

Implications of Smart Learning in the educational decision-making process

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ABSTRACT: *The world changes as we speak, and according to Forbes, around 2.5 quintillion bytes of data are created each day. Since the Internet of Things amounts around 100 billion devices worldwide, it cannot be comprehended how our decision-making process is impacted by this given framework. Moreover, the latter has had continuous and fundamental significance for many fields of study, including that of education, as it has evolved with the dramatic increase in the usage of the Internet and digital equipment. This study was created around the idea of making a critical review of the data regarding the decision-making process in the educational system, and to further a proposition on its impact and effect on smart learning, considering the whole education environment and its connections with the digital equipment, learning methods, the IT infrastructure, as well as the corporate needs.*

KEY WORD: *Smart Learning, Decision-making process, Smart Education, IOT*

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I. INTRODUCTION AND LITERATURE REVIEW

Considering the history of human knowledge, one can understand the dimensions of the evolutionary structures and functions of the decision-making process. The latter is specific to social anthropology, and creates a system that allows for the independent calculation of the probability and strategic choice. The human being has transformed its behaviour in terms of challenges from the living environment, and of possibilities across its daily existence. By comparing a set of possible outcomes, the human brain managed to create a pattern useful, in ancient times, for procuring food and shelter, and, today, for choosing the best solution to a modern problem/situation. Basically, the human brain and its behaviour have been rerouted from simple decision-making processes to complex, sophisticated means of deciphering the general conditions of a given situation, and the formal and intuitive field of logical limitation (Köksalan, Wallenius, Zions, 2013).

The concept of decision-making refracts also in the science of psychology, where numerous researchers have tried to classify the former on the basis of the latter. Therefore, according to Mirian et al. (2009), the decision-making process can be inflicted by different types of stimuli, determining a rational, impulsive, or random/hazardous choice. Moreover, some researchers (Ceașu, 1972) have reminded that the decision-making process is merely the concrete action towards future situations. This choice stems from the voluntary act of response, decoding first the layers of information – gathering, deciphering, realization, action, and self-regulation.

When making a decision, a human being is confronted with a series of challenges, such as the need for anticipation and prevision, and the need for rational, clear understanding of the ubiquitous laws of reality. The individual will find himself in the position of defining the certain and uncertain equilibrium between the subject and the object of the decision, considering three standard situations accordingly – certainty (100% of the time, the decision will determine the realization of a given event), uncertainty (50% chance of the event happening, and 50% of the event not happening), and the improbability (100% the event will not be determined by the choice made). The first scenario is relative in relation to the decision-making process, as to the level/degree of actually involving the choice of the subject in a certain situation. Basically, the greater the risk and improbability of a truth, the higher the probability of intrinsically subjecting the individual to making a certain decision. That is, the individual was not involved in any pattern or environment which he is familiar with, therefore not engaging the application of existent, memorized actions.

Such patterns are easily identifiable in any field of expertise, but they present some interesting aspects when considering the education environment. Decision-making processes happen daily in this sort of ambient, with the central focus shifting between different subjects – students, professors, policy-makers, and between considerably more objects – curriculum, organizational charts, digitalization, methods, procedures, legislation, teaching proposals, etc. Furthermore, the amount of decisions considered within the educational system converge around the changes in each generation of students and professors. The latter experience a wide-spread concern regarding the quality of the given environment, and of the finality of the education process. What does

it want to achieve? Is it an individualistic approach to problems? Is it a culmination in technological advancements? Or is it to create profound scientific revolution?

Alongside the world has witnessed a profound technological change, implying transformative views, both political and professional, and innovative means for achieving the ultimate goal – evolution. Each day, our civilization creates around 2.5 quintillion byte of data, by using 100 billion devices worldwide, all connected to the Internet. The influence of the Internet of Things on our general lifestyle is now considered ancient history, but it is important to understand the implications it has on the educational process, and on the decision-making processes within this sector.

