TUNISIAN HIGHER EDUCATION DURING THE CRISIS OF COVID-19: WHAT CHANGES TO DRAW?

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ABSTRACT

The objective of this paper is to show the importance of digital technology in the resolution of various natural disasters, in this case, the COVID-19 pandemic that is bringing the whole world to its knees. The Tunisian higher education system has embarked on a major transformation of learning styles by paying more attention to the integration of information and communication technologies (ICT) in the educational program. This article reflects on the impact of the COVID-19 crisis on accelerating this integration. It discusses the state of the art of Tunisian pedagogical practices during the crisis and the use of ICT as a necessity to ensure the continuity of courses.

Keywords: Higher education system, ICT, Digital technology, Tunisia, COVID-19.

INTRODUCTION

Over time, man needs to face natural phenomena (earthquakes, floods, pandemics). Generally, these disasters give rise to new reflections on the means of propagation to eliminate or to weaken the consequences. This is currently happening, with regard to the pandemic of the coronavirus which, "*in addition to the thousands of human losses, has caused a considerable disruption of social and economic life and has made its effects felt on almost all sectors of activity*" (Rechidi et al., 2020). COVID-19 has infected many people around the world. Each country is trying to adopt measures to combat the pandemic: prevent transmission, reduce the risk of infection, restore the economy, protect society, and preserve environments; and fix the losses caused during the pandemic (Lai & Hockenmaier, 2014). Therefore, governments are trying to make appropriate decisions to overcome the current challenge (Atkeson, 2020). Several countries are taking prudent decisions and emergency measures to delimit this epidemic namely the closure of large businesses, commercial spaces, schools and universities, tourist sites, etc. to ensure a general containment.

Under the constraint of this confinement, it is radical to find an effective solution to limit the damage and save the academic year. The Ministry of Higher Education and Scientific Research changes the teaching mode from face-to-face to hybrid. Face-to-face courses have been replaced by distance learning, allowing professors to communicate directly with their students and to organize distance learning courses (Platforms, Video conferences, Online classroom) (Hantem, 2020).

The use of ICT was instinctive and was considered the best alternative to guarantee the continuity of the courses due to the new digital trends. Those in charge have found the solution but they have not prepared well for the effectiveness of this solution. The field of integration of ICT in the education sector in Tunisia remains very limited and develops very slowly due to several obstacles such as the absence of institutions equipped with mobiquity, multimedia rooms, and audio-visual materials.

Currently, is the mobilization of the Tunisian higher education system adequately advanced enough to ensure the continuity of courses in this period of crisis?

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This study explores the influence of ICT on the Tunisian higher education system to adjust the measures against the pandemic. We then present the assumptions of our model in the Tunisian context.

Conceptual Framework

We successively unveil the evolution of Information and Communication Technologies and their impact on the Tunisian educational system. Therefore, the current conditions are the ideal track to confirm the value of ICT by underlining the need to accelerate its integration at the level of all fields, including education, notably due to the availability of various tools as well as the launching of many educational programs. If these techniques are used effectively, it will not only be an educational rescue tool during this crisis, but also guarantee a distance learning that meets the expectations of teachers and students.

The evolution of ICT in the education system

Today, Covid-19 is triggering a crisis of global proportions. There is much more uncertainty in the higher education sector (Hsu et al., 2020). With the devastation of healthcare, the global lockdown of educational institutions will cause a major and likely uneven disruption of student learning with internal disruptions to assessments.

At this stage, Tunisia has made remarkable progress in the field of ICT over the past two decades. According to statistics from the International Telecommunication Union (ITU), between 2002 and 2019, the rate of Internet use by households has increased from 1.43% to 51%. The number of subscriptions (per 100 inhabitants) to broadband Internet (fixed) reached 10 in 2019 compared to 0 in 2002. As for the number of subscriptions (per 100 inhabitants) to mobile telephony, it rose from 5.82 in 2002 to 126 in 2019. With such figures Tunisia is placed, according to the World Economic Forum (2019), in 83rd place in terms of adoption of ICT exceeding, in this way, its Moroccan neighbour.

The adoption of Information and Communication Technologies in the field of education has provoked the interest of researchers and professionals (Rechidi et al., 2020). Their effectiveness is guaranteed when they are integrated into a diversified pedagogical approach that finely structures learning activities and pedagogical approaches (Barrette et al., 2004). Indeed, the integration of ICT in the field of education requires coordination between these technologies and the various components of the educational chain to improve the quality of education and learning.

