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# Determinant Factors of Teaching Performance in COVID-19 Context

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**Abstract:** COVID-19 pandemic still impact higher education system, stakeholders and environment all around the world. Students, teachers, academic institutions and education decision makers were shocked by an atypical new context they promptly put in face, asking drastic change in behavior and procedures at individual, familial and institutional levels. Full lockdown and closing campuses enforced students and teachers staying and sticking home, fronting unusual domestic for work atmosphere and unacquainted online learning and teaching technologies. Consequent back to classroom framework also imposes new sanitary and social distancing conditions leading to new teaching and learning habits that affected in many ways the performance of teaching. The aim of this paper is to apprehend all the challenges that may arise in similar critical situations to make convenient decisions helping to avoid the education system shutdown or to benefit from the previous experience to adapt future behaviors and perform tools and practices. For such purpose, the present paper reviews all the determinant factors of the teaching performance in both alternative online and classroom modes of dispensing courses in the COVID-19 Lebanese context, using Partial Least Squares Structural Equation Modeling approach (PLS-SEM). It appears that all manifest variables corresponding to latent variables have a reflective measurement model. After the convergence of the algorithm of Partial Least Square (PLS), the structural path significance test of both inner and outer model is verified by a bootstrap procedure with 1000 subsamples.

**Keywords:** COVID-19 Impact, Online and Classroom Teaching Performance, Partial Least Squares - Structural Equation Modeling, Bootstrap, Goodness of Fit

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## 1. Introduction

Pandemics are still threatening the world population with various types and mutants; the latest variant of COVID is the XBB 1.5. COVID-19 pandemic was a shocking incident all the world urgently faced and tried to adapt. The education was one of sectors that has been mostly affected, because of the contamination risk due to mass of people daily sitting closely for hours in classrooms and living together for months in closed areas. Studies focused on the description of behavioral change of students and teachers in facing the social, education and technical consequences of the social distancing and

closures measures. Learning activities accomplished via live video and audio conferencing, with real-time feedback.

Writings around COVID-19 have the form of reports, factual studies, or surveys' findings presentations. They discussed the effect of COVID-19 on education, the prevailing challenges and acclimation capability of stakeholders, the resilience of the education sector, and the consequent technological advancement put at the services of education. Many specialized national and international organisms, governmental and nongovernmental institutions published reports displaying recommendations and information regarding the deployed efforts at individual and institutional

levels to overlap the generated difficulties by the COVID context.

The international organization UN [14] expected that COVID-19 has affected nearly 1.6 billion learners in more than 190 countries in all continents. Schools' closures have influenced 94 per cent of the world's student population, up to 99 per cent in low and lower-middle income countries. The UNESCO in 2020 [26] observed in 138 countries that 1.37 billion students were affected by school and university closures, and nearly 60.2 million teachers were no longer in the classroom. A common report published in 2021 by the UNESCO, UNICEF and World Bank [27] disclosed information on school closures and the educational response to COVID-19 in MENA countries. They estimated the potential learning loss, advanced series of recommendations for policy and programmed to ensure children's safe return to school, equitable access to remote learning, and opportunities for remedial learning.

Gallagher-Mackay *et al.* [12] administrated a survey for the International Labor Organization (ILO), and found that the impact of COVID on young people is systemic, deep and disproportionate, mainly hard on young women, younger youth and youth in lower-income countries. Schleicher A. *et al.* [22] reported for OCDE countries and mentioned that the economic consequences of COVID-19 have hit hardest the most vulnerable, notably in education. They released many inadequacies and inequities in education systems, related to the broadband and computers access needed for online education, and the supportive environments needed to focus on learning. In addition, Marinoni G. *et al.* [16], working on behalf the International Association of Universities, found that the shift from face-to-face to distance teaching relieved in the same time challenges and opportunities, the first are mainly related to access to the technical infrastructure, competences and pedagogies for distance learning, the seconds concern flexible learning possibilities, hybrid learning and the mix of synchronous with asynchronous learning.