The first part of this study cumulates in the review of the overall information on the decision-making process in education, and it continues with discussing the proposals for smart learning or smart education and the possible changes and challenges of decision-making with implication on technology, the Internet, big data, etc. Ultimately, the research will develop by identifying gaps within the education environment that can be filled in with the usage of digitalization, smart learning methods, professional IT infrastructure, and altogether considering the economic implications and needs for a purposeful realization of the education process.

1.1. The decision-making process

The decision represents a certain action towards selecting one possible alternative from a number of options. The scope of any decision resides in the need for finding a solution to a problem of administration, coordination, control or prevision of the activities within the competency of the manager. Any decision is part of a decision-making system of the organization, being it either a private entity or a public one. Popescu-Neveanu (1978) defines decision as a mean of overcoming a cognitive or an affective conflict, under the form of an actionable option, while Dudley and Vidovich(1995) considers the process of making a decision simply as the selection of an alternative, and Ajzen (1996) envisions the concept as a rational choice based either on information or emotions.

Other scholars (Sweetland, Haythorn, 1961) consider decision as an answer from a pool of possibilities; moreover, the complexity of a decision can be understood by assessing the dynamics of the interactivity of all participants in the act of selection (Payne et al., 1988). Nevertheless, Stafford and Gurney (2004) discuss Piéron's law on decision-making from the perspective of cybernetics, defining the former as a point of view guiding the optimum, between inputs and outputs, and considering the cost of passing from information to decision. Consequently, Diederich (2003) addresses the concept of decision-making from a situation of conflict, where the solution resides in a number of alternatives which are, in turn, released for only one possible variable. Any decision, nonetheless, will be that behaviour alteration, triggered by a need and an evaluation process, in order to arrive at the imagined outcome (Ceașu, 1972). Therefore, a decision will always be measured in its potential costs and benefits given the pre-existent reality, and it implies an evaluation process before it is instituted.

A decision can be classified on the basis of its frequency, the knowledge on the decision-making environment, the time horizon, the number of decision-makers and stakeholders, the number of criteria etc. From a frequency perspective, any decision can be programmed or not, the first being part of a continuous series of responses, achievable through the use of a computer programme. A non-programmed decision is one that appears in given situations, does not abide by any rule and is a consequence of the environment changes; they are considered unique, non-repeatable, and of high impact and uncertainty. Although there are decisions that can be classified according to the knowledge on their environment, the most common types of decisions are those of high risk and uncertainty. Considering the actual economic environment with effects growing into all other sectors of importance, it is of paramount significance the information on the decision-making process for situations where not all the variables can be controlled, and known. It is only through probabilistic approaches that the impact of a decision can be assessed, and the decision-maker will be only guided by its former experience in a similar situation, the outcome being unguaranteed whatsoever. Consequently, the decision will imply also risks, as the decision-maker, although aware of the alternatives in a given situation, can only estimate the effects of the former. Therefore, the decision has to be regarded from the perspective of accepting a certain level of risk. The latter is determined by both cultural sequence and the percentage of guaranteed probability. Furthermore, a decision can be made in unclear situations, where the alternatives are not immediate, and their effects cannot be synthesised in consequences. The gathering of relevant information which will guide the logical and rational direction is fundamental in such conditions.

Time is the most important resource of all, and it is, indeed, as precious as it is limited – to the extreme. Any decision implies the execution through time. Time is of essence; a decision can be operational, tactical or strategic, depending of the time span that it is going to impact its stakeholders. Moreover, the decisions can be affecting individuals, or groups of individuals, and they can be centralized or decentralized.

Any decision-making process follows a pattern, which can be either traditional, or it can be based on modern approaches. A traditional decision-making process is constituted by a number of phases, including the

identification and defining of the situation-problem, the identification of the objectives and decisional criteria, the gathering of information on the subject, the assembly of the alternatives, the evaluation of the alternatives and the optimal choice, the communication and implementation of the decision, the control of the implementation and the results evaluation. Clearly, the first stage of the decision-making process determines the way in which all the other phases evolve, and the main criteria for a good development of a decision-making process resides in the correct and complete identification of the cause of the problem, of the main question to the situation at hand. Based on that, the decision-makers will be able to set the further steps, starting of with the objectives for a proper continuity of the process. As long as they gather the information, all possible alternatives are being identified in a creative manner, distributing the possible outcomes based on their costs and benefits. Furthermore, the decision-makers are structuring the scenario under the form of a plan, with concrete directives towards all parts involved, and with a control system for the evaluation of the progress and results. This implies that the decision is made in a sterile and rational environment, based on the limited cognitive capacity of the decision-makers, in a linear sequence.

