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E-learning in the Lebanese Higher Education Institutions: An Assessment of Factors Leading to Students' Satisfaction

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Abstract

The Higher Education Institutions (HEIs) in Lebanon have been heavily impacted since the COVID-19 pandemic outbreak. The majority of the institutions had to react to the sudden decision to go online. In fact, they had to develop unplanned E-learning programs to assure the academic year's survival. In Lebanon, the Ministry of Education & Higher Education (MEHE) has ordered all educational institutions, public and private, to stop physical learning and start implementing E-learning through various online platforms. Because of Lebanon's unprepared infrastructure, students in universities struggled to continue their studies and to keep pace with others who have better situations. The purpose of this study is to assess the factors that may impact the success of E-learning in Lebanese universities and that affect students' satisfaction in adapting to this unplanned phase. The study is quantitative, explorative, descriptive and causal. A questionnaire was designed to collect primary data from 380 university students belonging to ten universities. Data analysis was carried out using the SPSS version 25 software. Several statistical techniques were performed including descriptive statistics and carrying out relational analysis via Factor Analysis (FA) and linear regression. Five constructs were defined namely, (1) Infrastructure, (2) Computer Skills, (3) E-Learning Content & Autonomy, (4) Support from others, and (5) Satisfaction. Results show that students' satisfaction is strongly influenced by the other four internal (2) and external (2) factors. Findings will support a set of recommendation directed to decision makers in HEI and the MEHE officials.

Keywords: E-learning, computer skills, external support, autonomy, satisfaction, infrastructure, Lebanon

1. Introduction

Coronavirus (COVID-19) outbreak was first reported from Wuhan, China, on 31 December 31, 2019. Not so far from this date, this outbreak spread through the whole world and was classified by the world health organization (WHO) as a pandemic. As of June 24, 2021, there were 179,657,832 COVID-19 infected cases, 3,893,114 deaths, and 2,762,968,268 vaccine doses administered (Johns Hopkins University & Medicine, 2021). The new virus lead to several restrictions of people's movement, goods and services, cessation of industrial units, and reduction in production alongside the increase of consumption (Aderemi et al., 2020). The global economy is currently shrunken by this pandemic giving an undeniable evidence about the importance of health and its impact on the growth of the economy (Dang and Nguyen, 2020).

Social distancing was one of the obligatory situations that governments across the globe issued to maintain human life and lower the threats of COVID-19 on society (Pueyo, 2020; Hejase, 2020). However, social distancing is not a new term and have been applied several times earlier under different conditions, mostly to protect the Mankind. Battin et al. (2019) mentioned that during the polio pandemic in 1916, public gatherings, meetings, theaters, schools, universities, and factories were closed to help fight this disease. Bell (2004) stated that during the break out of SARS in 2003, social distancing was implemented to control the outbreak and lead to the closure of educational, financial, and entertainment institutions. Furthermore, during the corona pandemic, social distancing until this moment has been implemented, forcing social life components to close, and people to

work, teach, and study from home (Stawicki, 2020; El Zein et al., 2021). Consequently, the social distancing issue and the closure of educational institutions did a vast shift in the teaching process. Since the closing of schools, universities, and colleges due to the Coronavirus pandemic, the educational process transformed from physical tutoring to remote teaching, which means teaching using information technology (Dubreil, 2020). The E-learning process significantly impacted the educational programs, forcing all variables of the process to shift to online schooling without a previous plan or paying attention of the change process's disadvantages (Fatani, 2020).

E-learning in Lebanon is unnoted before the pandemic, only few universities depended on online platforms for minor issues, keeping this technique very weak and undependable for a full educational process (Abu-Moghli & Shuayb, 2020). After the Covid-19 outbreak in Lebanon, MEHE started teaching programs via TV channels (UNESCO, 2020a); however, this option was a failure leading to a quick unplanned initiation of an online platform that lead to many problems for teachers, parents, and students.

This paper aims to assess the factors influencing the success of E-learning on Lebanon's educational process, and that affect students' satisfaction in adapting to this unplanned phase. This paper is divided as follows: A theoretical background is presented in section two followed by the materials and methods section three. Section four discusses results and findings and section six presents the conclusion and implications.

2. Review of Related Literature

2.1 E-learning Overview

Traditional learning was considered the physical connection and the direct relationship between the students and the institution; therefore, it shaped the curriculum itself. E-learning has changed this idea of this relationship by removing geography from the equation. In another world, E-learning is a process that occurs through a set of Information and Communications Technology (ICT) tools (Hejase & Chehimi, 2020), equipment, and practices enabled electronically, and conducted on the internet, where all teaching-learning elements can access it online at any place and any time (Maheshwari, 2021). Researchers have defined E-learning differently; Guri-Rosenbilt (2005), described E-learning as electronic media used for learning process in various ways. Also, Clark and Mayer (2016) defined E-learning as lessons delivered through electric devices to support learning. Moreover, Ruiz et al. (2006) stated that E-learning is using the internet to acquire knowledge and enhance performance.

The World Wide Web (WWW) has been excellent learning support; however, until the 1990's a small number of people had internet access. The first emergence of mobile learning (M-learning) was in the 1990's; it was considered the first step of initiating E-learning (Berge, 2013). Mobile learning uses mobile devices such as computers, cell phones, tablets, and laptops accompanied by problems of speed and context, leading to unutilized opportunities (Traxler, 2011). On the other hand, Keegan (2002) argued that E-learning was not just distance learning; it converted to education using the (WWW) where many books and documents were uploaded to the web accompanied by universities and schools implementing the web-based learning (Benedek, 2007).

2.2 Challenges of E-learning

Brooks et al. (2020), Rusu (2020) and Xiao and Li (2020) mentioned that the lack of internet access is a major challenge in the E-learning process. It may cause interruption of the learning process and a breakdown of the platform. In fact, some students and instructors/teachers across the globe have no access to internet to benefit from E-learning; however, even if the internet is available in some countries such as, the Middle East and Africa, the speed would be devastatingly slow. Another issue is the lack of availability of technologies that support E-learning; most low-income families have no ability to buy new tech such as laptops, tablets, and computers.

Moreover, E-learning impacts the harmony of the classroom, eliminates the real spirit of class, and weakens the initiation of group work. These factors are considered crucial regarding the development of education and are skills (or learning competencies) that a student should accumulate in the learning process to use later at work (Handel et al., 2020). In addition to that, E-learning requests more cooperation between the students and the instructor/teacher to understand each other, and demands more responsibility on the student than offline and physical learning (Haave and Vold, 2020). Furthermore, applying ad-hoc online learning steps (El Dirani et al., 2020) adds to the instructors' and students' feeling of panic. In agreement, Kebritchi et al. (2017), assert that not using blended learning, where the educational process is a fusion between face to face learning and E-learning, is problematic. Other researchers agree that "universities had to deal with financial burdens, ICTs' deficiencies and teaching and learning dilemmas" (Hejase & Chehimi, 2020, p. 1). Notwithstanding, the top priority academic concerns were fulfilling expected learning objectives, cultivating student competences and encouragement of engagement.

E-learning as a dependable system on technological advancement and the internet could be a difficult method on the instructors/teachers, especially the old ones who are not used to such technologies. However, they could have access to the appropriate technology but still need a lot of training to use it effectively (Fatani, 2020).

Xiao and Li (2020) argued that online learning lack supervision, teachers cannot supervise and lead the class effectively. Besides, the evaluation of the students is not efficient as physical tutoring; it has been classified as not accurate, and this issue could be again bounded with the lack of training for all the components of the teaching-learning process (Surma & Kirschner, 2020). In addition, Rkein et al. (2020) warn that conscientious educators, seeking to deliver quality e-learning, have discovered that due to the current technical setup, in-class assessment tools cannot be trusted as before.

2.3 Covid-19: A Catalyst for E-learning

During the Covid-19 outbreak, the number of learners "enrolled at pre-primary, primary, lower-secondary, and upper-secondary levels of education [ISCED levels 0 to 3], as well as at tertiary education levels [ISCED levels 5 to 8]" (UNESCO, 2021a), who were deprived from their schools and universities was tremendous and across all continents. Initially, by March 30, 2020, 167 countries closed their educational institutions completely in their majority and as time passed numbers went down but never reached zero as on June 25, 2021 (see Table 1). This closure of educational institutions forced the education system, in most cases, "to various distance learning strategies to be deployed for education continuity" (UNESCO, 2021b). The courses started to be taught for both graduate and ungraduated students online, which surpasses traditional educational boundaries being mediated by internet through E-learning platforms.

However, Arnhold, Brajkovic, Nikolaev, & Zavalina (2020) assert that "It seems that this transition was comparatively easy for those countries that had invested in the sector and approached digitalization in a strategic way pre-crisis (for example, Denmark, Estonia, Finland, France, Germany). Countries that had not developed a strategic approach toward digitalization did not provide the support; those that, more broadly, had seen decreasing investment in higher education faced significant difficulties" (p. 2).

Table 1. Deprivation of learners' education from March 30, 2020 to June 25, 2021

Date	No. of Countries	No. Affected Learners	% of Total Learners Enrolled
March 30, 2020	167	1,450,430,123	82.80%
March 22, 2021	40	201,719,899	11.5%
June 25, 2021	19	156,692,641	8.9%

Source: Selected by authors from UNESCO (2021a).

Amid the aforementioned facts, Araújo et al. (2020) argue that this pandemic has stimulated E-learning in education sectors even though the results of the impact of the COVID-19 on this sector are till now not final nor validated. On the other hand, Balakrishnan et al. (2020) stated that the Covid-19 pandemic presents a global problem in the delivery of teaching procedure, especially in the medical field, because this pandemic increases the reliance on online educational platforms, in the time that some of the majors need a physical attendance for complete learning. Furthermore, the requirement for social distancing obliges the individuals in the community to change their behavior and actions by keeping track of their physical distance. However, the risk of Covid-19 and the accompanying health and safety requirements, acted as a catalyzer and facilitator for digitalization in both business and educational fields, whereby employees are forced to work from home and students to learn remotely (Rusu, 2020). In fact, Lemoine & Richardson (2020) asserted that Covid-19 had changed the traditional teaching process to a technology-driven system. This transition was essential to manage the crisis and a way to re-build the educational system that is valid for the long-term. Moreover, though COVID-19 acted as a stimulator for implementing E-learning in the educational institution, the track to achieve a successful transition was not easy. In fact, Haave and Vold (2020) described the experience of Inland Norway University of Applied Sciences, which although it had an experience above 20 years in blended learning and online-learning, the University faced challenges in the sudden and short-notice change and shifting for entirely online courses, it was described as a dramatic transition.

Shmis et al. (2020) stress the fact that the "crisis's painful impact stimulates and creates an opportunity for adapting school systems to remote learning without creating further inequity over the medium term" (p. 3). Furthermore, Shmis et al. (2020) shed the light on several opportunities including: (1) "Catalyze innovations in education by creating ways to e-learning through interactive apps, live television broadcasts, online classrooms, and teleconferences; (2) Upgrading the ICT education infrastructure through solutions provided by public-private partnerships, including governments, education professionals, NGOs, technology providers, and telecom network operators; (3) Prioritizing investments in vulnerable children through the targeted provision of ICT equipment to decrease the current digital divide between wealthy and poor, or urban and rural areas" (p. 3). The World Bank recommends that "governments and their partners must sustain education progress by prioritizing and investing in keeping all students engaged and learning, to prevent further human capital loss" (ibid).

Moreover, Soete (2021, April) contends that the "organizational innovation which education systems across the world could benefit from following the COVID-19 pandemic, consists of exploiting in a more flexible and hybrid way best practice online education to the benefit of a more inclusive school and learning system" (p. 3).

2.4 Impact of Coronavirus on Education

The "outburst of the COVID-19 pandemic and the ensuing school lockdown measures taken revealed the limits of organizational innovation in education confronted suddenly with having to limit social contacts between pupils, students and teachers" (Soete, 2021, p. 3). Indeed, the pandemic impact is not on the education itself but also on students who will face a delay of graduation and the hazard of unemployment (Xiao and Li, 2020). In addition, people who are planning to study abroad should have second thoughts, also teaching and education boards should make new plans for next years and be always prepared for other disasters. One of the most critical impacts of this virus on education is the cost that should be paid for adopting new technologies that support E-learning and training all the employees for this sake (Xiao and Li, 2020). In another example, the Xinhua news agency in china, stressed the long term impact of this virus on the educational process (Xiao and Li, 2020; Araújo et al., 2020). Xiao and Li (2020) argued that 1.6 million students studying abroad were not allowed to continue their studies in the US, UK, and Italy referring to the huge effect on abroad students and their problem generated from this plague. Furthermore, due to COVID-19 negative consequences like "reduction in family income, limited access to digital resources, and the high cost of internet connectivity have disrupted the academic life of the students" (Chaturvedi, Vishwakarma, & Singh, 2021). Moreover, 1.5 billion students world-wide are currently deprived of basic education (Lee, 2020) leading to a serious psychological impact on their wellbeing. Moreover, "changes in daily routine including lack of outdoor activity, disturbed sleeping patterns, social distancing have affected the mental well-being of the students" (Chaturvedi et al., 2021). Actually the aforementioned is confirmed by Chakraborty & Samuels (2021) who stressed the fact supported with published research that the pandemic has "radically altered mental health needs and support capabilities. Covid-19 has exacerbated previous stressors and introduced new drivers of mental ill-health among adolescents such as stress and anxiety induced by the health and economic impacts of the pandemic, the closure of public spaces and schools, children's increased online presence, and the possibility of being confined in abusive households" (p. 6).