The office for civil right in USA [15] reported that even if educators, staff, and school leaders at all educational levels have made extraordinary commitments and dedicated their talents, energy, and resources to address the needs of students, still COVID-19's consequences had fallen unevenly and shown deepening disparities in educational opportunity and achievement. Osman A. and Keevy J. [17], charged by the Commonwealth Secretariat, reviewed 11 papers aiming to explore the impact of COVID-19 on the educational opportunities afforded to the most disadvantaged and marginalized groups, on gender equity and equality in education, and on youth workers.

From its part, the Edge Foundation [6] marked that the disruption caused by the coronavirus pandemic is likely to have an impact on students' decisions relating to employment and higher education and has the potential to widen the inequalities that exist when young people leave compulsory education. Greater integration of digital techniques and delivery is needed to enrich the existing education system and increase access. Moreover, Ed Tech Hub and e-Learning

Africa [7], surveying 52 African countries, highlighted three main obstacles for learners in the midst of school shutdown: a lack of access to technology, an unsuitable home learning environment, and a lack of access to learning materials. The main obstacle for teachers was the lack of appropriate training to design and manage distance learning programs, added to a lack of infrastructure (electricity, connectivity, devices) and appropriate learning materials (books, television and internet-enabled devices). Recio S. G. and Colella C. [20] reporting to YERUN (Young European Research Universities, urged academic institutions to rapidly turn to online formats and methods, namely that many challenges face online teaching due to equity concerns, accessibility issues, work and balance worries, mental health matters, exam evaluation complications, communication and mentoring problems, and physical attendance problems for disciplines requiring physical meetings.

Tarkar P. [24] notes that social distancing and lockdown disrupt the whole education system. Policymakers, students, teachers and parents face many problems with the change from offline to online. Mc Kinzey and Co. [5] find that students learning loss during school closures varies significantly regarding the access to remote learning, the quality of remote instruction, the home support, and the degree of engagement. Zancajo A. [31] reviews the available literature in Scopus on the impact of the COVID-19 pandemic on education, and remark that a substantial part is dedicated to analyze how the pandemic has impacted students' learning outcomes in the short-term, how this impact can increase educational inequalities or the attainment gap between social groups, how students, teachers, families, schools and universities have dealt with the unexpected situation, as well as how socioeconomic inequalities have mediated their responses. Ribeh *et al.* [21] mention that most of the research tends to focus on improving effectiveness of distance learning implementation and on students' perspectives. Harry A., Patrinos E. and Vegas R. [19], based on the available evidence and empirical findings during the first two years of the pandemic, confirm that the decline in student knowledge and skills is real and significant.

Bashir A. *et al.* [1] reveal that a majority of Aston University's Bioscience students reported positive experiences of online open-book assessments. Hybrid course delivery could offer a solution to ensure students receive hands-on laboratory experience and face-to-face contact to remain motivated and benefit from the on-campus facilities and support, and allows students some of the flexibility afforded by remote study. Yang J. *et al.* [30] also highlighted some positive impact of pandemic on education, students, teachers, researchers and nonteaching staffs of school, colleges and universities, and listed number of positive impacts of COVID-19 on online education development, environment, human life, business etc. Similarly, Chan R. Y. *et al.* [2] provide issues making the online and distance education a leveraged to facilitate student mobility, and discuss the nature and effectiveness of innovative forms of online teaching, learning, and assessment adopted during and

after the pandemic. Spunei, E. et al. [23] mention that the various digital skills acquired during online teaching activities will be useful to students in their professional work, being in line with the trend of increasing technology and adaptation to the careers of the future.

Gallagher-Mackay K., Srivastava P., Underwood K., et al. [18] note that international and local evidences suggest that school closures affect children's academic achievement and lead to significant and unequally distributed learning losses, mainly due to the duration of closures. Ejdy, J., [8] find that satisfaction, personal development and attitude toward e-learning had a significant positive impact on intention to use e-learning methods in the future to benefit from time saving and greater control over learning process. Parker et al. [18] mentioned that school closures, interruption of classes and the cancelation or postponement of assessments and examinations have all had detrimental consequences for children's academic development.