1.2. The decision-making process in education

The education environment is unstable to the degree that it presents lower predictability, uncertainty and nonlinearity. It is, therefore, difficult to approximate the alternatives of a decision-making process for a problem pertaining to this sector. The *real* education system will imply dynamism, psychological dimension, different stimuli, creativity, and big data. The parties involved in the system are as complex as the system itself, if not more; they transform the decision-making process into a laborious and difficult identification of innovative solutions. They imply the existence of subjectivity in the alternative choice, their personal opinion playing a fundamental role in the realization and implementation of the optimal decision.

Most of the time, comparative methods are used in this field of activity, given the importance of the phenomenon continuity principle in education. Therefore, different time periods are considered and compared in terms of strategical and tactical decisions. Mathematical methods of optimization are utilized for arriving at an economic optimum, although the structure of the decision will be implemented in such a manner that it will transform the system for a future environment. The decisions can be structured, semi-structured and unstructured, depending on the degree to which a problem is associated with objectives, alternatives and possible outcomes. Moreover, the utility of the decision-making process will increase as the time and research resources increase, and if the problems arisen are complex (Payne et al., 1988).

The cognitive perspective of decision-making and performance evaluation resides in the instruments used and also in the user's competences. The classical psychometric techniques are implemented in the decision-making process in order to limit the systemic distortions and errors of choice. Social psychology is fundamental in the process of decision-making and evaluation of implementation and outcomes. Feldman (1981) proposes a cognitive model for the evaluation procedure of the performances, starting with the classification of information, updates of the mechanisms and control tactics. Given the studied elements of the problem, it is only a matter of time until the subjectivity of the decision-makers will be involved in the process, and their capabilities and qualities as planners, organizers and leaders will be tested. The process involves the usage of experience and intuition in the strategical decision-making, more so in education, where the impact of any solution and implementation will reverberate in the general economic system. Most of the time, the executive decisions will imply qualitative, rather than quantitative methods, as not all problems can be programmed and operatively quantified.

Since former experiences of decision-makers represent a starting point in the realization of the transformative processes, it is important to understand the connection of knowledge and beliefs to the education system, and the decision-making phenomenon. Economists discuss often, especially when it implies decision-making processes, about the opportunity costs of pursuing a certain course of action. The latter constitutes an example of not being able to simultaneously engage in more than one decision pattern, which implies the missing out of other new experiences, and this type of situation must be considered from a rational perspective. But for a decision to lead towards transformative experiences it has to be anything but rational. This is where psychology comes on the stage. A decision-maker will find himself at a crossroads; he will be standing between choosing with his instinct and choosing based on his cognitive, rational system. New studies of social psychology (Walsh, Ayton, 2009) suggested that human beings can actually predict the future outcomes of their decisions based on impersonal reporting and imagined future experiences. The latter concept, which is scientifically titled as affective forecasting, will determine a poorer prediction of future outcomes, compared to decisions based on rational behaviour and thought.

Furthermore, when assessing the education system, it is important to underline the requirements it must abide to in order for a future development based on rational decision-making. In essence, education implies an organized curriculum, which proposes equality in the use of knowledge for all its students to solve their social and personal problems, the opportunity for students to participate in the decision-making process involving

situations that will affect their lives, and practices in the educational system for the stakeholders to succeed in their endeavours. Therefore, the decisions made within the education environment are having a ripple effect on the whole economic system.