Zoom, Google Meet, Skype, and Microsoft Teams. These tools are the most used during this period because of their richness in features. They offer surprising mobility to gather several participants in the same virtual room and also have better audio and video quality streams. They offer to the participants several services such as screen sharing, file sharing, instant messaging, meeting recording as well as active voice detection which automatically detects and focuses on any person speaking in a group.

To facilitate and strengthen communication between students and teachers, platforms such as Classroom, WhatsApp, and Facebook guarantee the interactive exchange of lessons and assignments. We also mention the email engines (Gmail, Yahoo) that offer a solution for storing and sharing large files, thanks in particular to the Drive functionality.

These tools have often been used to support face-to-face teaching, but their use has become imperative and indispensable for the continuity of distance learning in the current circumstances.

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In light of the above, the integration of ICT has a positive impact on pedagogy and allows students to maximize their knowledge (Karsenti, 2001). However, the exclusive focus on technological gadgetry at the expense of learning is a real risk. Franklin (2007) point out that information and communication technologies multiply the potential exchanges between Internet users while promoting participation, socialization, cooperation, and involvement. They allow easy access to information and communication resources without obligations or spatial and temporal limitations (Aourik & Ouzid, 2020).

Dias (1999) asserts that "*technologies are integrated when they are used continuously to support and further program goals and to engage students in meaningful learning*." Furthermore, the use of ICT in the educational context enhances learner motivation and allows for profound changes in students' strategies for learning, and teachers' strategies for making learning happen (Liang et al., 2013).

On the other hand, the factors hindering the integration of ICTE are mainly related to the educational system, institutions lacking sufficient computer resources (lack or poor quality of hardware and lack of educational software), and to teachers lacking skills, motivation, and confidence in using new technologies in teaching (Balanskat et al., 2006; Rechidi et al., 2020).

Models of ICT integration by teachers

In the 1990s, several major research efforts in various countries around the world Rieber & Welliver (1989); Sandholtz et al. (1992); Marcinkiewicz et al. (1995) began to develop and apply models for introducing computers into the classroom. These models are based on teacher reports of innovation, often referred to as concerns-based adoption models. Most of these models are derived from Fuller's (1969) work on teachers' behaviour as they develop their teaching skills. Almost everyone who believes in major educational reforms, particularly through the use of computers, supports the idea that learning needs to be more constructivist-inspired (Clouse & Nelson, 2000; Newhouse, 2007). Arguments for educational reform require constructivist concepts such as the need for students to develop reflective skills. According to Lebrun (2004), the Apple Classroom of Tomorrow (ACOT) research showed that most teachers faced with ICT learning went through different stages (Table 1).

Table 1
STAGES OF FACULTY DEVELOPMENT IN THE DISCOVERY OF ICT

Steps according to ACOT	Description of the steps
Entry	The teacher discovers the basics and the foundations of the use of ICT.
Adoption	He becomes more informed and starts to use the tools, often in a traditional way and for personal use.
Adaptation	He begins to use the computer in classroom practices.
Approval	It incorporates the use of computers (among other tools) in the students' work: projects, and group work.
Invention	It creates new ways of doing things and diverts some software from its original uses.

Source: Lebrun (2004)

The concerns-based adoption model (CBAM)

This model indicates a certain number of questions whose answers will gradually lead to the teacher's personal commitment through the different stages of the ICT adoption process. Firstly, "*awareness*", the teacher does not feel at all concerned by the technology. Secondly, "informational", the teacher is challenged by the existence of the technology and seeks to

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learn more about it. Thirdly, "*adaptation*", he/she really starts to be interested in technology by wondering about the usefulness and the possibilities offered by technology for his/her professional activities (in this case teaching and research activities). Fourthly, "*approval*" is the consequence where he will start to look for the necessary means to implement to make the most of this technology. At this level, the teacher would have some experience with the technology and begins to compare his or her positive experiences with the technology with what he or she was doing previously and what others are doing with or without the technology at the last stage, "collaboration. The "*refocusing*" stage will reinforce his or her adoption initiatives and the teacher seeks to learn new lessons from his or her experience with technology to do his or her job better.

The appreciative inquiry model

The appreciative inquiry model (Yaeger et al., 2005), offers an extremely positive approach to encouraging this learning phenomenon. Appreciative inquiry is based on the fact that human systems grow in the direction that is most questioned and seek the best components of the past to create a more desirable future. It is a theory of organizational development proposed in the early 1990s. Positive images of ourselves, organizations, and the world drive us to action and innovation. Appreciative Inquiry offers an interesting alternative to conventional problem-oriented approaches. In this approach, the starting point is not the problem but the desired state (organizations also generate solutions, not only problems).