Crawford, J. and Cifuentes-Faura, J. [3] note that the rapid move toward online and digital curricula have led to declines in student and staff wellbeing. From their part, Fülöp, T. M. et al. [10] observe several discontents and personal discomfort for teachers in adapting to new technologies. Fülöp, T. M. et al. [11] link e-learning satisfaction to academic success of Romanian students who used e-learning during the pandemic. They found that external factors do not influence perceived usefulness. Accordingly, students consider that the perceived ease of use does not influence the behavior intention to use new technologies.

## 2. Problematic and Hypotheses

In the same alignment of the of the reviewed literature, the present paper aims to understand what happens and how was the response of teachers to the consequences of COVID-19 pandemic, by describing the change in teachers' behavior allowing to assure the sustainability of the Lebanese teaching system. It targets also to disclose the challenges facing the educators during the pandemic and the powerful factors allowing to deal flexibly to surpass the bottleneck.

For such object, the current research work commissions all

teaching behavioral and practical aspects relieved in the literature, and assesses the impact of each of online or offline mode on teaching performance, taking into consideration Lebanese educative, socioeconomic and technical background as the psychosocial environment in which teachers achieve their mission in COVID context. Teaching performance is intended here to define the state by which teachers deliver courses in the best academic, technical and psychosocial conditions allowing them to dispense full program and assure full students assimilation of delivered information.

Based on the teachers' perceptions on what they experienced at academic, technical and psychosocial level with their students during the pandemic period, the present work tries to identify determinant factors of teaching performance with both teaching modes. By screening opinions regarding teaching behavior and conditions during COVID-19 period it was possible to assess challenges and potentials suiting online and classroom modes and impacting teaching performance during such critical circumstances.

For that purpose, the study supports the following hypotheses regarding teaching performance during COVID-19 chaotic situation:

H1: Advantages of online teaching mode surpass disadvantages during COVID-19.

H2: Disadvantages of classroom teaching mode surpass advantages during COVID-19.

H3: Online teaching mode has greater impact on teaching performance than classroom mode during COVID-19.

H4: Socioeconomic and socio-psychological conditions environing COVID-19 impact teaching performance more than technical issues of online and offline teaching modes.

H5: Teachers' experience and background has a little impact on teaching performance during COVID-19.

## 3. Experiment Study

In order to treat this research problem, confirm or unfirms the associated hypotheses, an online survey is conducted and a model is developed according the flowchart shown in the "Figure 1".

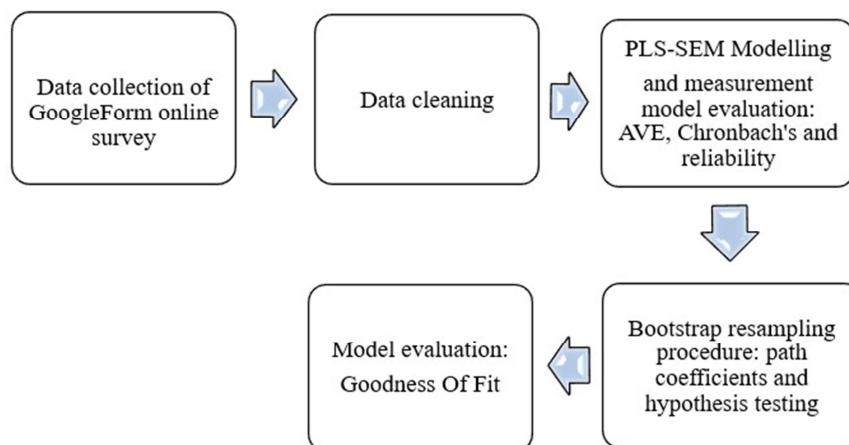


Figure 1. Flowchart of the experimental study.