1.3. Innovation and technology in teaching

Decisions made for the reform of the education include, in the 21st century, the extensive usage of the technology. As there are approximately 200 billion devices in the world connected to the Internet, it is only to imagine what is the extent of influence of data created each day by the users. That information is partly created within the education system, and part of it is used within the latter. Some of that data is used in the decision-making process, for taking action with regard to different elements of the education environment, in order to design it for the future generations.

Each new generation of students creates its own set of aspirations and ideals, and higher education is meant to introduce advancement in the society and the economy. The means by which such an ideal can be achieved are related to the potential of the teaching and the usage of digital resources for the bettering of the education system and environment.

Just like any other type of organization, the entities activating in the education system will only survive in the high-technology service world with the intensive usage of the innovation, and by making decisions based on the systematic reduction of uncertainty. Moreover, the road to success in this industry is oriented towards internal factors, such as organizational climate, information sharing, and the decision-making process with regard to technology (Van Riel, Lemmink, Ouwensloot, 2004).

As a consequence of the 2020 pandemic, the world has been pushed out of its comfort zone, and yet another time in the humankind history we found ourselves in the blind spot, without being prepared for what was about to come. All the decisions made for the preservation of the population's health have had some not necessarily good influence on the education system. The schools being shut down and the students asked to attend classes online proved that the technology, although widely used, was far away from being prioritized for the smart learning system.

Moreover, the abilities and competencies of the professors must abide to the extensive use of technology and innovation (Bennett, Lockyer, Agostinho, 2018). The means of learning must be scalable and sustainable, and they should build the capacity to drive change, especially in higher education. Technology-enhanced learning would reframe teaching and learning, defining a new concept of advanced learning design, balancing pedagogical and technical elements in the education context, coming in to perfect the process with the usage of practical tools and instruments capable of mirroring the complexity of the international education framework.

Ultimately, students should be able to use technology in their learning process, and they should be part of the decision-making process (Foskett, Hemsley-Brown, 2001, Cox, Dyer, Robinson-Pant, Schweisfurth, 2011). Considering all factors influencing the possible choices of the student body, including country-of-origin, programme of study, personal reasons etc., the smart-learning process should be constructed based on decisions that have at least relative importance to the source of future work. Although it is important to emphasises on the acquiring of experts from different fields of interest into the teaching body, the underlining need will remain connected to the teaching process as a decision-making process implying knowledges, skills, competencies, attitudes, awareness, and also a framework for educating strategies delimited especially for learning the art of teaching (Freeman, 1989; Cubillo, Sanchez, Cervino, 2006).

II. RESEARCH METHODOLOGY AND DATA ANALYSIS

2.1. Research Objectives

The current research was constructed around the idea of describing the decision-making process in the education system based on the extensive usage of the new technologies and digitalization of the whole framework. Conclusively, the paper proposes a new perspective of the decision-making process in education, considering the impact of the smart-learning concept, its connections to the Internet of Things, the understanding of the art of teaching, and, of course, the importance of creating a sustainable framework in education, that includes the requirements and needs of the corporate sector, turning students into capable, skilled instruments in the economy.

The paper will also underline the importance which must be attributed to the practical, pedagogical and curricular issues that intertwine with technology and innovation. It is no longer the case of including some multimedia elements to the education discourse, but converging the education framework with the computer technology, as well as innovations in data, information, infrastructure, and resources. Since there are few aspects in the decision-making processes involved in the field of education and smart learning, one can only support the idea that technology is basically the motorized core of the educational reform.

2.2. Research Methodology and Data Analysis

The paper examines, in a qualitative manner, the general situation around the link between education and technology from a decision-making point of view. The critical overview of prior research and development work within this particular study has forwarded interesting topics, including the general concepts of decision-making, and education process, as well as innovation and technological instruments used for the development of concrete choices for the implementation of the smart learning framework. Ultimately, the fact is that there is a lack of information and application regarding the inter-connectivity between education, technology, innovation and the decision-making process affecting the general policy.