The process of appreciative inquiry is based on 4 steps, the 4 Ds: Discover, Dream, Design, and Destiny.

The I aM an innovative professor (IMAIP) Model

In search of a dynamic "*model*" of learning, Lebrun (2004) undertakes to organize different perspectives, and different authors including Combs et al. (1976), Biggs (1989), Laurillard (1993), and Savoie & Hughes (1994). He chooses to structure the (interacting) components of learning on the basis of a possible "*scenario*" of the learning process. Starting from the fact that "*it is useful for information to be made available*", he deduces that "*it is important that the learning process takes place in an authentic, motivational context*". High-level cognitive activities can then be evoked (abstraction, analysis, synthesis); they are driven by the interactivity of the educational situation and lead to a re-appropriation of the contents and methods by the person who learns, who builds, and then builds himself. This model is proposed by Lebrun (2004) on the basis of the reconciliation of certain characteristics of the interactive processes of teaching and learning. Lebrun (2004) summarizes the following five major "*facets*" of these interactive processes in the table 2 below.

TABLE 2
COMPONENTS OF THE LEARNING PROCESS FROM THE LITERATURE REVIEW

Facets of the learning process	Description of the facet
Inform	The one that concerns knowledge and its support
Motivate	The one that comes from the general context and the didactic environment
Activate	The one that involves higher level skills (analysis, synthesis, evaluation, a critical sense)
Interact	The one that is related to the use of various resources and in particular to the available resources
Production	The one that comes from personal construction or "*production*".

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Source: Lebrun (2004)

The Coen and schumacher model: the Visi-TIC

The model of ICT integration by teachers proposed by Coen & Schumacher (2006), was built on the work of Charlier (2003), Daele & Sylvestre (2016), Fuller (1996), Karsenti et al. (2001), Lebrun (2004), as well as on the systemic model of innovation, formalized by Depover & Strebelle (1997). This model presents three levels of integration of an innovation:

Adoption is defined as "the decision to change something in one's practice out of personal conviction or under external pressure that may be exerted from within the microsystem;

Implementation, which corresponds to "*the concretization in the field of the asserted will during the adoption phase to engage in a process leading to a modification of educational practices this phase naturally translates into perceptible modifications in educational practices but also in the environment in which these practices take place*";

Routinization is characterized by the fact that "the use of new practices occurs regularly and is integrated into regular school activities without requiring external support from a research or pedagogical team.

The study of these models allows us to have a precise understanding of the motivations of teachers in their approach to integrating ICT into their teaching practices. The literature is very rich in explanatory models of the adoption and/or diffusion of a new technology such as the TAM model of technology acceptance (Davis, 1989), the Unified Theory of Acceptance and Use of Technology (UTAUT) by (Venkatesh et al., 2003).

Research Hypotheses

Perceived ease of use

Ease of use is a factor taken from Davis' (1989) TAM model. It is defined as "the degree to which a person believes that using a particular system is effortless. It is also defined as the degree of ease associated with using a system (Venkatesh et al., 2003). Thus, the likelihood of ICT adoption in higher education by faculty and students is greater, the easier the process of appropriation and learning is to understand and use. Our study will assess how the perceived ease of use of different platforms (Google meet, Google classroom, etc.) can influence ICT adoption behaviour in their assignments and activities. The "*perceived ease of use*" in both the GAT and UTAUT, is considered a direct determinant of adoption. We, therefore, retained as a hypothesis:

H_1: *Ease of use has a significant influence on the adoption of ICT in the higher education system*.

Mobiquity

"*Mobiquity*" is the ability to adapt to a use in any place and time (Chaix, 2013). It is the union of two words: mobility and ubiquity. It describes the ability to connect to a mobile network without the constraint of time, place, or terminal. It is the concept of ATAWAD (AnyTime, AnyWere, AnyDevice) or ATAWADAC (+ AnyContent).

According to Sigma, 128.48% of Tunisians subscribe to mobile telephony, and 63.23% of Internet connections are made from a mobile at any time to follow the news. Therefore, this new lifestyle increases this new concept of mobiquity that allows "*the*

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convergence between the MOBIlity of cell phone and the ubiquity of internet offered by smartphones" (Miranda & Pastorelly, 2011).