As have been said, and according to Hejase & Chehimi (2020) quoting Prof. Ahmed Bawa, CEO, Universities South Africa "the pandemic raised huge threats as well as opportunities to HEIs, however the common challenge/threat to all, is the "complexity and interweaving of factors" (p. 2). The aforementioned factors are individual, organizational and governmental, leading academic institutions to adopt new perspectives to governance and to fit the new ongoing ecosystem expectations. Moreover, uncertainty was one of the problems present with Coronavirus; students and teachers could not foresee when this pandemic will end. Rumors just make them more stressed, medical personnel lacking knowledge about the virus, and the government unable to take a precise plan; all these made them uncertain and felt insecure (Brooks et al., 2020). Moreover, the restriction of meetings and the elimination of club gatherings, university and school celebrations, and parties did a mental discomfort for the students used to do in the past.

2.5 The Matthew Effect

The corona pandemic triggered ad hoc changes at universities worldwide, from face-to-face tutoring to entirely digitally assisted instruction. This stimulated the universities to accelerate the introduction of digital learning platforms and new teaching formats (Surma & Kirschner, 2020). In the context of this digital transition, students with varying levels of digital experience and of acquisition of technological instruments will face the Matthew effect issue.

According to Ward (2020), "The 'Matthew Effect' is a term credited to sociologists, Richard K. Merton and Harriet Zuckerman in 1968. In the educational community, the term was applied specifically to reading and consequent development by psychologist Keith Stanovich" (para 2). In fact, Stanovich (1986) stresses the fact that "poorer readers often find themselves in materials that are too difficult for them. The combination of lack of practice, deficient decoding skills, and difficult materials results in unrewarding early reading experiences that lead to less involvement in reading-related activities" (p 364). In another words, he asserts that a student who reads well in early stages will usually make him achieve more success in the future and acquire a good reading skills. Looking at the aforementioned concept in the context and perspective of Covid-19, researchers showed that the Matthew effect would arise on low and middle-income families and educational institutions. Poor students who have no access to internet and technological instruments such as laptops, computers, and cellphones will not keep pace with students that already have these techs and are used to it (Xiao and Li, 2020).

On June 3, 2021, UNESCO (2021c) organized an online consultation with UNESCO International Literacy Prizes' laureates to discuss issues faced due to COVID-19. Consultants agreed over the following issues: "Distance learning has posed a range of challenges, including digital divide in terms of infrastructure, the cost of digital tools, and digital skills of educators and learners. The real impact on learning outcomes are still to be understood" (para 5). Also, "there is the need for appropriate infrastructure to implement distance learning for both high-tech solutions but also low-tech and no-tech practices" (para 6). Moreover, "Global Manager of the 'Centre for the Study of Learning and Performance', Ms. Anne Wade, said. "In terms of infrastructure, one concern with this shift to using distance learning or distance education is that governments are going to assign a lot of money towards installing equipment in schools. But the concern would be that governments also address the teacher's professional development that goes alongside that, how to maintain and support that equipment overtime and finally how to replace that technology in the long term" (para 7). Actually, the danger is not about the short term because as explained shortly before, the Matthew effect is a continuous matter that interferes in the buildup of students' skills.

2.6 E-learning in Lebanon During Covid-19

COVID-19 state of events were initiated and reported first from Wuhan, Hubei Province of China, on December 31, 2019 (WHO, 2020). As of February 21, Lebanon confirmed its first coronavirus case, and the Lebanese authorities closed the universities and schools after the 4th case discovery, in addition, the MEHE stated that there is fear from more cases to appear, and the closure will stay until the situation is safe (Houssari, 2020). The aforementioned events were unfortunately for Lebanon going in parallel to the aggressive negative state of events causing a major downturn to the socio-economic situation starting in October 17, 2019 (ANND, 2019). According to Hejase and Chehimi (2020), "COVID-19 pandemic came as a major threat to the ecosystem of universities around the globe" (p. 1). Lebanon and its educational institutions at all levels was no exception. However, before the financial crisis accompanying the Lebanese revolution, Lebanese people by default have no trust in the public educational institutions, whereas two-third of them are educated by private schooling (Nakhoul & Perry, 2019). Given the aforementioned fact, and after the virus's fast spread, the Lebanese government initiated the first distance learning initiative basing the effort on the Lebanese national television, however this move was a failure and not satisfying (Abu-Moghli and Shuayb, 2020). Notwithstanding, after the first try, MEHE started a distance learning project to provide E-learning for public schools during the coronavirus pandemic (Wazzan, 2020). This project included a combination of online platforms such as YouTube, Microsoft Teams, and Zoom, in addition to recorded video classes that learners could access online (Mouchantaf, 2020). However, the overall evaluation for the public educational institutions' experience was below satisfactory level (Abu-Moghli & Shuayb, 2020). Furthermore, from a general perspective, universities that lacked familiarity with online learning (being public or private) reacted and fell into panic while universities that were familiar with online learning classes took proactive steps (El Dirani et al., 2020, p. 1). Since the initiation of the online platform project in Lebanon many challenges and barriers confronted the academic year's rescue plan (Wazzan, 2020) including, E-learning full dependability on the internet and the accompanying network breakdowns and the connectivity problem (is one of the most serious issues that Lebanon faces in the regular days) making the E-learning process harder and debatable about its success. The aforementioned hardships and the instructors' worries about fulfilling the expected learning outcomes coupled with the current deficient technical setups, discovered that the ongoing applications of classical assessments via examination tools cannot be deemed appropriate as before (Rkein et al. 2020). In addition, "universities had to deal with financial burdens, information and communication technology (ICT) deficiencies, and teaching and learning dilemmas" (Hejase & Chehimi, 2020, p. 1). For example, in a study carried out by Abu-Moghli and Shuayb (2020) with the cooperation of Lebanese American University (LAU) stated that 67% of students uses their own

smart phone to follow up their studies. Moreover, 57% of students do not have a tablet, whereas 45% do not have a laptop, and 63% have no personal computer. These numbers present a big question about the affectivity of the E-learning when the student lacks the essential technology to use. This wide technology divide between students having the techs and those who do not will surely rise the Matthew effect matter.

Given the before mentioned facts, challenges can be numerous in Lebanon for E-learning, mainly because the country was already facing a financial crisis amid a socio-economic situation that was in its lowest stages of progress, and the majority of the Lebanese teachers were protesting for their rights. Due to Covid-19 pandemic and the closure of schools and universities, 32% of the private sector teachers faced a pay cut on their salaries with no aid from MEHE and private schools were let to be drowned (Abu-Moghli & Shuayb, 2020).

Lebanon joined the thousands of educational institutions around the globe that were suffering from technical problems. Some examples were described by Clover (2017) and Tamm (2019): Electricity irregularities, Internet costs, capacity and continuity issues, availability of ICT to all stakeholders, Wi-Fi, 3- or 4-G affordability & availability, infrastructure problems and deficiencies, and Security (among others).

The literature as demonstrated in this section leads to classify two sets of factors that influence the success of e-learning and which affect directly the students' satisfaction. These are divided into internal and external factors (Zhang & Goel, 2011; Hammarlund, Nilsson, & Gummesson, 2015). The internal factors include students' perception toward the e-learning content, students' autonomous behavior in dealing with the process and the material, and students' computer skills. The external factors include the infrastructure and support from others. It is worth mentioning that the literature has offered extensive description of the aforementioned factors accompanied with a good deal of papers reporting successes and failures across the globe. However, as far as the authors' knowledge, no modelling has been carried out in Lebanon or the surrounding countries about students' satisfaction with e-learning. Consequently, this paper aims to propose an overall model to assess and empirically explore the internal and external factors leading to students' satisfaction from their e-learning experience. There is a high merit to empirically test the proposed model based on students' opinions, views and experiences during the last year of e-learning education amid the COVID-19 pandemic.

3. Materials and Methods

3.1 Research Design

This research uses a quantitative research method with a deductive approach. Elo & Helvi, (2008) contend that "A deductive approach is useful if the general aim was to test a previous theory in a different situation or to compare categories at different time periods" (p. 107). Moreover, it follows a positivism philosophy whereby Hejase & Hejase (2013) define "Positivism is when the researcher assumes the role of an objective analyst, is independent, and neither affects nor is affected by the subject of the research" (p. 77). In addition, this paper is exploratory since it is exploring a topic with an unstructured problem and the researchers seek to gain more knowledge about its characteristics. Furthermore, the research tool is a survey questionnaire designed to collect primary data to assess the sampled Lebanese students' awareness about their satisfaction of e-learning in their education. Currently, to the researchers' knowledge, there are no published empirical causal figures exploring the Lebanese students' satisfaction towards their e-learning education.

3.2 Sample and Design

Cochran's sampling formula (Hejase & Hejase, 2013, p. 231) was utilized:

$n = (1.96)^2(P)(Q) / e^2$.

Where, 'n' being the sample size sought. P and Q (assuming equal percentage of genders) = 50%; Z = 1.96 (95% confidence); e = 5% (desired level of precision). Then given this rule, the minimum sample size is 384 participants for this investigation. However, 400 questionnaires were expected from which only 380 valid questionnaires were collected. Therefore, the final sample size was 380 with a response rate of 95% considered excellent for this research.

3.3 Questionnaire and Procedure

The authors created a questionnaire designed to measure and assess students' attitude and opinion on their satisfaction about e-learning and the influence of selected factors such as infrastructure, e-learning content, students' autonomy, computer skills, and support of others. The questionnaire includes six multiple-choice questions related to the ICT tools used and problems encountered, followed by six sets each with 5 questions (30-item) based on 5-level Likert scale questions ranging from strongly disagree (coded 1) to strongly agree (coded 5), these sets assess students' attitude and opinion about the factors addressed above, and it ends with an

open question for the students to express their opinions about any subject related to the questionnaire. The questionnaire was created on google forms and distributed randomly through a digital link to the targeted universities' students.

3.4 Data Analysis

The Statistical Product and Service Solutions (SPSS) version 25 software was used, an IBM product since 2009 (Hejase & Hejase, 2013). Several statistical applications were implemented for the analysis which included descriptive statistics, one way analysis of variance (ANOVA), T-tests to test the hypotheses and Regression analysis. Furthermore, Harman Single Factor Test and Factor Analysis were carried out to isolate and identify the factors to be used later in regression. Validity and Reliability testing were performed using Cronbach's Alpha testing. Furthermore, Variance Inflation Factor (VIF) analysis was done to help identify the degree of multicollinearity.

4. Results and Findings

Descriptive analysis is performed first to assess the participants' responses regarding their use of ICT tools and problems encountered.

4.1 Device Used to Study Online

58.7% of the students use a laptop, 37.6% use their cellular phone, around 2% use tablets and the remaining 1.7% use personal computers.

4.2 Platform Used to Study Online

Results show that 58.9% use Google Meet platform, 28.2% use Zoom, and 10.5% use Microsoft Teams. The remaining 1.4% use U-Tube videos, Skype, Google Classroom and WhatsApp.

4.3 Problems Faced by Learners Online

Students were asked to identify the first, second and third problem encountered while studying online. Table 2 shows the results and Figure 1 depicts the results graphically.

Table 2. Online problems faced by E-learners

Online Problems Faced by E-learners	**First Problem, %**	**Second Problem, %**	**Third Problem, %**
Snail-like Internet	46.8	21.3	9.5
Online Platform Crashes a Lot	6.7	9.7	11.1
Lack of Communication with Instructor	14.7	16.1	21.1
Stress & Anxiety	11.8	15.8	15.5
Power Cuts	12.9	23.7	16.3
None of the Above	7.1	13.4	26.5

Results show that 46.8% of the students picked "Snail-like Internet" as their first problem encountered during their online sessions, 23.7% selected "Power Cuts" which are frequent in Lebanon, and thirdly 21.1% of the students selected "Lack of Communication with Instructors". The aforemntioned problems are usually typical problems encountered globally as asserted by many researchers (Clover, 2017; Tamm, 2019; Najim, 2020).

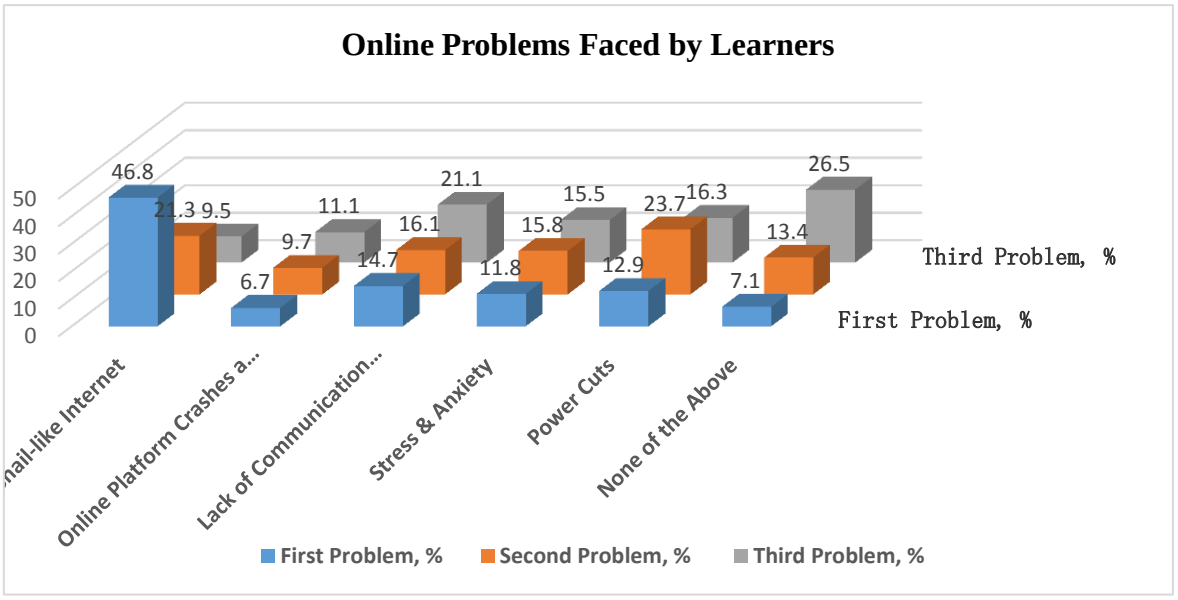

Figure 1. Online problems faced by E-learners

4.4 Preferred Types of Learning by Students

Students were also asked to show their preferred setup for learning and their responses were as follows: 49.50% prefer a hybrid learning approach where face-to-face [offline] learning is mixed with online learning [based on an integrated set of ICTs], 33.90% preferred offline learning or face-to-face approach, while the remaining 16.60% preferred online learning. These choices are depicted in Figure 2 herein.