Furthermore, initiatives in learning design and student learning practice would fill in gaps within the educational system through the implication of stakeholder's decision-making. It is also a matter of philosophy, where a decision is based on the general knowledge gathered on a particular subject. But what exactly transforms knowledge into facts, as a guarantee of truth? In the education system, the knowledge is the central instrument in learning, and it is based on solid foundations on each topic it concerns. The choice of transforming a piece of information into knowledge, link it to a general accepted truth is part of a complex process of decision-making, turning the latter not only fundamental for the content of the study, but also for the form it takes before transforms into an instrument for education (Androniceanu, Ristea, 2014).

The education system has been helped by the previous experiences in the process of decision-making, and now the information and real-world examples playing a major role in the development and evolution of the humankind is represented by the new technologies utilized to create the so-called smart learning concept (Fensham, 2004). Consequently, this idea can be explained by going back in ancient times and compare the technology that brought the human civilization forward, such as the discovery of tools for an easier and faster lifestyle, so does technology today, it puts us further into the universe with the use of space shuttles, high-performance, top-tier computers, and state-of-the-art software. Education is one of the systems in our world that must honour the place of technology, technological advancements, and innovations (Shield, 1996).

Education technology or learning technology can have more than one meaning within the discussed framework. For instance, educational technology has the purpose of shaping the learning environment, both from the perspective of actual instruments utilized in the education process, and from the perspective of methods of organization and systems for teaching employed in the education process (Bruner, 1999; Edwards, eds., 2012). It is also really important to ask the right questions regarding this notion – what is redundant and what is the future? Technology will determine the simple existence of a physical entity to be redundant, having the capability of moving every action online. Will the student be able to construct a solid educational future based on such approach? Does the direct relationship with fellow students and professors represent an advantage to its educational journey? Or does it require to abandon old pedagogical approaches for new and improved ones? Will technology ultimately unite or divide us?

Nevertheless, technology can be perceived as interconnected activities within a system using parts of a device to make the latter perform a certain physical manifestation of a process resembling to thinking. At the same time, the concept comprises of much more, and it is described also as a phenomenon shaping the future of mankind. Considering that the society adapts to the technology and the development of technology, it implies also that the decision-making processes regarding the education system must abide to the same sequence. Simultaneously, the society works also a constructor of technology, making the latter subordinate to the former. It is a circular perspective, where one element is both cause and consequence for the other element within the same system.

There are three main concepts part of the equation of decision-making in the given sector, namely education, technology and change. The dynamics of technology and innovation have transferred to the application of those a subjective perspective, being determined by the relationship to the stakeholders of the education process. The dominant strain, the evolutionary process of both organics and technologies, developed from a framework that was nothing like linear. The complexity of the choice, especially in the dimension of a segment meant to change the future perspectives and the human condition, is that more important, and cannot be limited to a simple sequence of decision-making. Moreover, in the initiation of all decision-makers in the education process, first the composition of the groups must be identified, as well as their degree of influence.

The technological change and the theory on the diffusion of innovation explain the mode in which all new concepts are adopted widely, starting with the mere existence of innovation, to the formation of an attitude towards it, to the decision of adopting it or rejecting it, to the implementation and use of than innovation, for finally to confirm the decision towards the new idea (Edwards, eds., 2012). The decision-making process will be defined by the decision-makers, and the influence of stakeholders, and in this particular circumstance, when it comes to the adoption or rejection of technology and innovation, is based on the opinion of the stakeholders – if they are either innovators or risk-takers, liberators or sceptics, or traditionalists. This is, subsequently, one type of framework that can be used in the decision-making process. Going back to the educational context, any decision of the management on the inclusion of new technology either in the curriculum or in the classroom,

will need to be based on rational, logical principles. Due to the complexity of the problem, a new discipline has emerged – the educational technology, discussing the theories regarding the connections between the two dimensions, and the motivation behind employing such elements for the aid of the learning/teaching process.

It is also a matter of discussion the quality of new versus old, since there are education systems across the world still trying to decide which road to be taken, and if there is any chance of making a hybrid decision of intertwining both the new and the old-world methods and knowledge.