This new variable is very little addressed in the literature, which often focuses on the separate notions of mobility (Mallat et al., 2006; Kim, 2010) and ubiquity (Hwang et al., 2008; Yan & Yang, 2015). The implementation of a virtual and distance learning system with a fiber optic network, wireless backbone connectivity, and the Internet as support (Ouédraogo, 2011). Therefore, we present the following proposal:

H_2: *Mobiquity has a significant influence on ICT adoption in higher education.*

Satisfaction

Job satisfaction is defined as the gap between what the individual expects from his or her job and what he or she finds there; in other words, it consists of an employee's favorable or unfavourable attitude towards his or her job. Some studies conducted in schools, including those of Wickstrom & Castenholz (1973), and Holdaway (1979), have attempted to identify the various factors associated with teachers' job satisfaction and dissatisfaction. According to the results of Sergiovanni & Carver (1969) study, a sense of self-actualization, recognition, and responsibility are the factors that contribute most to teachers' job satisfaction. He states that these factors are rewards that the teacher can only obtain through job performance and that in fact, these satisfaction factors are dependent on performance. He adds that performance is rewarded in terms of intrinsic personal success and extrinsic recognition. On the other hand, interpersonal relationships, technical supervision, school policy, and administration are major contributors to teacher job dissatisfaction. These factors tend to center around conditions and circumstances that teachers hope to maintain at an acceptable level. In a recent study, Hopkins (1983) discusses the factors influencing satisfaction. On the one hand, internal factors are related to the characteristics of the task and, on the other, factors related to its environment. The internal factors relate to the quality of the task, the effort expended at work, and the resources available. Environmental factors relate to supervision, mobility, working conditions, discrimination, compensation, and equity in promotions, size of the organization, public service membership, and union membership. The results of this study indicate that more satisfied employees have higher-quality jobs and adequate resources. In terms of environmental factors, we note that the most satisfied employees have a favorable perception of their management and promotion equity, that their working conditions are adequate, that they do not feel discriminated against, and that they are not unionized or covered by a collective agreement. As a result, we propose the following hypothesis:

H_3: *Satisfaction has a significant influence on ICT adoption in the higher education system.*

Perceived risk

In this study, the perceived risk is similar to a loss of control over personal and confidential information when a user's information is used without their knowledge and/or permission. Thus, a risk to instructors who are forced to share their course and tutorial materials in public, as well as a risk to students in terms of reliability and understanding of the course. In the online context, empirical studies have shown that perceived risk is a barrier to adoption. Indeed, users consciously and unconsciously perceive perceived risk as they evaluate electronic services for adoption. Featherman & Hajli (2016), the intangibility of perceived risk causes the adoption decision to feel anxious and uncomfortable. In addition,

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online services reveal uncertainty because of the risks associated with the tool of the transaction, namely, the internet (Featherman & Hajli, 2016; Sassi et al., 2022) Figure 1.

Perceived risk refers primarily to security risk. This type refers to the risk of fraud and hacking of the personal data of teachers and students. Users cannot control their personal information and their personal information may be used without their knowledge and/or permission. Therefore, it is assumed that:

***H_4**: Perceived risk negatively influences ICT adoption in higher education.*

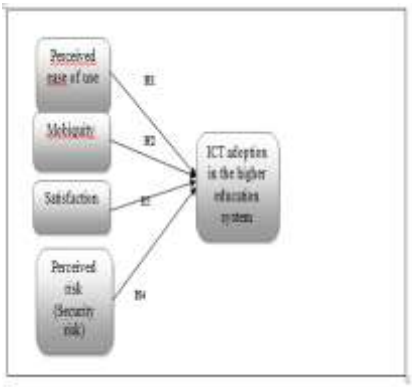

FIGURE 1
CONCEPTUAL MODEL

CONCLUSION

The health crisis of the coronavirus has caused an unprecedented shock to educational systems in the history of education, disrupting educational life on all continents of the world. In this paper, we have tried to explore the experience of online education in Tunisian universities during the Covid-19 pandemic, to understand the brakes that hinder the process. This paper has implications for policymakers of higher and continuing education. Indeed, it is recommended to the Ministries of Education, Higher Education, and Scientific Research as well as the Ministry of Telecommunication to invest in this new learning paradigm by improving the infrastructure through the installation of optical fibers, the implementation of 5G, the intensification and generalization of digital equipment in schools and universities. However, we cannot deny the agility and responsiveness of Tunisian university teachers in the face of these unprecedented conditions. This new experience will undoubtedly have a positive impact on the improvement of the Tunisian university education sector in the coming years.

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