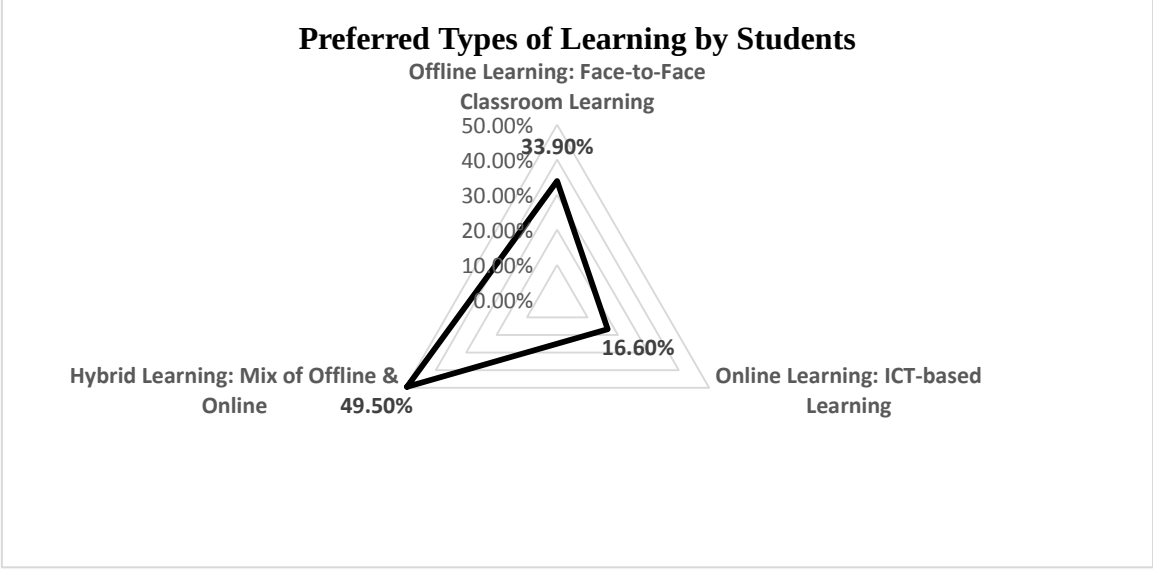

Figure 2. Preferred types of learning by students [n=380 students]

4.5 Descriptive Statistics

The next section of the questionnaire uses 6 sets of questions, each having five questions, with a total of 30 questions covering the proposed model dependent and independent variables. Data collected were analyzed using diverse statistical analysis techniques to support factual objective decisions, which are based on real, timely empirical data (Hejase et al., 2012, p. 129). Furthermore, Hejase & Hejase (2013) contend that "descriptive statistics deals with describing a collection of data by condensing the amounts of data into simple

representative numerical quantities or plots that can provide a better understanding of the collected data" (p. 272). Consequently, this research reported the frequency, percentage, mean, and standard deviation of variables of interest in the form of tables and figures. Descriptive results are recorded in Tables 3 to 8. Worth mentioning that these tables use a condensed agreement dimension (A: strongly agree & agree), a neutral (N) and a condensed disagreement dimension (D: strongly disagree & disagree) for simplicity, visualization and easiness of the interpretation of results.

Table 3. Infrastructure dimension

No.	**Code**	**Statement**	**A**	**N**	**D**	**Mean**	**Std. Dev.**
1	Inf1	Students own or have daily access to a computer with Internet access.	44.50	28.20	27.30	3.22	1.122
2	Inf2	Students can afford the expenses of the technology needed for E-learning.	22.60	33.20	44.20	2.72	1.059
3	Inf3	Students do have calm space, good lighting, with no distraction during E-learning.	28.40	26.10	45.50	2.63	1.172
4	Inf4	Students are satisfied with the internet connection during E-learning.	14.20	21.60	64.20	2.22	1.093
5	Inf5	Students are not bothered with Electricity Cutoff during E-learning.	12.40	17.10	70.50	2.08	1.113

Infrastructure dimension expresses the students' need for the required access to ICT tools (computer, Internet), appropriate logistics and setup requirements and finally affordability of the aforementioned. Table 3 shows that students indeed lacked the appropriate support to concentrate on their e-learning sessions whereby they had problems with electricity cutoffs (mean=2.08, std. dev.=1.113), low level internet connectivity (mean=2.22, std. dev.=1.093), lacking financial support (mean=2.72, std. dev.=1.059) and less than average study conditions (mean=2.63, std. dev.=1.172).

Table 4. Computer skills dimension

No.	Code	Statement	A	N	D	Mean	Std. Dev.
6	Csk1	Students are comfortable using a computer and the Internet during their E-courses.	33.70	30.20	36.10	2.95	1.115
7	Csk2	Students know how to open, modify, save and upload E-courses documents.	59.40	30.30	10.30	3.61	.911
8	Csk3	Students feel comfortable navigating web pages and sending and receiving e-mails regarding their E-courses.	50.00	33.20	16.80	3.41	1.040
9	Csk4	Students are prepared to learn the necessary skills required to be successful in their E-courses.	45.50	30.30	24.20	3.24	1.072
10	Csk5	Students know how to use online platforms such as MS Teams, Zoom, and SKYPE for Business, Google Meet, Moodle and Blackboard.	58.70	27.90	13.40	3.58	.954

The computer skills dimension results are depicted in Table 4. The lowest score was with students' comfortability with e-learning setup (computer & Internet) (mean=2.95, std. dev.=1.115). However, all other computer skills were above the average including managing e-learning documents, navigating and using asynchronous communication (email and websites), using online platforms, and the readiness to be successful with their e-learning experience. All of the above had means between 3.24 and 3.61 with std. dev. between 0.911 and 1.072.

Table 5. E-learning content dimension

No.	Code	Statement	A	N	D	Mean	Std. Dev.
11	Elc1	Students are prepared to learn new content in an E-Learning environment.	45.60	34.70	19.70	3.28	.997
12	Elc2	The E-courses objectives, content, and assessments are consistent.	37.90	40.00	22.10	3.19	.977
13	Elc3	A clear statement of E-courses requirements was provided at the beginning of the course.	44.80	34.70	20.50	3.28	1.039
14	Elc4	The E-courses' activities helped students to examine issues, to evaluate new ideas, and to apply what they have learned.	41.00	34.70	24.30	3.17	1.046
15	Elc5	The E-courses workload was just right.	30.50	40.50	29.00	2.93	1.063

Table 5 reports the students' attitude and behavior towards achieving their learning objectives by managing e-learning content including acceptance, preparation, handling and applying the intended content. All the reported means vary between 2.93 and 3.28 (std. dev. between .977 and 1.063) considered very average i.e. about the neutral level of agreement.

Table 6. Autonomous dimension

No.	Code	Statement	A	N	D	Mean	Std. Dev.
16	Aut1	Students feel motivated when accessing their E-courses and can work without others pushing them to get things done.	34.00	33.90	32.10	2.96	1.116
17	Aut2	Students can manage their E-courses schedule and complete their assignments on time.	43.70	31.30	25.00	3.20	1.082
18	Aut3	Students like to solve their E-courses problems and exercises and try to figure things out on their own.	40.00	36.30	23.70	3.17	1.018
19	Aut4	Students read well and follow written directions on their E-courses.	46.00	34.50	19.50	3.29	.980
20	Aut5	Students are willing to access E-courses system on a daily basis to check announcements, schedule and other communication.	44.20	29.20	26.60	3.19	1.108

Table 6 shows the students' personal autonomy to deal with the requirements for e-learning. Elements of this dimension include motivation, management, initiative, willingness and comprehension. All these dimensions however scored average (mean between 2.96 and 3.29; std. dev between .980 and 1.116) considered actually low as needed for this endeavor under stressed conditions and circumstances. The low scores in this dimension may lead us to worry about the achievement of learning outcomes of the different courses undertaken via e-learning.

Table 7. Support from others dimension

No.	Code	Statement	A	N	D	Mean	Std. Dev.
21	Spo1	Students are receiving help from their universities to adapt to E-learning.	47.40	31.30	21.30	3.31	1.096
22	Spo2	Students can reach their instructors via internet during their office hours.	53.50	29.70	16.80	3.44	1.035
23	Spo3	When students encounter a difficult problem, they are willing to seek assistance from other people.	51.30	32.40	16.30	3.42	1.018
24	Spo4	Students can easily work in groups via internet to achieve E-courses requirements.	37.90	28.40	33.70	3.04	1.141
25	Spo5	Students are receiving help from their parents to adapt to E-learning.	27.60	37.10	35.30	2.85	1.142

Table 7 shows that parents were not very helpful for students to adapt to e-learning (lowest mean=2.85, std. dev.=1.142). On the other hand, the highest mean was for students seeking their instructors' assistance during office hours though online (mean=3.44, std. dev.=1.035). As for seeking others' help for problem solving and university advise, students scored such help as above average. One final element regarding working in teams online was almost neutral in its significance.

Table 8. Satisfaction dimension

No.	Code	Statement	A	N	D	Mean	Std. Dev.
26	Sat1	Students hope university will continue to use E-learning in teaching.	31.60	27.90	40.50	2.82	1.379
27	Sat2	Students think their grades will improve with their E-courses.	30.30	36.30	33.40	2.92	1.146
28	Sat3	Students feel E-learning is more interesting in acquiring knowledge.	27.90	26.80	45.30	2.69	1.234
29	Sat4	Students feel that E-learning saves time for them.	48.40	27.10	24.50	3.32	1.260
30	Sat5	The E-courses meet students' personal and professional goals.	35.60	35.50	28.90	3.05	1.134

Table 8 expresses about the students' responses regarding the extent of their satisfaction with the e-learning experience in general. Results show the students' dissatisfaction with their university intention to continue with their e-learning experience (mean=2.82, std. dev.=1.279), with their overall grades which on the average e-courses did not improve their performance (mean=2.92, std. dev.=1.146), and with their e-learning impact on their interest and knowledge acquisition (mean=2.69, std. dev.=1.234). However, students were mildly satisfied with two facts namely saving time (48.4% agreed) and meeting personal and professional goals (35.60% agreed).

Possibly many students saved time in transportation to and from their universities and were able to plan for other activities being for personal development by attending many free professional webinars and online meetings with professionals who offered actual work experiences and advices.

4.6 Summary

The aforementioned results and findings deal with 6 factors which the literature have addressed under different contexts, and were empirically assessed herein, a fact that make such factors candidates for further research especially for Factor and Regression analyses. However, first, the research model is suggested as follows: Two sets of factors affect the students' satisfaction divided into internal and external factors (Zhang & Goel, 2011; Hammarlund, Nilsson, & Gummesson, 2015). The internal factors include students' perception toward the e-learning content, students' autonomous behavior in dealing with the process and the material, and students' computer skills. The external factors include the infrastructure and support from others.

4.7 Suggested Research Model

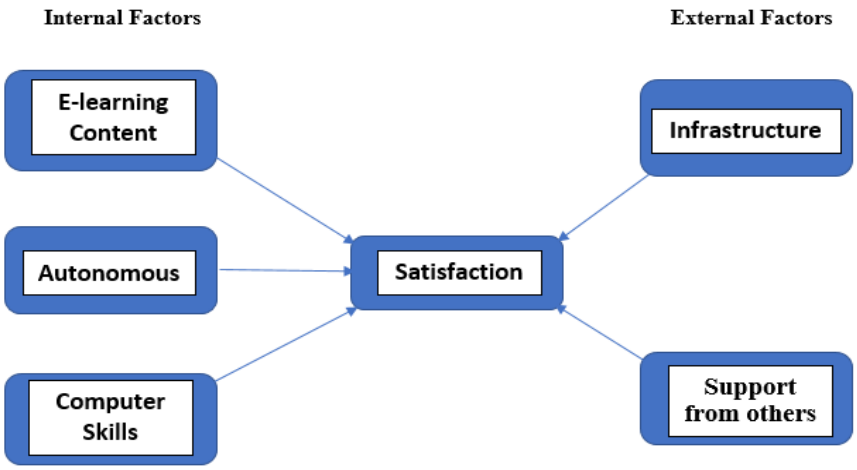

Figure 3. Suggested research model

4.8 Common Method Bias

One of the most common research tools in quantitative methods is a survey questionnaire. "These surveys often provide the information used to measure both the independent and dependent variables in an analysis. However, this introduces the risk of common method bias" (Jakobsen & Jensen, 2015, p. 3). Common Method Bias (CMB), among other causes, occurs because of the similarities in the structure and wording of questionnaire items that generate similar responses. Another cause is due to applying uniformly across measures leading to specific response tendencies that raters can do (Farhat, 2020). Therefore, it is necessary to inspect the data for the above mentioned risk and for that, Harman Single Factor Test was used.

Table 9. Total variance explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	11.553	38.511	38.511	11.553	**38.511**	**38.511**
2	2.312	7.706	46.217			
3	1.856	6.187	52.404			
4	1.349	4.497	56.902			
5	1.048	3.494	60.396			
6	.995	3.316	63.712			

7	.911	3.036	66.748
8	.861	2.870	69.618
9	.687	2.289	71.907
10	.652	2.172	74.079
.	.	.	.
.	.	.	.
26	.264	.879	97.113
27	.262	.872	97.985
28	.231	.771	98.756
29	.211	.702	99.457
30	.163	.543	100.000

Extraction Method: Principal Component Analysis.