III. PROPOSITIONS AND CONCLUSIONS

3.1. Findings and Interpretation

Historically, education has been based on oral instruction, until the introduction of different types of technology, which moved teaching/learning processes in much more complex circumstances and frameworks. The debate regarding the educational process started between adepts of the old versus modern. Nevertheless, some elements will always resonate in the past, and some in the future. Paper was one of the first technologies introduced in education, having its roots in China of 100 BCE, a type of technology that would take 400 years to be implemented by its neighbour – India, and 1000 years until it landed on European soil. Much has changed from those times, especially in terms of timeframe for introduction, release, implementation and adoption of a certain technology, regardless of the sector. Today, a technology developed in the United States will arrive in Europe in a matter of weeks or months. In education, as well as in business or politics, a decision would reverberate quickly across the globe, overlapping in waves until reaching final destination.

Education and technology have had a continuous relationship since *the beginning of time*. All the decisions made across the millennia regarding those two concepts have had to explore and test the knowledge, and its transmission in an effective and efficient manner. What is interesting is that a decision-making process is supposed to answer a problem with a solution that is viable for implementation, and that would actually bring an extra capability to the whole system. When looking at what technology is meant to do – namely, combining knowledge, skills and creativity/innovation in the utilization of instruments, equipment, systems etc., with the ultimate scope of enhancing the environment and controlling in a manner that conducts to the improvements in the human lifestyle, it creates a pattern. Moreover, education, at its core, is also an enlightening experience which implies the transfer of knowledge with the scope of bettering the competencies of students for better perspectives in the near future. Therefore, all three concepts are lining up at the finish, where they become convergent to the same ideal.

The role of education remained the same across the time, only the means by which it is introduced and implemented, as well as the model by which abides have fundamentally changed due to the introduction of technology-based instruments. Moreover, it is interesting to assess the situation of decision-making in education from the perspective of the learning process. The concept of smart education or smart learning incorporates information and communication technologies for a differentiated learning process for the students. At the same time, it allows for a close and correct monitoring of the overall situation, determining for adjustment decisions on the go. The state of the activities of the students, connected to the Internet of Things through their devices, permits to gradually analyse the education process through the usage of technology, and it creates a bridge of communication between the parties involved in the education process. This not only improves the productivity of the education, but it also includes continuous control over the activities and results for higher performance and effectiveness. The Internet of Things is a term that brings together the capability of the Internet and the technological devices, transforming the latter into intelligent objects (Abdel-Basset et al., 2018). The IOT works just like an ecosystem, where the user is connected to the platform through the application and the network on the device. Moreover, the IOT consists of two different worlds – one that is physical, the communication network comprising of devices, and networks, basically all electrical components, and one that is virtual – the flow of information between devices, digital maps, multimedia content etc., any type of element that can be stored, accessed and processed. This allows objects to interact to each other, and eventually becomes a mean in the decision-making process.

The Internet of Things is an infrastructure of network protocols for communication, giving identification series to devices and virtual entities, which uses information and data to progress different services for the society. This type of connected society, of intelligent information society allows for the creation of synergies in all sectors of the economy – it manages to improve the decision-making processes also in education. The valuation of the IOT resides in big data, which is created as a follow-up of the interactions between people, people and virtual entities, and between virtual entities linked together via the Internet. This new technology, the IOT, is in charge with three types of procedures – gathering contextual data, processing it, and then control it by constructing a security and privacy framework around it.

In education, the IOT makes it possible for students to gain access to important databases, to online courses, to connect with professors and other fellow students online, to exchange ideas, to create and forwards projects, it is a place where a wide range of hardware and software technologies create a connected live system.

Due to the tremendous amount of data created through the means of the IOT, the policy-makers and decision-makers can retrieve information and learn about the education system in order to choose the best course of action, and to further implement various growth-potential projects. Conclusively, IOT transforms the learning process for students into an easier and more effective operation, and it transpires to the enhancement of the education environment and system as a whole. Nevertheless, the costs of its application do represent one of the limitations of this innovation, but it cannot be denied the overall beneficial impact for the future of education.

