omega(r_i) = \langle r_i, V \rangle, \nabla_i V = r_i - \omega(r_i) V$$

Имеем

$$\nabla_1 V^1 = 1 - g_{11}(V^1)^2, \nabla_1 V^2 = -g_{11} V^1 V^2, \tag{5}$$

$$\nabla_2 V^1 = -g_{22} V^1 V^2, \nabla_2 V^2 = 1 - g_{22}(V^2)^2$$

Формулы (5) в силу (4) примут вид

$$\begin{aligned} \partial_i V^1 + \Gamma_{1s}^1 V^s &= 1 - (V^1)^2, \partial_i V^2 + \Gamma_{1s}^2 V^s = -V^1 V^2, \\ \partial_v V^1 + \Gamma_{2s}^1 V^s &= -ch(t)^2, \partial_v V^2 + \Gamma_{2s}^2 V^s = 1 - ch(t)^2 (V^2)^2. \end{aligned} \tag{6}$$

Система (6) имеет решение

$$V^1(t, v) = \frac{e^{2t} A1(v) + A2(v)}{e^{2t} A1(v) - A2(v)},$$

$$V^2(t, v) = 4 \frac{e^{2t} C_1 + C_2}{(e^t A1(v) - e^{-t} A2(v))(e^t + e^{-t})},$$

$$A1(v) = 2e^v + e^{2v} C_1 - C_2,$$

$$A2(v) = 2e^v - e^{2v} C_1 + C_2, C_1, C_2 = const.$$

Потребуем, чтобы $\langle V, V \rangle = 1$. Тогда $C_1 C_2 + 1 = 0$.

Введем обозначение $c_1 = \frac{1}{C_1}$. Имеем

$$V^1(t, v) = \frac{e^{2t}(e^v + c_1)^2 - (e^v - c_1)^2}{e^{2t}(e^v + c_1)^2 + (e^v - c_1)^2},$$

$$V^2(t, v) = 4 \frac{e^{2v} - c_1}{(e^{2t}(e^v + c_1)^2 + (e^v - c_1)^2)(e^t + e^{-t})}.$$

Построим поверхность \bar{M} , полагая $c_1 = e^2, c_1 = e$ (рис.2, рис.3).

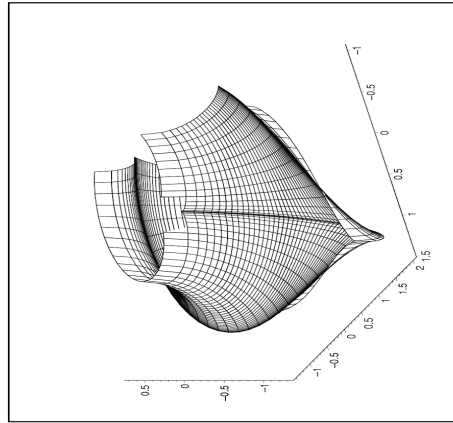


Рис.2: Преобразование Бианки катушки Миндинга, $c_1 = e^2$

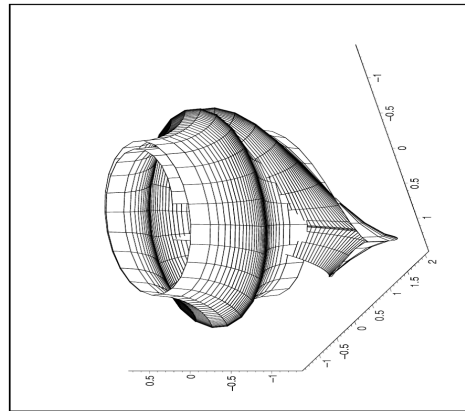


Рис.3: Преобразование Бианки катушки Миндинга, $c_1 = e$

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