Harman Single Factor Test is actually running the Principal Component Analysis by choosing one factor only and testing if the resultant % of variance is less than 50%. Indeed, the outcome shows a value of 38.511% < 50%, then we conclude that there is no Common Method Bias and data are ready for further analysis. Consequently, the next step is to extract the valid constructs for this research using Factor Analysis.

4.9 Factor Analysis

An initial testing of the data is performed using the Principle Component Analysis (PCA) with subsequent rotation (starting with Varimax and followed by Direct Oblimin). The analysis was carried out using 30-item 5-level Likert scale statements. Results from the resultant pattern matrix (Table 10) showed that 4 items namely, Infrastructure1, ComputerSkills1, LearningContent2, and Supportfromothers5 had to be eliminated to improve the results.

Table 10. Pattern Matrix [First run factor analysis]

	Factor				
	1	**2**	**3**	**4**	**5**
Infrastructure1					
Infrastructure2			.610		
Infrastructure3			.549		
Infrastructure4			.699		
Infrastructure5			.690		
ComputerSkills1					
ComputerSkills2		.824			
ComputerSkills3		.685			
ComputerSkills4		.510			
ComputerSkills5		.758			
LearningContent1		.436			
LearningContent2					
LearningContent3					.386
LearningContent4	.408				
LearningContent5	.479				
Autonomous1	.740				
Autonomous2	.573				

Autonomous3	.564		
Autonomous4	.424		
Autonomous5	.513		
Supportfromothers1			.636
Supportfromothers2			.814
Supportfromothers3			.572
Supportfromothers4			.424
Supportfromothers5			
Satisfaction1		-.855	
Satisfaction2		-.664	
Satisfaction3		-.810	
Satisfaction4		-.672	
Satisfaction5		-.710	

Extraction Method: Principal Axis Factoring.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 12 iterations.

4.10 Main Factor Analysis Run

The initial run resulted in defining 5 factors only out of the 6 questionnaire constructs and decreasing the 30 items scale to 26 items scale with satisfactory results and improvement in the total variance explained results from 52.894% (30-items, 5 factors) to 63.692% (26-items, 5 factors) as well as the weights of all the other items. Consequently, the main run herein is completed.

4.10.1 PCA Using Varimax Rotation

Upon inspecting the correlation matrix (not included here due to its size), all correlations exceed 0.3 and are statistically significant (less 5%), so the matrix is suitable for factoring. As shown in Table 11, the Bartlett test of Sphericity is significant (χ^2 = 5387.696, Sig. =.000) and the Kaiser-Meyer-Olkin measure of sampling adequacy is equal to 0.934 (far beyond .60). This means that variables are correlated to each other, and grouping of variables is possible (Coakes, 2013; Burns & Burns, 2008). Moreover, the anti-image correlation matrix reveals that "all measures of sampling adequacy (MSA) are well above the acceptable level of 0.5" (Coakes, 2013, p. 133) and fall between 0.822 and 0.963 range.

Table 11. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.934
Bartlett's Test of Sphericity	Approx. Chi-Square	5387.696
	df	325
	Sig.	.000

Communalities varied from 0.454 to 0.793 (Table 12). Burns & Burns (2008) assert that "Communalities show how much of the variances in each variable have been accounted for the extracted factors" (p. 455). For example, over 67% of the variance in "Students are satisfied with the internet connection during E-learning" is accounted for, while only 45.4% of the variance in "Students can easily work in groups via internet to achieve E-courses requirements" is accounted for. Following, Table 13 displays the total variance explained and the cumulative percentages. As for the eigenvalues, five factors can be extracted because they have eigenvalues greater than 1. Extracting the five factors means that 63.69% of the variance would be explained. The Scree plot in Figure 4 confirms the aforementioned five factors and suggests that there is one predominant factor accompanied by four other factors whose eigenvalues are larger than 1, so the five factors are retained. According to Burns & Burns (2008, p. 456), the aforementioned is consistent with Kaiser's Rule.

Table 12. Communalities

	Initial	Extraction
Inf2- Students can afford the expenses of the technology needed for E-learning.	1.000	.576
Inf3-Students do have calm space, good lighting, with no distraction during E-learning.	1.000	.526
Inf4-Students are satisfied with the internet connection during E-learning.	1.000	.670
Inf5-Students are not bothered with Electricity Cutoff during E-learning.	1.000	.636
Csk2-Students know how to open, modify, save and upload E-courses documents.	1.000	.753
Csk3-Students feel comfortable navigating web pages and sending and receiving e-mails regarding their E-courses.	1.000	.681
Csk4-Students are prepared to learn the necessary skills required to be successful in their E-courses.	1.000	.618
Csk5-Students know how to use online platforms such as MS Teams, Zoom, and SKYPE for Business, Google Meet, Moodle and Blackboard.	1.000	.705
Elc1-Students are prepared to learn new content in an E-Learning environment.	1.000	.584
Elc3-A clear statement of E-courses requirements was provided at the beginning of the course.	1.000	.557
Elc4-The E-courses' activities helped students to examine issues, to evaluate new ideas, and to apply what they have learned.	1.000	.539
Elc5-The E-courses workload was just right.	1.000	.600
Aut1-Students feel motivated when accessing their E-courses and can work without others pushing them to get things done.	1.000	.697
Aut2-Students can manage their E-courses schedule and complete their assignments on time.	1.000	.651
Aut3-Students like to solve their E-courses problems and exercises and try to figure things out on their own.	1.000	.661
Aut4-Students read well and follow written directions on their E-courses.	1.000	.595
Aut5-Students are willing to access E-courses system on a daily basis to check announcements, schedule and other communication.	1.000	.535
Spo1-Students are receiving help from their universities to adapt to E-learning.	1.000	.622
Spo2-Students can reach their instructors via internet during their office hours.	1.000	.726
Spo3-When students encounter a difficult problem, they are willing to seek assistance from other people.	1.000	.588
Spo4-Students can easily work in groups via internet to achieve E-courses requirements.	1.000	.454
Sat1-Students hope university will continue to use E-learning in teaching.	1.000	.761
Sat2-Students think their grades will improve with their E-courses.	1.000	.613
Sat3-Students feel E-learning is more interesting in acquiring knowledge.	1.000	.793
Sat4-Students feel that E-learning saves time for them.	1.000	.665
Sat5-The E-courses meet students' personal and professional goals.	1.000	.754

Extraction Method: Principal Component Analysis.

Furthermore, Table 14 depicts the matrix of loadings or correlations between the variables and factors. Two sets of variables are identified: Pure variables whose loadings are 0.35 or greater on only one factor, while Complex variables have high loadings on various factors, a fact that makes interpretation of the output difficult. Then, rotation may be needed.

Table 13. Total variance explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	10.291	39.581	39.581	10.291	39.581	39.581	7.426
2	2.277	8.759	48.341	2.277	8.759	48.341	5.503
3	1.703	6.548	54.889	1.703	6.548	54.889	4.385
4	1.264	4.862	59.751	1.264	4.862	59.751	5.552
5	1.025	3.941	63.692	1.025	3.941	63.692	6.368
6	.906	3.485	67.177				
7	.736	2.832	70.009				
8	.701	2.696	72.705				
9	.602	2.316	75.021				
10	.578	2.224	77.245				
.	.	.	.				
.	.	.	.				
23	.274	1.053	97.531				
24	.255	.979	98.510				
25	.216	.829	99.339				
26	.172	.661	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

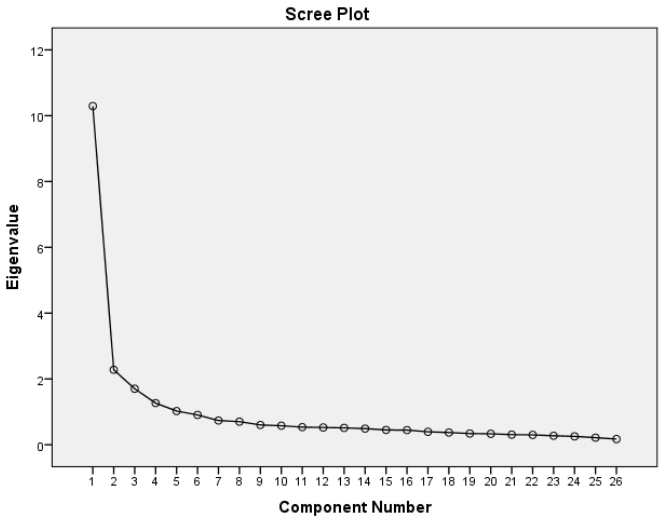

Figure 4. Scree plot

Table 14. Factor Matrix[a]

	Factor				
	1	**2**	**3**	**4**	**5**
Infrastructure1	.445				
Infrastructure2	.517		.427		
Infrastructure3	.525		.354		
Infrastructure4	.524		.473		
Infrastructure5	.373		.485		
ComputerSkills1	.639				
ComputerSkills2	.551	.561			
ComputerSkills3	.670	.394			
ComputerSkills4	.666				
ComputerSkills5	.478	.499			
LearningContent1	.685				
LearningContent2	.706				
LearningContent3	.629				
LearningContent4	.665				
LearningContent5	.686				
Autonomous1	.689				
Autonomous2	.729				
Autonomous3	.716				
Autonomous4	.696				
Autonomous5	.605				
Supportfromothers1	.550				
Supportfromothers2	.577				
Supportfromothers3	.495				
Supportfromothers4	.567				
Supportfromothers5	.377				
Satisfaction1	.637	-.468			
Satisfaction2	.558				
Satisfaction3	.680	-.521			
Satisfaction4	.636				
Satisfaction5	.737	-.372			

Extraction Method: Principal Axis Factoring.

a. 5 factors extracted. 10 iterations required.

Table 15 reports the Varimax rotation results, where "the factor axes are kept at right angles to each other. This rotation is regularly chosen. Ordinarily, rotation reduces the number of complex variables and improves interpretation" (Hejase et al., 2014, p. 1573). However, as seen in Table 15, the rotated solution still includes several complex variables. In fact, Factor 1 groups 9 items with factor loadings from .364 to .738. Factor 2 groups 5 items with factor loadings from .725 and .811, and so on. These items must be interpreted with caution and to lessen the intensity of the observed ambiguous structure, oblique rotation (Direct Oblimin) is chosen (Coakes, 2013, p. 137).

Table 15. Rotated Component Matrix[a]

	Component				
	1	**2**	**3**	**4**	**5**
Infrastructure2					.661
Infrastructure3					.642
Infrastructure4					.758
Infrastructure5					.780
ComputerSkills2			.826		
ComputerSkills3			.714		
ComputerSkills4			.636		
ComputerSkills5			.819		
LearningContent1	.364		.563		
LearningContent3	.429			.504	
LearningContent4	.553				
LearningContent5	.587				
Autonomous1	.738				
Autonomous2	.647				
Autonomous3	.666				
Autonomous4	.557		.389		
Autonomous5	.628				
Supportfromothers1				.713	
Supportfromothers2				.783	
Supportfromothers3				.703	
Supportfromothers4				.524	
Satisfaction1		.811			
Satisfaction2		.734			
Satisfaction3		.781			
Satisfaction4		.725			
Satisfaction5		.729			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

4.10.2 PCA Using Oblimin Rotation

Oblimin rotation, in comparison to Varimax rotation, provides a considerably more interpretable solution. Two matrices result. The first is the 'Pattern' matrix (Table 16) and the second is the 'Structure' matrix (Table 17). Loadings differences are clearly seen and separated in the pattern matrix, a fact that leads to choose this matrix for interpretation. Actually the loadings represent the unique relationship between the factor and the variable. In addition, the Pattern matrix has fewer complex variables and simpler structure. The Factor correlation matrix indicates the relationship between factors. All factors appear moderately to goodly related.

Table 16. Pattern Matrix[a]

	Component				
	1	**2**	**3**	**4**	**5**
Infrastructure2			.656		
Infrastructure3			.631		
Infrastructure4			.765		
Infrastructure5			.819		
ComputerSkills2		.859			
ComputerSkills3		.699			
ComputerSkills4		.608			
ComputerSkills5		.876			
LearningContent1		.523			
LearningContent3	.357			.458	
LearningContent4	.507				
LearningContent5	.555				
Autonomous1	.778				
Autonomous2	.623				
Autonomous3	.651				
Autonomous4	.504				
Autonomous5	.654				
Supportfromothers1				.752	
Supportfromothers2				.815	
Supportfromothers3				.737	
Supportfromothers4				.498	
Satisfaction1					.847
Satisfaction2					.774
Satisfaction3					.782
Satisfaction4					.738
Satisfaction5					.705

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 9 iterations.

Table 17. Structure Matrix

	Component				
	1	**2**	**3**	**4**	**5**
Infrastructure2	.418	.361	.716		
Infrastructure3	.397		.704		
Infrastructure4			.806		.371
Infrastructure5			.785		
ComputerSkills2		.864		.386	
ComputerSkills3	.479	.801		.462	
ComputerSkills4	.475	.735	.405	.417	.369

ComputerSkills5		.833			
LearningContent1	.559	.671	.375		.439
LearningContent3	.573	.443	.355	.639	
LearningContent4	.688		.351	.464	.515
LearningContent5	.717		.478	.447	.486
Autonomous1	.820		.375		.509
Autonomous2	.776	.438		.519	.477
Autonomous3	.787	.382		.463	.542
Autonomous4	.702	.545		.462	.462
Autonomous5	.709	.445			.377
Supportfromothers1	.413			.769	
Supportfromothers2	.365	.442		.843	
Supportfromothers3		.353		.751	
Supportfromothers4	.473	.368		.634	
Satisfaction1	.468				.864
Satisfaction2	.380				.777
Satisfaction3	.515		.461		.864
Satisfaction4	.505				.798
Satisfaction5	.575		.365	.457	.840

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

4.10.3 Interpretation of Factors

To finalize the Factor analysis process, we need to determine the number of factors to interpret and then assigning a label to each of these factors (Hejase et al., 2014). Applying Kaiser's Rule and the Scree-test, five factors were deemed important. Following Oblimin rotation, factor 1 was loaded on 7 items (see Table 16) that reflected 'E-learning content and Autonomy' and accounted for 39.581% of the variance (see Table 13). Factor 2 was loaded on 5 items (accounted for 8.76% of the variance). It was labeled 'computer skills' and was represented. The third factor with 4 items was labeled 'infrastructure' and accounted for 6.55% of the variance. Factors four and five were defined with the same criteria and are shown in Table 18.