In strategic management, there are two terms that come up all the time – efficiency and effectiveness. Efficiency refers to doing things right, while effectiveness encapsulates the principle of decision-making (Elbanna, 2006), which is doing the right things. Decision-making is a core part of the mechanism of change and evolution, and its impact can range from very bad to extremely good, meaning that a right decision will have to power to completely transform any system it is related to in a manner that speaks up innovation and development. The raw materials needed for the start of any decision-making process resides in the data, with big data today offering a superb proposition for growth. Putting together that with compatible technology, there comes up the secret of success. Algorithms will define the analytics in the decision-making process, going through lessons learned, experience, information, models etc., and support those decisions with the help of software. The decision-making model including the IOT infrastructure brings advantages from a business perspective to the education system, cutting costs, and time, differentiating between useful and redundant data, validating the sources of information, and from a smart learning perspective, as it improves both the means and the context of the education system to the needs and wants of the new generation of students. This structure will bring all stakeholders of the decision-making process together in the discussion of the best course of action, with the usage of intensive technological advanced infrastructure (e.g. cloud-based storage, crowd-sourcing, expert opinion, analytic tools etc.).

After the information gathered becomes structured data, ready for the use in effective and efficient decision-making processes, the framework for smart education is ready. The decision-making process would follow a structure congruent with collecting the data, verification of the data collected, storage and analysis of the data, processing the data, transforming it in structured information, adhere it to a body of knowledge, turning it into synthesis, and follow up on the final decision. Smart learning will, therefore, become one of the results of such a decision-making process with the help of IOT. The former concept is constructed around new learning and working procedures and methods, which are cumulated in the daily usage of technology; it is based on a state-of-the-art infrastructure, using digital equipment and a software architecture, moulding into the needs of the real-world business environment. All the schools and universities using this type of smart education will transform their environments into personalised learning facilities, adhering to smart devices, innovative methods and procedures in teaching and learning, state-of-the-art resources, continuously sending and receiving information needed for furthering the decision-making process.

The implications of the Covid-19 pandemic have been numerous, but those related strictly to the education system have been related to the intensive usage of technology, and in general of the IOT infrastructure, for all the months following the outbreak of the virus. Those few months have proved the extent of need for technology and innovation in the education system. It has been a wake-up call for all stakeholders of the decision-making process in education, from students to policy-makers. Apparently, technology not only saves lives, but it also enhances the lives. From an educational point of view, moving all operations online has been difficult for some systems across the world, but it has paid off in the end. Some developing countries from the African continent, which did not have the needed technology and infrastructure for the continuity of the education process during the lockdown, have had to make the tough decision of repeating the school year in 2020-2021. It is, therefore, a disadvantage to not being able to adapt to the needs of the changing world.

Among the necessary elements that IOT and smart education must bring to the table are the interactive learning platforms and applications (either for conferences/classrooms, or for the transmitting of information), the digital devices used in the teaching/learning process, such as tablets, computers, laptops or smartphones, the electronic books and materials, apps, security measures, wireless technology, and tracking systems. The hybridization of the education system and process would not only bring benefits from an education psychology point of view, where the different styles of learning of the students are conceptualized and implemented, but also from a general resource perspective, as smart education brings down costs on the long term to only maintenance of the infrastructure.

Smart education is to be proposed and implemented in any organization with the scope of offering education programmes, capable of a number of mandatory elements as they are part of the framework for the former concept. There are a few main directories that need to be considered during the decision-making process of implementing the system of smart learning. Those are referring to the means of education – including textbooks, videos, devices, as well as technology-based connectivity, computer software etc., to the space allocated to the teaching/learning process – classrooms, digital classrooms, possible international collaborations between students, and between the professor body of the institutions etc., and also to the security constituents of

the system – surveillance cameras, radio or wi-fi sensors, air recirculation systems, cleaning technology etc. The smart school would be based on a network of analytics and applications for gathering, monitoring, and transferring data. Any information stored in the cloud technology would be part of the application of the decision-making process, to better the system on the go. Moreover, the supplies and resources of such a project like the smart school are also aligned to the technological advancements, such as augmented reality, virtual reality, even robotics.