The flowchart subsequent steps are used to apprehend the determinant factors of online and classroom teaching performance, and to highlight on the favored education system allowing to assure teaching performance during prevailing crisis such as COVID-19 pandemic.

### 3.1. Survey

A questionnaire is launched on “Google Form” application on March 25, 2022, to which a sample of 142 teachers, from all Lebanese private and public universities, anonymously responded. In this manner, a random sampling method of data collection is assured through which survey responses were automatically collected and extracted from “Google Form” into an Excel file. All questionnaire items were measured using a ten-point Likert scale, ranging from “strongly disagree” to “strongly agree”.

The questionnaire is decomposed in four main parts. The first part asks about information related to teachers’ identity, type of delivered courses (lectures, tutorials, laboratory, on field), educational institution, teaching language, teaching mode during COVID-19, and the familiarity with digital, IT, communication and social media tools. The second part focuses on the teachers’ perception regarding advantageous and challenging factors of online and classroom teaching during COVID-19. Online advantages are resumed in terms of teaching effectiveness. Online challenges concern academic, technical and psychosocial issues. Favorable factors of offline education are due to the

control of students’ engagement, assiduity, accountability, and teachers’ rights. The third part of the questionnaire addresses teachers’ perception on teaching performance with online and classroom modes. The benefic impact of online courses appears through the increase of teachers’ awareness, productivity and the use of innovative teaching methods. The questionnaire is ended by a separate panel of questions addressed to teachers to express their clear preferences regarding the best teaching mode (online, classroom, combination) during and after COVID19 period, and the measures that could be adopted to improve online classrooms teaching performance.

### 3.2. Material and Method

Collected responses are reviewed and cleaned. Only information from complete and coherent questionnaires are retained and treated with respect to modeling. The displayed model is based on the Partial Least Squares Path Modeling approach (PLS-SEM), that allows to model complex relationships between observed variables, known as manifests, and latent variables (Croutsche,[4]). The Smart PLS package version 4 is consequently engaged (Hair et al., [13]) to illustrate the hierarchical model and validate the results. A global Goodness-of-Fit (GoF) (Tenenhaus et al., [25]) tests the quality of the model. All manifest variables to the corresponding latent variables have a reflective measurement model. This scheme indicates the existence, rather than the direction, of the relationships among latent variables.