Table 18. Interpretation of factors/components

Rotation Sum of Squared Loadings (Varimax)% of Variance	**Component**
39.581%	**E-learning Content & Autonomy [7 elements]**
	* Elc4. The E-courses' activities helped students to examine issues, to evaluate new ideas, and to apply what they have learned.
	* Elc5. The E-courses workload was just right.
	* Aut1. Students feel motivated when accessing their E-courses and can work without others pushing them to get things done.
	* Aut2. Students can manage their E-courses schedule and complete their assignments on time.
	* Aut3. Students like to solve their E-courses problems and exercises and try to figure things out on their own.

	* Aut4. Students read well and follow written directions on their E-courses.
	* Aut5. Students are willing to access E-courses system on a daily basis to check announcements, schedule and other communication.
8.759%	**Computer Skills [5 elements]**
	* Csk2. Students know how to open, modify, save and upload E-courses documents.
	* Csk3. Students feel comfortable navigating web pages and sending and receiving e-mails regarding their E-courses.
	* Csk4. Students are prepared to learn the necessary skills required to be successful in their E-courses.
	* Csk5. Students know how to use online platforms such as MS Teams, Zoom, and SKYPE for Business, Google Meet, Moodle and Blackboard.
	* Elc1. Students are prepared to learn new content in an E-Learning environment.
6.548%	**Infrastructure [4 elements]**
	* Inf2. Students can afford the expenses of the technology needed for E-learning.
	* Inf3. Students do have calm space, good lighting, with no distraction during E-learning.
	* Inf4. Students are satisfied with the internet connection during E-learning.
	* Inf5. Students are not bothered with Electricity Cutoff during E-learning.
4.862%	**Support from Others [5 elements]**
	* Elc3. A clear statement of E-courses requirements was provided at the beginning of the course.
	* Spo1. Students are receiving help from their universities to adapt to E-learning.
	* Spo2. Students can reach their instructors via internet during their office hours.
	* Spo3. When students encounter a difficult problem, they are willing to seek assistance from other people.
	* Spo4. Students can easily work in groups via internet to achieve E-courses requirements.
3.941%	**Satisfaction [5 elements]**
	* Sat1. Students hope university will continue to use E-learning in teaching.
	* Sat2. Students think their grades will improve with their E-courses.
	* Sat3. Students feel E-learning is more interesting in acquiring knowledge.
	* Sat4. Students feel that E-learning saves time for them.
	* Sat5. The E-courses meet students' personal and professional goals.
63.692%	

4.11 Reliability Test

Taking into consideration all five-level Likert scale statements (30 statements) of the survey results into a Cronbach's Alpha of 0.942 as reported in Table 19.

Table 19. Reliability Statistics

Cronbach's Alpha	N of Items
.942	30

The Internal Reliability of the 30-item scale is assessed next. Cronbach's alpha if items deleted all fall in the range 0.939 to 0.942 matching the range 0.9 – 1.0 labeled "Excellent" (Burns & Burns, 2008; Hejase & Hejase,

2013). According to Chehimi et al. (2019), "this indicates a very good strength of association and proves that the selection of the questions is suitable for the questionnaire purpose" (p. 1915). Moreover, Hejase et al. (2014) contend that "an alpha value of 0.8 or above is regarded as highly acceptable for assuming homogeneity of items" (p. 1578).

4.12 Generation of Weighted Factors

Based on Table 17 output, the resultant factors/components were weighted based on the Factor analysis resultant weights for the 26 items-scales and a new computed weighted factor is obtained. Exhibit 1 herein depicts the details of the computations performed.

Exhibit 1. Weighted factors computations using SPSS v. 25

E-learning Content & Autonomy [7 elements]

ELCAUT=SUM(LearningContent4*0.688,LearningContent5*0.717,Autonomous1*0.820,Autonomous2*0.776, Autonomous3*0.787,Autonomous4*0.702,Autonomous5*0.709).

Computer Skills [5 elements]

CMPSKL=SUM(ComputerSkills2*0.864,ComputerSkills3*0.801,ComputerSkills4*0.735, ComputerSkills5*0.833,LearningContent1*0.671).

Infrastructure [4 elements]

INFSTR=SUM(Infrastructure2*0.716,Infrastructure3*0.704,Infrastructure4*0.806,Infrastructure5*0.785).

Support from Others [5 elements]

SUPPOTH=SUM(LearningContent3*0.639,Supportfromothers1*0.769,Supportfromothers2*0.843, Supportfromothers3*0.751,Supportfromothers4*0.634).

Satisfaction [5 elements]

SATISF=SUM(Satisfaction1*0.864,Satisfaction2*0.777,Satisfaction3*0.864,Satisfaction4*0.798, Satisfaction5*0.840).

The weighted factors actually depict components of the suggested model for this research.

4.13 Regression Analysis

Field (2005, p.144) and Malhotra (2004, p. 511) assert that regression analysis leads to a predictive model used to predict an outcome of the dependent variable form one or more independent variables. Therefore, a number of elements were regressed against the Satisfaction scale (dependent variable). A backward stepwise analysis (Criteria: Probability-of-F-to-enter ≤ .050, Probability-of-F-to-remove ≥ .100) was used to find out the individual contribution of each predictor (independent variables).

4.13.1 Model 1

Table 18 and Exhibit 1 are the registries of all the items grouped into the five factors considered for regression. Since this paper aims to assess the factors leading to students' satisfaction with their e-learning experiences, the following regression variables are defined:

Dependent variable: Satisfaction [SATISF]

Independent variables: E-learning Content & Autonomous [ELCAUT]; Computer Skills [CMPSKL]; Infrastructure [INFSTR]; and Support by Others [SUPPOTH]

Pearson's correlation coefficients of dependent versus independent variables all showed statistically significant (Sig. P=.000 < .05), moderate strength and positive

(SATISF vs ELCAUT, R=.686; SATISF vs CMPSKL, R=.405; SATISF vs INFSTR, R=.447;

SATISF vs SUPPOTH, R=.464).

Of these elements only two namely "E-learning Content & Autonomous [ELCAUT]" (Std. Beta= .614, Sig. P=.000) and infrastructure "Infrastructure [INFSTR]" (Std. Beta=.150, Sig. P=.000) were highly statistically significant predictors of students' satisfaction. The regression model is: SATISF = 0.614ELCAUT + 0.150INFSTR. Results show that the predictors (indep. vars.) have a positive strong correlation with the dep. var., R=.699. The coefficient of determination (R^2) value is "the measure of how much of the variability in the outcome is accounted for by the variability of the predictors" (Field, 2005, p. 154). Accordingly, one can tell that students' E-learning content & autonomy and the infrastructure account for 48.8 % (R^2 =.488) of variability in students' satisfaction. Adjusted R^2 is .486 (less than the R^2 by .002). This reduction means that if "the model were derived from the population rather than a sample it would have accounted for approximately 0.2% less variance in the outcome" (Hejase et al., 2014, p. 1578). Moreover, the F ratio is high (F = 179.856, p<.000), which means the model has significantly improved ability to predict the outcome variable. Moreover, satisfaction is significantly predicted by the extent students use autonomy in their acceptance of e-learning content (an internal factor). The Beta value (B=.614), means there is a positive moderate relationship and indicates that as the students assimilate their e-learning content and use their self-motivation to learn, then satisfaction is a natural outcome, and will increase too. Having the appropriate means and the suitable infrastructure also seems to significantly predict students' satisfaction (B=.150) though to a weak extent. In fact, the more resources the students can afford to use e-learning successfully the more satisfaction they will get. Furthermore, the Variance Inflation Factor (VIF) is the reciprocal of Tolerance, it is always (≥ 1). Values of VIF [both indep. var. have equal values 1.307] show that these do not exceed 2 indicating no multicollinearity presence. Therefore, there is no correlation or bidirectional relationship among the predictor variables, and all the predictor or explanatory variables are suitable to form a causal relationship using regression. As for the Durbin-Watson (D-W) statistic, a value of 2.0 means that there is no autocorrelation detected in the sample. Here D-W is 1.851 which is approximately 2. Moreover, the Normal P-P plot shows an acceptable fit between the regression line and the given data. As shown in Figure 5.

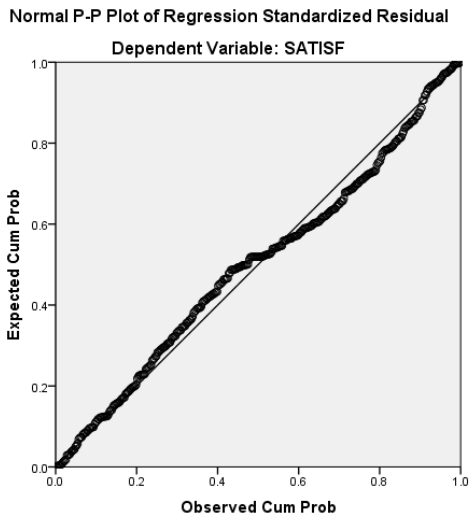

Figure 5. Normal P-P Plot of Regression standardized residuals

4.13.2 Resultant Research Model 1

Findings of the Factor Analysis show that five factors resulted from the proposed six constructs depicted in the survey. Actually E-learning construct items were distributed among other three factors as shown in Table 18. Moreover, the resultant model after regression analysis (see Figure 5) was, SATISF = 0.614ELCAUT + 0.150INFSTR, whereby each factor is composed of several items as also depicted in Table 18. Worth mentioning, that the three factors of the revised model are representation of weighted items as discussed in Exhibit 1. The next step is to assess the actual regression models resulting if weighted dependent variable SATISF is regressed on all the items of the other four factors, followed by regressing three important items within the Satisfaction

factor to have better details and improving the final model representative of the objective of this paper. Therefore, for such a purpose, four regression analysis runs are carried out. Only two final models will be reported here namely the first with SATISF (weighted factor for satisfaction) versus all other items (not weighted) and the second after comparing the coefficients of determination of three models each testing one different item extracted from the Satisfaction factor (unweighted) versus all the other items.

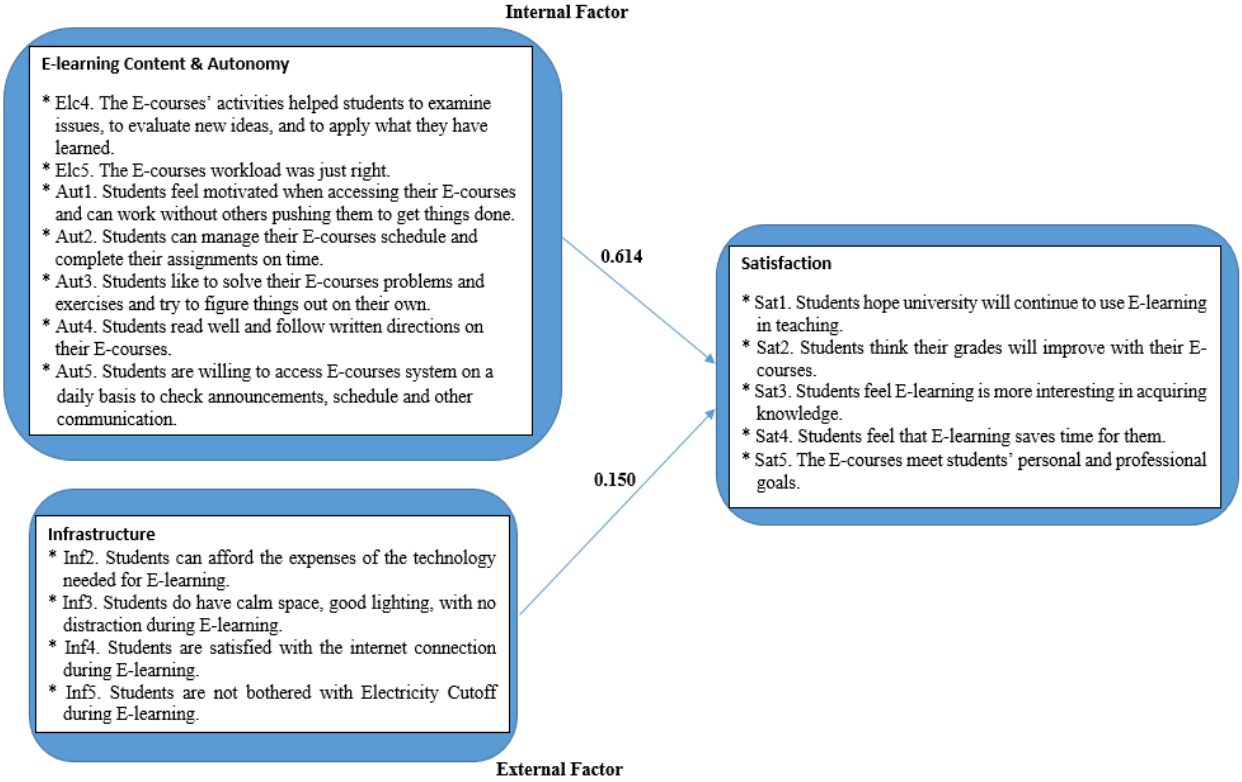

Figure 6. Resultant statistically valid model with weighted factors

4.13.3 Model 2

Table 18 and Exhibit 1 are the registries of all the items grouped into the five factors considered for regression. Since this paper aims to assess the factors leading to students' satisfaction with their e-learning experiences, the following regression variables are defined:

Dependent variable: Satisfaction [SATISF] (weighted 5 items)

Independent variables: E-learning Content & Autonomous [7 items]; Computer Skills [5 items]; Infrastructure [4 items]; and Support by Others [5 items]

Pearson's correlation coefficients of dependent versus independent variables all showed statistically significant (Sig. P=.000 < .05), moderate strength and positive.