From a management perspective, the implementation of such a project, as a result of a complex decision-making process in education, would present challenges, as planning, organizing, controlling and monitoring the situation would imply a wide range of elements, independent to each other in their daily development, but also on the front of technology devices, costs associated with that infrastructure, updating the textbooks, offering the online services and databases for study, including free libraries and testing platforms. Nevertheless, the benefits of such a framework are directed towards all the stakeholders of the education process, transforming the studies into international ones, creating connections between students worldwide, bringing a new perspective on the energy-efficient systems and organizations, allowing for a secure, controlled environment for studying and acquiring competencies for students worldwide without the costs of moving to different locations, and making students and professors principal creators in the education process.

3.2. Conclusion

Education represents much more than the transfer of knowledge. It is a fundamental right of any human being, which allows the latter to develop both spiritually and intellectually, and to become the transformation that the society needs. By working on creating the total individual, from an education perspective, the society as a whole will become the individual. This transformation that only education can achieve is based on decision-making processes regarding the information and knowledge to be transferred, the technologies that it uses daily, the means by which determines development of knowledge, and retainment of competencies etc. It is an infinite strand of locked-in elements diffusing convergent topics, opening the minds and the universe, through its generating power.

Due to globalization, education has been standing at the intersection between pluralism, inter-cultural exchanges, the cumulative development of the society, unequal technological advancements, extensive data and information, divergence of policies and decision-making processes, uneven general direction. It brought out some clear advantages for the education and its stakeholders, while showcasing also possible negative aspects, most of them stemming from the underdevelopment in some areas and lack of future planning and direction for the sector. The diversity of cultures, languages, mediums of development represent a fuelling power for the generation of big data. The latter is extensively used in all sorts of processes, including political campaigns, general advertising, education programmes and decision-making processes.

The humanity has witnessed in 2020 this unprecedented event in the modern history, and the way it changed absolutely everything that previously was considered normal, sufficient, and probably many have realised that to some extent creativity has been abandoned, that there was no back-up plan, that innovative ideas and technology were second-tier elements in education. It showed how much the education sector has been kept under limitative boundaries, and how decision-making processes in this sector were nowhere to be found. What was needed was the intensive infuse of instructional technology in the education system, including teaching/learning technologies, reforms in education for individualized instruction, interactivity and digitalization, remote transferring of knowledge, etc.; all those concepts represent the next major and much needed step further into the development process of the smart education sector worldwide.

But what is the actual gain? How can it be translated to the stakeholders, the students especially? Their capitalization in the decision-making process is of paramount importance. The tangentiality of education and politics is no breaking news, and both are considered from limited perspectives. The influence of the students in the decision-making is restricted, although they do represent the subject of education, turning this matter into a paradox. Technology and the new generations of students are linked together by the constructs of our society; they were basically born at the same time, and are bound to each other by the necessity of inter-connectivity and multiculturalism. The education system worldwide does include technology to a certain extent, but it does not use it together with the perspectives of students in the decision-making process. By determining the way in which such a change can be implemented and developed at a much more profound level, the education system and the process of learning would be translated into the smart education concept.

The present research has realized a qualitative study on the connections between decision-making processes, smart education, and the influence of technology on both former concepts. It is clear by now that the use of technology can be viewed and interpreted from a limited perspective, considering that what technology can bring is a connection to the Internet, the possibility of presenting courses via a computer-based system, or the transferring of knowledge digitally rather than physically. When assessing the elements intrinsic to the decision-making process, it is clear that technology brings so many advantages to the overall delivery of the

choice. And the influence of the main stakeholder in education, namely the student, should be one of the principal elements of the decision-making process, alongside the capabilities of technology to put forward the opinions, the experiences, the feedback, the activity's results of the students. In order to turn the education system into smart education, there are two ubiquitous components that need not to be made redundant – the stakeholders of the education system and their input, and the technology that assists the system and expands its capabilities by making rational decisions based on teaching/learning experiences and feedback, using big data, and creating a safe, secure, evolutionary application of knowledge.

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