Of these elements (21 items), with 95% confidence level, only eight items were valid as predictors namely, E-learning Content & Autonomous [Autonomous1, Autonomous3, Autonomous4, LearningContent1, LearningContent4]; Computer Skills [ComputerSkills5]; Infrastructure [Infrastructure4]; and from Support by Others [Supportfromothers4]. One element with 90% confidence level was valid namely [Supportfromothers3]. Results depicted in Table 20 show the following resultant model:

SATISF=.185Autonomous1+.177Autonomous3+ .117Autonomous4 + .161LearningContent2 + .161LearningContent4 + .123ComputerSkills1 - .118ComputerSkills5 + .121Infrastructure4.

Table 20. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
8	(Constant)	.872	.782		1.114	.266		
	Autonomous3	.761	.217	.180	3.516	.000	.499	2.003
	Autonomous1	.799	.185	.208	4.331	.000	.571	1.751
	LearningContent4	.681	.196	.166	3.479	.001	.578	1.731
	Infrastructure4	.617	.157	.157	3.927	.000	.821	1.217
	Autonomous4	.538	.213	.123	2.528	.012	.557	1.795
	LearningContent1	.659	.210	.153	3.141	.002	.553	1.809
	ComputerSkills5	-.583	.196	-.129	-2.981	.003	.697	1.435
	Supportfromothers3	.356	.171	.084	2.074	.039	.795	1.257
	Infrastructure3			.073[i]	1.692	.091	.704	1.420

a. Dependent Variable: SATISF

b. ANOVA F =48.779 (Sig.=.000)

c. R=.716; RSq.=.513; Adj.RSq.=.502; Sig. F Change=.039; D-W=1.889

SATISF = .208 Autonomous1 + .180 Autonomous3 + .214 Autonomous4 + .153 LearningContent1
(.000)*** (.000) *** (.012)** (.002)***
+ .166 LearningContent4 - .129 ComputerSkills5 + .171 Supportfromothers3 + **.073 Infrastructure3**
(.001)*** (.003)*** (.039)** (.091)*
+ .157 Infrastructure4
(.000)**

Where, four items in "learning content and autonomous" belong to Factor one (Internal):

* Aut1. Students feel motivated when accessing their E-courses and can work without others pushing them to get things done.
* Aut3. Students like to solve their E-courses problems and exercises and try to figure things out on their own.
* Aut4. Students read well and follow written directions on their E-courses.
* Elc4. The E-courses' activities helped students to examine issues, to evaluate new ideas, and to apply what they have learned.

The second Factor "Computer Skills" (Internal) consists of two elements:

* Csk5. Students know how to use online platforms such as MS Teams, Zoom, and SKYPE for Business, Google Meet, Moodle and Blackboard.
* Elc1. Students are prepared to learn new content in an E-Learning environment.

The third Factor "Infrastructure" (External) consists of two elements:

* Inf3. Students do have calm space, good lighting, with no distraction during E-learning.
* Inf4. Students are satisfied with the internet connection during E-learning.

And the fourth Factor "Support from Others" (External) has one element

* Spo3. When students encounter a difficult problem, they are willing to seek assistance from other people.

The items in the model are all statistically significant with probabilities less than 5% (.000; .001; .015; .001; .001, .007; .004; .004), respectively except one (.091) with probability less than 10%. These items were highly statistically significant predictors of students' satisfaction. Results show that the

predictors (independent vars.) have a positive strong correlation with the dep. var., R=.716. The R^2 value is .513, accordingly, one can tell that the set of 9 predictors account for 51.3 % of variability in students' satisfaction. Adjusted R^2 is .502 (less than the R^2 by .011). This decrease means that if "the model were derived from the population rather than a sample it would have accounted for approximately 1.1% less variance in the outcome" (Hejase et al., 2014, p. 1578). Moreover, the F ratio is high (F = 48.779, p<.000), meaning that the model has significantly improved ability to predict the outcome variable. Results also show that satisfaction is significantly predicted by the extent students use autonomy and e-learning content as well as computer skills in their acceptance of e-learning content (internal factors). This shows a positive relationship (.208, .180, .214, .153 and .166) for Factor One: "autonomy and e-learning content" and a negative and positive for items of Factor Two "computer skills" (-.129, .153), indicating that as the students assimilate their e-learning content and use their self-motivation and initiatives to learn and are supported with active learning in addition to relying on one well defined online platform beside their computer skills to learn, then satisfaction is a natural outcome, and will increase too. Moreover, having the appropriate means and the suitable infrastructure and external support (external factors), more specifically, suitable study setup at home, internet connection during E-learning, and receiving support when encountering difficulties also seem to significantly predict students' satisfaction. In fact, the more resources the students can afford to use e-learning successfully the more satisfaction they will get. Furthermore, the Variance Inflation Factor (VIF) is the reciprocal of Tolerance, it is always (≥ 1). Values of VIF (minimum of 1.257 to maximum 2.003) show that these do not exceed 2 indicating no multicollinearity presence. The D-W statistic is 1.889 which is approximately 2 means that there is no autocorrelation detected in the sample. Moreover, the Normal shape Histogram and the Normal P-P plot show an acceptable fit between the regression line and the given data. As shown in Figure 7(a, b).

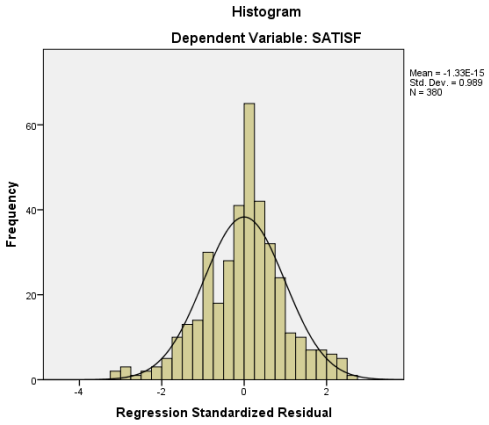

Figure 7a. Histogram of regression standardized residual

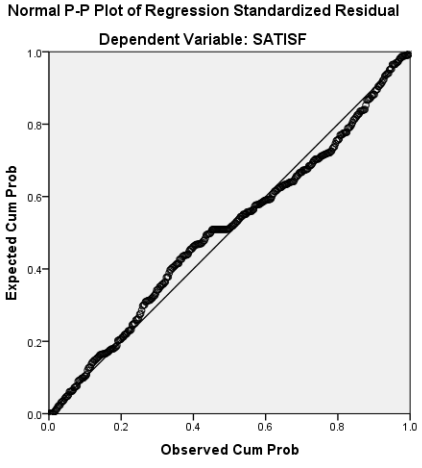

Figure 7b. Normal P-P Plot of regression standardized residual

4.13.4 Resultant Research Model 2

The final research model actually represents both the influence of internal as well as the external factors (Zhang & Goel, 2011; Hammarlund, Nilsson, & Gummesson, 2015) on students' satisfaction which actually shows if the e-learning experience has achieved its objectives in the educational process. However, this final model stresses the statistical significance of selected items all which have particular significance for this research. Figure 8 depicts the resultant model whereby the dependent variable or the Satisfaction Factor is a weighted component of the five items making it after Factor analysis. The influencing predictors are the unique items having statistical significance and leading to the students' satisfaction provided decision makers of the learning process consider their direct impact on the success of the online learning process which at the same time leads to students' satisfaction and therefore having no issues repeating the experience.

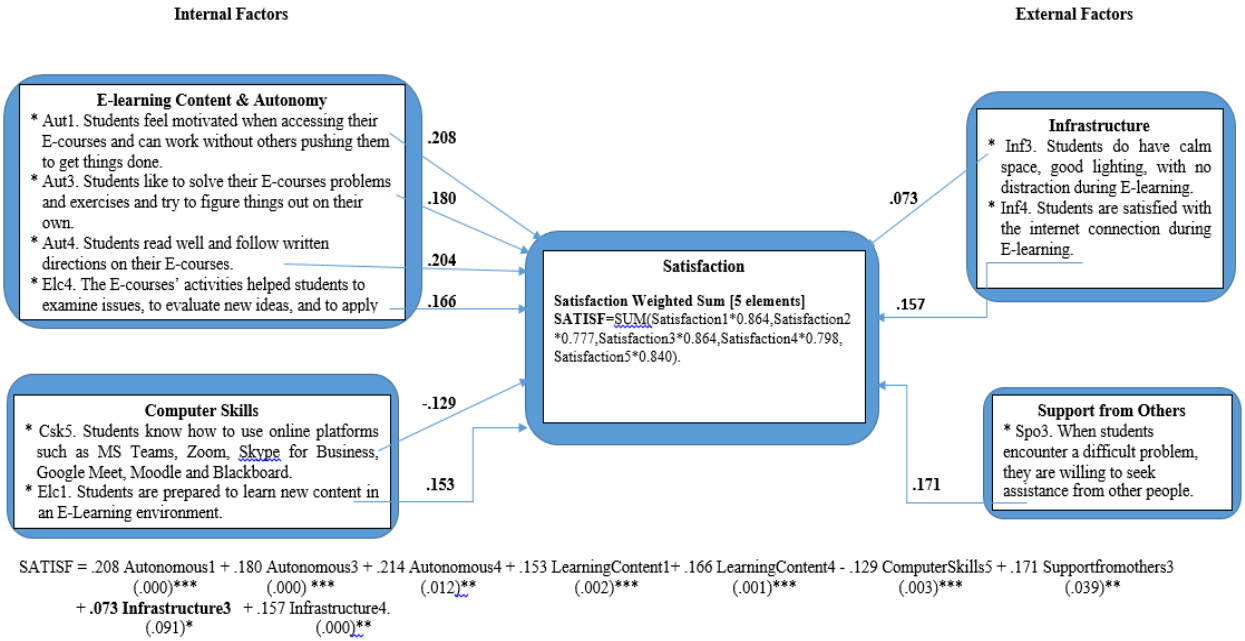

Figure 8. Resultant Research Model

5. Conclusion and Recommendation

5.1 Conclusion

This paper aimed to assess the factors that may impact the success of E-learning in Lebanese universities and that affect students' satisfaction in adapting to this unplanned phase. Findings led to two final models namely an initially statistically valid model with weighted factors. In this first model only two factors influenced students' satisfaction with the e-learning experience whereby one factor is internal including e-learning content and autonomy and the second external factor related to the infrastructure. And the second model is also a statistically valid model with a weighted dependent variable (Satisfaction) versus a set of items (Predictors) categorized under four factors. Two are internal factors including e-learning content & autonomy and computer skills, and two external factors being the infrastructure and support from others. Both models were validated with descriptive statistics and factor analysis followed by causal regression analysis. Factor analysis used as an extraction method "Principal Component Analysis" and as a rotation method "Oblimin with Kaiser Normalization" all statistically tested within 95% confidence. Worth mentioning that the purpose of 'Factor Analysis' is to "allow understanding and interpreting the supposed relationship between multiple variables and representing multiple variables with a smaller number of factors" (Tinsley & Brown, 2000, p. 721). Recalling that the Kaiser–Meyer–Olkin (KMO) and Bartlett's test are prerequisites for factor analysis. In fact, the Bartlett's test value (5387.696; $P < 0.001$) and KMO value (0.934) obtained to test the divisibility of the correlation matrix into factors, the data was determined to be suitable for factor analysis. Therefore, obtaining significant results from both tests shows that the data are suitable for factor analysis (Tahtali, 2019). Both models were valid and reliable with no autocorrelations (D-W of 1.889) or multicollinearity (VIF < 2) effects. The second model

exposes to a larger extent the specific influencing set of variables categorized as presented earlier four factors (predictors) and one factor (dependent variable) as depicted in Figure 8.

Results have shown that even if the relations are statistically significant (Sig. < 5%) though the relationships are numerically weak (Betas from .039 to .208), nevertheless qualitatively the model and its components are significant to assess the actual experience manifested by 380 students from ten different universities. The model also is an eye opener to the factors that are influencing the success of e-learning that should lead to the learners' satisfaction. Next, addressing each factor will make this model clearer.

5.1.1 Internal Factors

Factor 1: E-learning content and autonomy, consists of three autonomy items and 1 e-learning content item. Three autonomy items out of five (suggested earlier before factor analysis) were part of the model namely,

* Aut1. Students feel motivated when accessing their E-courses and can work without others pushing them to get things done (B =.208).

* Aut3. Students like to solve their E-courses problems and exercises and try to figure things out on their own (B =.189).

* Aut4. Students read well and follow written directions on their E-courses (B = 0.204).

* Elc4. The E-courses' activities helped students to examine issues, to evaluate new ideas, and to apply what they have learned (0.166).

The four factors show that an increase of one standard deviation in each of the three predictors leads to an increase in students' satisfaction by 20.8%, 18.9%, 20.4% and 16.6% of a standard deviation, respectively. In fact, these four factors represent the students' self-motivation, preparedness to look for solutions and new ideas, and initiatives to seek direction in the e-learning content available for them. The aforementioned items are fundamental and important requirements for e-learning to be successful, and if the approach is successful leads to students' further engagement and increase their willingness to pursue online education. The relationships are weak because the students' responses were mostly moderate (mean about 3) and many actually were reserved to take sides in their responses, that is, responses in the 'Neutral' zone were almost 30% across. Notwithstanding, these findings express the importance of universities and instructors to prepare students for online education and the transparent, focused and empathetic support needed to ease their anxiety and fear from the initially sudden impact (first semester) and later the continuity of the exercise (2 more semesters). The acceptability of e-learning content and the autonomy shown fit very well with the justification for e-learning by several researchers. They asserted that e-learning "Promotes learning control and self-containment" (Khan, 2005, p. 10; El Zein et al., 2021, p. 37), "independent learning, repetitiveness to access learning material, accessibility" (Khoury et al., 2011, p. 53), "scalability and consistency" (Gupta, 2017, para 11-12), "convenience and flexibility" (Clover, 2017, para 5) and "effectiveness, safety and health measures" (Hejase & Chehimi, 2020, p. 2).

Factor 2: Computer Skills consists of one item computer skills (out of five) and one item e-learning content (out of five).

* Csk5. Students know how to use online platforms such as MS Teams, Zoom, Skype for Business, Google Meet, Moodle and Blackboard (B= - 0.129).

* Elc1. Students are prepared to learn new content in an E-Learning environment (B=0.153).

The first item shows that an increase of one standard deviation in the predictor leads to a decrease in students' satisfaction by 12.9%, of a standard deviation. While the second item shows that an increase of one standard deviation in the predictor leads to an increase in students' satisfaction by 15.3%, of a standard deviation. These two items represent the students' technical preparedness and flexibility to access different platforms for their e-learning sessions. The aforementioned items help assess to what extent students are prepared and trained technically to deal with ICT interfaces separating them to achieve their learning outcomes. The negative sign for the first item calls attention to the fact that students were asked about various platform though they are acquainted with one or two forms leading to reduce their agreement responses. Therefore, it is not surprising that only 58.70% agreed to the first item while 27.90% were neutral about. The expectation is that students' after three semesters must be much more confident in their use of the platform. As for the second item, 45.60% of the respondents agreed about their preparedness to learn new content via the e-learning environment as related to the platform of instruction, a fact that relates to the first item, while 34.70% opted for the neutral response shying away from the reality that they do not know about all platforms. The aforementioned two items, or the computer skills factor, call the attention to an actual deficiency in the preparedness of universities and instructors to bring

forward to students an interface for leaning that eases the students' fear of the sudden transition to e-learning. Indeed, according to Hejase & Chehimi (2019), "using ICT newest equipment and software without fitting the existing infrastructure, and the lack of stakeholders training" (p. 2) adds to the challenges faced by institutions and their stakeholders. Kebritchi et al. (2017) also agreed that not using blended learning is problematic. Consequently, having deficiencies in dealing with the suitable technology and having students lacking the appropriate means to deal with the technical issues will surely rise the Matthew effect matter as time passes by.

5.1.2 External Factors

Factor 3: Infrastructure consists of two items (out of five).

* Inf3. Students do have calm space, good lighting, with no distraction during E-learning (B=0.073).

* Inf4. Students are satisfied with the internet connection during E-learning (B=0.157).

The two factors show that an increase of one standard deviation in each of the two predictors leads to an increase in students' satisfaction by 7.3% and 15.7% of a standard deviation, respectively. In fact, these two items represent a critical success factor for online education. The students' setup environment where they access their e-learning content and the principle motor for e-learning, or the internet connectivity, are fatal to the process if not appropriate or deficient. Actually, Clover (2017), Tamm (2019), Chaturvedi, Vishwakarma, & Singh (2021) and UNESCO (2021c) agree that ICT deficiencies present critical challenges to online education including: Internet continuity, Technology availability to all stakeholders (among others). Similar to the internal factors, this factor is statistically significant though having a numerical weak relationship with students' satisfaction. However, qualitatively, this factor stresses the critical role of infrastructure towards e-learning which eventually leads to higher students' satisfaction if the infrastructure is appropriate as stressed by Akhras & Akhras (2012).

Factor 4: Support from Others consists of one item only (out of five).

* Spo3. When students encounter a difficult problem, they are willing to seek assistance from other people (B=0.171).

This item shows that an increase of one standard deviation in the predictor leads to an increase in students' satisfaction by 17.1%, of a standard deviation. Actually, 51.30% of the students agreed to this fact while 32.40% have chosen to take a neutral stance. This item shows that different universities had different e-learning preparations because it is evident that for online education to succeed student-instructor communication must be maximum. And having most universities with no experience in e-learning practices leads to the current situation of students not showing an agreement to seek help from others at a much higher scale. Indeed, having deficiencies in digital skills of educators and learners resulted in less communication and created more difficulties in achieving learning outcomes for both parties (UNESCO, 2021c). Moreover, Tamm (2019) warned that failure for better communication within e-learning may lead to further social Isolation, lack of strong self-motivation and time management skill, and the lack of communicational skill development in online students.

5.2 Recommendations

The overall model succeeded in shedding the light on the internal and external factors leading to students' satisfaction from their e-learning experience. The qualitative nature of the model stresses the need for decision makers to focus their attention on the different factors of influence knowing their complexity and interweaving relationships (Prof. Ahmed Bawa, CEO, Universities South Africa quoted in CLICKS, 2020), a fact that requires HEIs and MEHE to create new approaches to universities' and ministry's governance and to fit the requirements of the new ongoing ecosystem. Moreover, Henry Stoever (CEO, Association of Governing Boards of Universities and Colleges (AGB) in the USA; CLICKS, 2020), asserted that a new model of governance is neither actually needed for Institutions of Higher Education nor for the Ministry of Education and Higher Education to face the pandemic rather what is needed is a new attitude, balanced expectations and positive behavior toward stakeholders. Hejase & Chehimi (2020) recommend that "HEIs must focus on the academic quality effectively and efficiently, and academic boards must step back and rethink their missions, and certainly the executive teams need to prioritize their core competencies" (p. 3). In addition, Prof. Mohamed Zairi (a UAE, international expert in total quality and excellence management), stressed that, "HEIs must deal with its stakeholders (being students, faculty and staff) with compassion and empathy, and at the same time capitalize on human ingenuity, the practice of humanity, and enforce the spirit of collaboration and partnership" (CLICKS, 2020).

The academic year to come, amid the news that COVID-19 pandemic is more under control, most probably will be demanding the use of hybrid framework in universities which is enriched by blended education capitalizing

on lessons learned during the past semesters. Beside the attention to the different factors of this paper model namely, e-learning content, students' motivation and autonomy, computer skills (or more correctly ICT skills), infrastructure, and the staff & instructors' direct support to students universities as well as the MEHE need to put more attention on the continuity, consistency and innovation of the quality of education and the fulfillment of the educational programmes' learning outcomes (Fatani, 2020; Surma & Kirschner, 2020).

The future of higher education in Lebanon, and other countries as well, is still oriented towards graduating employable students. Ordoñez (2003) stressed the fact that the progress of a nation depends on the continuous development of its human capital (HC) which focuses on competencies, attitudes and intellectual agility. Furthermore, HC has been considered as the primary element of Intellectual Capital and the most important source of sustainable competitive advantage (Edvinsson & Malone, 1997; Seleim, Ashour & Bontis, 2004). In addition, Starovic and Marr (2004; cited in Hejase et al., 2018) discern that according to "guidelines produced by researchers from universities across Europe, collectively known as the Meritum Project, HC is defined as the knowledge, skills and experience that employees/students take with them when they leave" (p.14). Consequently, Lebanon under the MEHE leadership for its HEIs progress and development must make sure that a national committee representing all educational institutions take the lead to define the changes necessary to cope with the first sudden impact and move forward equipped with lessons learned and best practices in e-learning to make sure that the next wave of graduates are indeed fortified with the competencies needed for the future labor force.

This research has its merit in the model presented which is unique and innovative. As far as the authors' knowledge, no modelling has been carried out in Lebanon or the surrounding countries about students' satisfaction with e-learning. Moreover, authors capitalized on the students' inputs as advised by Khoury et al. (2011), who recommended to look into the experiences of students, "as these groups of students were known to be using various forms of e-learning in their courses, studies about their experiences were a good place to begin a deeper exploration of their views, expectation and experiences" (p. 56). Moreover, the empirical results of this exploratory study support statistically significant findings that can be used academically to add different insights for further statistical analysis. In addition, this study stands as a new platform with new insights and stimulating effect useful to be validated by other researchers. Future research may include cross-cultural comparisons provided having equal sample size or larger.

References

Abu-Moghli, M., & Shuayb, M. (2020). Education under COVID-19 Lockdown: Reflections from Teachers, Students & Parents. Retrieved June 21, 2021, from https://inee.org/system/files/resources/booklet-covid-19-22july.pdf

Aderemi, T. A., Ojo, L. B., Ifeanyi, O. J., & Efunbajo, S. A. (2020). Impact of corona virus (COVID-19) pandemic on small and medium scale enterprises (SMEs) in Nigeria: A critical case study. *Acta Universitatis Danubius. Œconomica, 16*(4), 251-261.

Akhras. C., & Akhras, C (2012). Interactive, Asynchronous, Face-to-Face: Does It Really Make a Difference?. *2nd World Conference on Educational Technology Researches*. Near East University, Kyrneia, North Cyprus. June 27-30.

Araújo, F. J. de O., De Lima, L. S. A., Cidade, P. I. M., Nobre, C. B., & Neto, M. L. R. (2020). Impact of sars-cov-2 and its reverberation in global higher education and mental health. *Psychiatry Research*, *288*, 112977. https://doi.org/10.1016/j.psychres.2020.112977

Arnhold, N., Brajkovic, L., Nikolaev, D., & Zavalina, P. (2020). Tertiary Education and COVID-19: Impact and Mitigation Strategies in Europe and Central Asia. *Europe and Central Asia (ECA) region of the World Bank's Education Global Practice*. Retrieved June 22, 2021, from https://documents1.worldbank.org/curated/en/783451590702592897/COVID-19-Impact-on-Tertiary-Education-in-Europe-and-Central-Asia.pdf

Balakrishnan, R., Singh, K., Harigopal, M., & Fineberg, S. (2020). A novel "google classroom"-based pathology education tool for trainees during the COVID-19 pandemic: Impactful learning while social distancing. *Archives of Pathology & Laboratory Medicine*, *144*(12), 1445b-1447. https://doi.org/10.5858/arpa.2020-0476-LE

Battin, M. P., Francis, L. P., Jacobson, J. A., & Smith, C. B. (2007). The patient as victim and vector: The challenge of infectious disease for bioethics. In R. Rhodes, L. P. Francis & A. Silvers (Eds.), *The Blackwell Guide to Medical Ethics* (pp. 269-288). Blackwell Publishing Ltd. https://doi.org/10.1002/9780470690932.ch15

Bell, D. M. (2004). Public Health Interventions and SARS Spread, 2003. *Emerging Infectious Diseases, 10*(11), 1900-1906. https://doi.org/10.3201/eid1011.040729

Benedek, A. (2007). Mobile learning and lifelong knowledge acquisition. In K. Nyiri (Ed.), *Mobile studies: Paradigms and perspectives*. *Communications in the 21st century* (pp. 35-44). Vienna: Passagen Verlag.

Berge, Z. L., Muilenburg, L. Y., & Crompton, H. (2013). In Z. L. Berge, & L. Muilenburg (Eds.), *Handbook of mobile learning*. Routledge. https://doi.org/10.4324/9780203118764

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *The Lancet* (British Edition), *395*(10227), 912-920. https://doi.org/10.1016/S0140-6736(20)30460-8

Burns, R. B., & Burns, R. A. (2008). *Business Research Methods and Statistics Using SPSS*. London: SAGE Publications Ltd.

Chakraborty, R., & Samuels, F. (2021, January). Impact of Covid-19 on adolescent mental health in Viet Nam and Tanzania: A rapid review. *ODI Working Paper 600*. Retrieved June 25, 2021, from https://cdn.odi.org/media/documents/odi-ec-impact-c19-mentalhealth-wp600-jan21-proof03.pdf

Chaturvedi, K., Vishwakarma, D. K., & Singh, N. (2021). COVID-19 and its impact on education, social life and mental health of students: A survey. *Children and Youth Services Review, 121*, 105855. https://doi.org/10.1016/j.childyouth.2020.105866

Chehimi, G. M., Hejase, A. J., & Hejase, N. H. (2019). An Assessment of Lebanese Companies' Motivators to Adopt CSR Strategies. *Open Journal of Business and Management, 7*, 1891-1925. https://doi.org/10.4236/ojbm.2019.74130

Clark, R. C., & Mayer, R. E. (2016). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning*. John Wiley & Sons, Inc.

CLICKS. (2020). *Rethinking Governance in Times of Uncertainty*. [Video]. Retrieved June 26, 2021, from https://www.youtube.com/watch?v=cPOP08G4nAU&feature=youtu.be

Clover, I. (2017, February 17). *Advantages And Disadvantages of eLearning*. Retrieved June 26, 2021, from https://elearningindustry.com/advantages-and-disadvantages-of-elearning

Coakes, S. J. (2013). *SPSS Version 20.0 for Windows: Analysis without Anguish*. Milton, Queensland: John Wiley & Sons Australia, Ltd.

Dang, T. L., & Nguyen, T. M. H. (2020). Liquidity risk and stock performance during the financial crisis. *Research in International Business and Finance*, *52*, 101-165. https://doi.org/10.1016/j.ribaf.2019.101165

Dubreil, S. (2020). Using games for language learning in the age of social distancing. *Foreign Language Annals, 53*(2), 250-259. https://doi.org/10.1111/flan.12465

Edvinsson, L., & Malone, M. (1997). *Intellectual Capital*. New York, NY: Harper Business.

El Dirani, A., Hejase, H. J., & Rkein, H. I. (2020). Remote Instruction or Instructing Remotely: Spring 2020 Educators' Experience. Scholarship of Tertiary Teaching: CQ University Australia Conference 2020. October 13-14, 2020. Retrieved June 23, 2021, from https://www.eventbrite.com.au/e/scholarship-of-tertiary-teaching-online-conference-registration-107516795630?aff=eml

El Zein, A., Akhras, C., Hejase, H. J., & Hajjar, D. (2021). Distance learning emergence as an outcome of Pandemic: Case Study for Lebanese Universities. *International Journal of Education and Research, 9*(4), 35-48.

Elo, S., & Helvi, K. (2008). The qualitative content analysis process. *Journal of Advanced Nursing, 62*(1), 107-115. https://doi.org/10.1111/j.1365-2648.2007.04569.x

Farhat, K. (2020, July 30). *Common Method Bias Using Harman's Single Test*. [Video]. You Tube. Retrieved June 21, 2021, from https://youtu.be/ulbZ-kYDvdY

Fatani, T. H. (2020). Student satisfaction with videoconferencing teaching quality during the COVID-19 pandemic. *BMC Medical Education, 20*(1), 396-396. https://doi.org/10.1186/s12909-020-02310-2

Field, A. (2005). *Discovering Statistics Using SPSS* (2nd ed.). London: SAGE Publications Ltd.

Gupta, S. (2017). *9 Benefits Of eLearning For Students*. Retrieved May 26, 2020, from https://elearningindustry.com/9-benefits-of-elearning-for-students

Guri-Rosenblit, S. (2005). Distance education and e-learning: Not the same thing. *Higher Education*, *49*(4), 467-493. https://doi.org/10.1007/s10734-004-0040-0.

Haave, H., & Vold, T. (2020). E-learning and online quizzing: Pedagogical effects of the corona crisis. *Guide No. 35. 19th European Conference on e-Learning ECEL 2020; Virtual Conference*, pp. 229-234. University of Applied Sciences HTW Berlin Germany, 28-30 October 2020. Retrieved June 24, 2021, from https://www.academic-conferences.org/wp-content/uploads/dlm_uploads/2020/11/000_ECEL-2020-abstract-booklet-original-with-cover.pdf

Hammarlund, C. S., Nilsson, M. H., & Gummesson, C. (2015, June). External and internal factors influencing self-directed online learning of physiotherapy undergraduate students in Sweden: a qualitative study. *Journal of Educational Evaluation for Health Professions, 12*, 33-38. https://doi.org/10.3352/jeehp.2015.12.33

Händel, M., Bedenlier, S., Gläser-Zikuda, M., Kammerl, R., Kopp, B., & Ziegler, A. (2020, July 1). *Do Students have the Means to Learn During the Coronavirus Pandemic? Student Demands for Distance Learning in a Suddenly Digital Landscape*. https://doi.org/10.31234/osf.io/5ngm9

Hejase, A. J., & Hejase, H. J. (2013). *Research Methods: A Practical Approach for Business Students* (2nd ed.). Philadelphia, PA, USA: Masadir Inc.

Hejase, H. J. (2020 Translator). *Coronavirus: Why You Must Act Now* (Pueyo, Tomas, 2020). Al Maaref University, Beirut, Lebanon. (AR). Retrieved June 21, 2021, from https://www.researchgate.net/publication/339900871_kwrwna_fyrws_lmadha_yjb_lyk_altsrf_alan_-_Coronavirus_Why_you_must_act_now_Translated_Article

Hejase, H. J., & Chehimi, G. M. (2020). E-Learning: What to Look for Amid the Pandemic. *Journal of Economics and Economic Education Research, 21*(1), 1-3. https://doi.org/10.13140/RG.2.2.17011.35369

Hejase, H. J., Haddad, Z., Hamdar, B., Al Ali, R., Hejase, A. J., & Beyrouti, N. (2014). Knowledge Sharing: Assessment of Factors Affecting Employee' Motivation and Behavior in the Lebanese Organizations. *Journal of Scientific Research & Reports, 3*(12), 1549-1593. https://doi.org/10.9734/JSRR/2014/8107

Hejase, H. J., Hejase, A. J., & Hejase, H. A. N. J. (2012). *Quantitative methods for decision makers: Management approach*. Beirut, Lebanon: Dar Sader Publishers.

Hejase, H. J., Hejase, A. J., Tabsh Assi, H., & Chalak, H. C. (2018, November). Intellectual Capital: An Exploratory Study from Lebanon. In book: *Advances in Business and Management* (pp. 1-66). Irvine, CA: Scientific Research Publishing, Inc., USA.

Houssari, N. (2020, February 29). Lebanon shuts schools after fourth coronavirus case. [Blog]. *Arab News.* Retrieved from https://www.arabnews.com/node/1634941/middle-east

Jakobsen, M., & Jensen, R. (2015). Common Method Bias in Public Management Studies. *International Public Management Journal, 18*(1), 3-30, https://doi.org/10.1080/10967494.2014.997906

Johns Hopkins University & Medicine. (2021, June 24). COVID-19 dashboard. *Johns Hopkins University & Medicine: Coronavirus Resource Center*. Retrieved June 24, 2021, from https://coronavirus.jhu.edu/map.html

Kebritchi, M., Lipschuetz, A., & Santiague, L. (2017). Issues and challenges for teaching successful online courses in higher education: A literature review. *Journal of Educational Technology Systems*, *46*(1), 4-29. https://doi.org/10.1177/0047239516661713

Keegan, D. (2002). The future of learning: From eLearning to mlearning. Hagen: FernUniversitä. *Series: ZIFF Papiere, 119*. Retrieved June 21, 2021, from https://www.worldcat.org/title/future-of-learning-from-elearning-to-mlearning/oclc/77086825?referer=di&ht=edition

Khan, H. (2005). *Managing e-learning: Design, delivery, implementation, and evaluation*. Idea Group Incorporation - IGI Global.

Khoury, A. H., Nasir Eddeen, L. M., Saadeh, D. S., & Harfoushi, O. K. (2011). E-learning: Justification and Obstacles. *International Journal of Emerging Technologies in Learning, 6*(3), 53-56.

Lee, J. (2020). Reflections Features Mental health effects of school closures during COVID-19. *The Lancet Child & Adolescent Health, 4*, 421, https://doi.org/10.1016/S2352-4642(20)30109-7

Lemoine, P. A., & Richardson, M. D. (2020). Planning for Higher Education Institutions: Chaos and the COVID-19 Pandemic. *Educational Planning, 27*(3), 43-57. Retrieved from https://files.eric.ed.gov/fulltext/EJ1279907.pdf

Maheshwari, G. (2021). Factors affecting students' intentions to undertake online learning: an empirical study in Vietnam. *Educ Inf Technol*. https://doi.org/10.1007/s10639-021-10465-8

Malhotra, N. (2004). *Marketing Research: An Applied Orientation* (4th ed.). New Jersey: Prentice Hall.

Mouchantaf, M. (2020). The COVID-19 pandemic: Challenges faced and lessons learned regarding distance learning in Lebanese higher education institutions. *Theory and Practice in Language Studies, 10*(10), 1259-1266. https://doi.org/10.17507/tpls.1010.11

Najim, M. (2020, August 13). Why E-learning is Not Working in Lebanon? [Blog]. *Hogwarts of Engineers*. Retrieved June 26, 2021, from https://hogwartsofengineers.com/index.php/2020/08/13/why-e-learning-is-not-working-in-lebanon/

Nakhoul, S., & Perry, T. (2019, October 24). Reeling from protests, what's next for Lebanon. [Blog]. *Reuters*. Retrieved June 23, 2021, from https://www.reuters.com/article/us-lebanon-protests-scenarios/reeling-from-protests-whats-next-for-lebanon-idUSKBN1X3272

Ordoñez, P. (2003). Intellectual Capital Reporting in Spain: a Comparative View. *Journal of Intellectual Capital, 4*, 61-81. https://doi.org/10.1108/14691930310455397

Pueyo, T. (2020, March 10). *Coronavirus: Why You Must Act Now. Politicians, Community Leaders and Business Leaders: What Should You Do and When?*. Retrieved June 21, 2021, from https://medium.com/@tomaspueyo/coronavirus-act-today-or-people-will-die-f4d3d9cd99ca

Rkein, H. I., Hejase, H. J., & El Dirani, A. (2020). Innovative Assessments for Quality Learning Experience. *Scholarship of Tertiary Teaching: CQ University Australia Conference 2020*. October 13-14, 2020. Retrieved June 23, 2021, from https://www.eventbrite.com.au/e/scholarship-of-tertiary-teaching-online-conference-registration-107516795630?aff=eml

Ruiz, J. G., Mintzer, M. J., & Leipzig, R. M. (2006). The impact of E-learning in medical education. *Academic Medicine, 81*(3), 207-212. https://doi.org/10.1097/00001888-200603000-00002

Rusu, M. (2020). Social distancing in the context of the COVID-19 pandemic. *International Conference KBO, 26*(2), 333-341. https://doi.org/10.2478/kbo-2020-0100

Seleim, A., Ashour, A., & Bontis, N. (2004). Intellectual Capital in Egyptian Software Firms. *The Learning Organization, 11*, 332-346. http://dx.doi.org/10.1108/09696470410538233

Shmis, T., Sava, A., Teixeira, J. E. N., & Patrinos, H. A. (2020, May). Response to COVID-19 in Europe and Central Asia: Policy and Practice Recommendations. *Europe and Central Asia Education & the World Bank Group*. Retrieved June 22, 2021, from https://thedocs.worldbank.org/en/doc/862141592835804882-0090022020/original/ECAEducationResponseNotev9final.pdf

Soete, L. (2021, April). How Covid-19 Could Trigger Organisational Innovation in Education. *Ann Soc Sci Manage Stud, 6*(3), 001-004. https://doi.org/10.19080/ASM.2021.06.555687

Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly, XXI*(4), 360-407. Retrieved June 25, 2021, from https://www.psychologytoday.com/files/u81/Stanovich__1986_.pdf

Surma, T., & Kirschner, P. A. (2020). Virtual special issue computers in human behavior technology enhanced distance learning should not forget how learning happens. *Computers in Human Behavior*, *110*, 106390-106390. https://doi.org/10.1016/j.chb.2020.106390

Tahtali, Y. (2019). Use of factor scores in multiple regression analysis for estimation of body weight by certain body measurements in Romanov Lambs. *PeerJ., 7*, e7434. https://doi.org/10.7717/peerj.7434

Tamm, S. (2019, March 21). *Disadvantages of E-Learning*. Retrieved June 25, 2020, from https://e-student.org/disadvantages-of-e-learning/

The Arab NGO Network for Development-ANND. (2019, November 21). *2019 Lebanese Revolution: Wicked Politics and Shaken Socio-Economy* [Blog]. Retrieved June 25, 2021, from https://www.annd.org/data/file/files/ANND_News%20bulletin_Lebanese%20Revolution.pdf

Tinsley, H., & Brown, S. (Eds.) (2000). *Handbook of applied multivariate statistics and mathematical modeling* (1st ed.). New York, NY: Academic Press.

Traxler, J. (2011). Introduction. In J. Traxler & J. Wishart (Eds.), *Making mobile learning work: Case studies of practice* (pp. 4-12). Bristol, UK: ESCalate Education Subject Centre: advanced learning and teaching in education.

UNESCO. (2020a, July 24). *UNESCO explores "Online Teaching and Learning" during the Lebanese Internet Governance Forum*. Retrieved June 21, 2021, from https://en.unesco.org/news/unesco-explores-online-teaching-and-learning-during-lebanese-internet-governance-forum

UNESCO. (2021a, June 25). School Closures. *UNESCO Institute for Statistics Data*. Retrieved June 25, 2021, from https://en.unesco.org/covid19/educationresponse#schoolclosures

UNESCO. (2021b). Global tracking of COVID-19 caused school closures and re-opening. *UNESCO: Education Sector. Methodological note*. Retrieved June 25, 2021, from https://en.unesco.org/sites/default/files/en_methogological_note_-_unesco_map_on_covid-19_caused_school_closures_reopening_final.pdf

UNESCO. (2021c, June 11). *Distance and digital learning during COVID-19 crisis: UNESCO Literacy Prizes laureates share their experiences*. Retrieved June 26, 2021, from https://en.unesco.org/news/distance-and-digital-learning-during-covid-19-crisis-unesco-literacy-prizes-laureates-share

Ward, J. (2020, September 20). The Matthew Effect and Why Reading is Crucial for Children: Reading should start as young as possible. [Blog]. *Medium*. Retrieved June 25, 2021, from https://medium.com/illumination-curated/the-matthew-effect-and-why-reading-is-crucial-for-children-b2454b22651b

Wazzan, M. (2020, April 2). Learning Remotely as the Only Resort: How is Lebanon Doing? [Blog]. *Al-Fanar Media*. Retrieved June 22, 2021, from https://www.al-fanarmedia.org/2020/04/learning-remotely-as-the-only-resort-how-is-lebanon-doing

World Health Organization -WHO. (2020, January 21). *Novel Coronavirus (2019-nCoV): Situation Report 1*. Retrieved June 25, 2021, from https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200121-sitrep-1-2019-ncov.pdf

Xiao, C., & Li, Y. (2020). Analysis on the Influence of the Epidemic on the Education in China. *2020 International Conference on Big Data and Informatization Education (ICBDIE)*, 2020, pp. 143-147. https://doi.org/10.1109/ICBDIE50010.2020.00040

Zhang, P., & Goel, L. (2011). Is E-Learning for Everyone? An Internal-External Framework of E-Learning Initiatives. *MERLOT Journal of Online Learning and Teaching, 7*(2), 193-205.