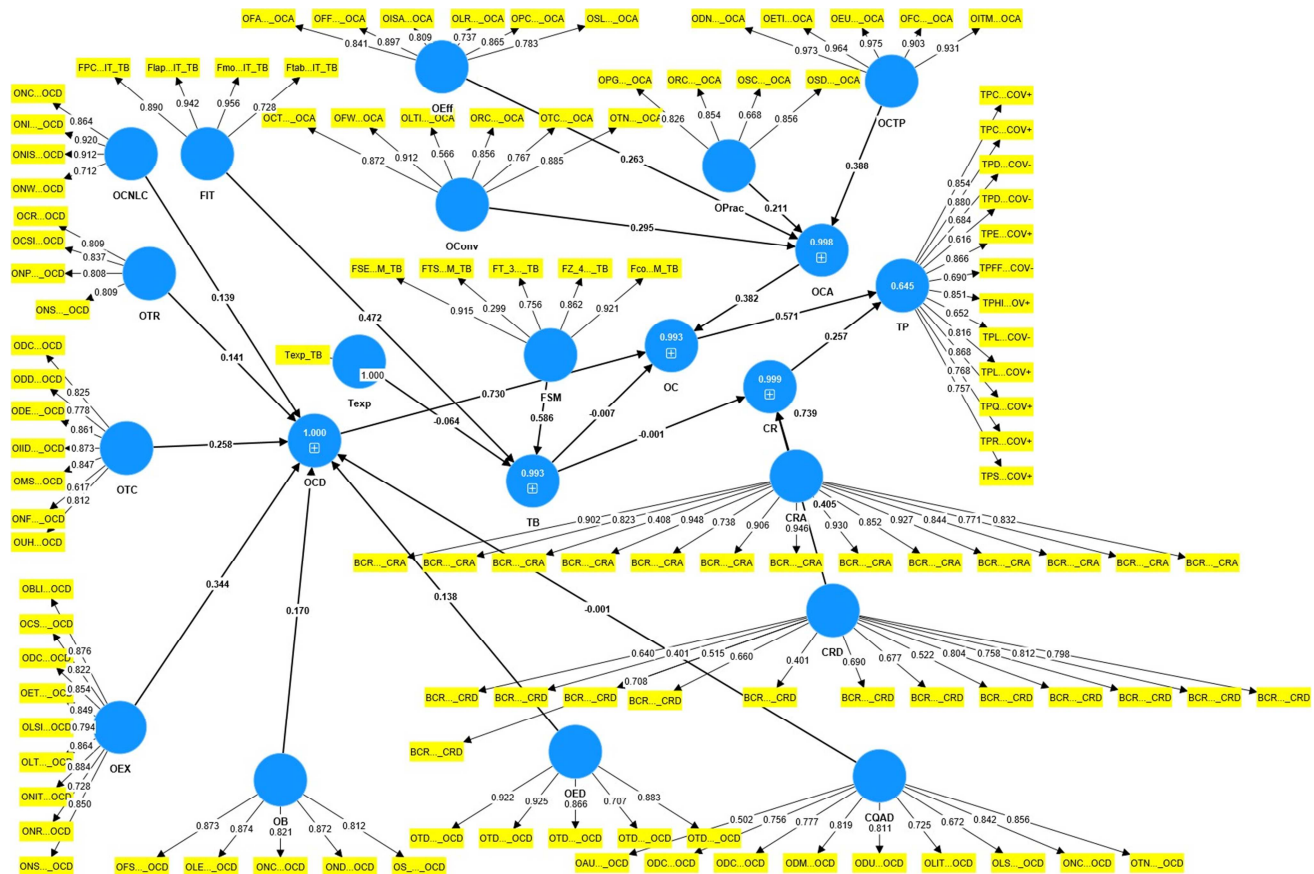


Figure 2. Original Path Diagram.



### 3.3. PLS-SEM Results and Discussion

Among numerous tentative to fix the convenient model stylizing all related considerations to teaching during COVID-19 period, only three versions of the modelling approach are here displayed, the first one represents the original model, on which two subsequent modifications are held to assure higher technical records.

As shown in “Figure 2”, the first jet of the constructed model represents separately the teachers background (TB) impact on both the online and classroom courses (OC and CR) which each, influenced also by two separated components representative of its determinants advantageous (OCA and CRA) and disadvantageous (OCD and CRD) factors, affects from its side the teaching performance. In other terms, the teaching performance is shown to be affected by the online and classroom courses (OC and CR), which each in its turn is affected by its advantageous (OCA and CRA) and disadvantageous (OCD and CRD) and the teachers background determinants factors. A list of abbreviation characteristics is presented in the Table 4 (Appendix).

After the convergence of the algorithm of PLS, the structural path significance testing of both inner and outer model is verified by a bootstrap procedure with 1000 subsamples. In order to improve the quality of the model, weakened and negligible factors are eliminated. The results

showed in “Figure 3” that the factors « Teacher’s Background (TB) », « Teacher’s experience (Texp: 0.064) » and « Online Course Quality Assurance Disadvantages (OCQAD: -0.001) » have to be removed from the model. In fact, it appears that, disregarding the effective validity of its components, teachers background (TB) represents a skinny negative influence on both of online (-0.007) and classroom (-0.001) mode of teaching. Teaching experience and familiarity with IT and communication tools seems have a negligible, even negative, impact on the online and classroom teaching processes. Teachers’ years of experience don’t constitute at all valuable added value nor notable weakness (-0.064) for the teachers’ background in the COVID-19 context of teaching. Moreover, quality assurance matters don’t have real count among online disadvantageous factors (-0.001). It seems that in such a troubled period, teachers haven’t allowed attention to issues like difficulty to meet standards of teaching, mainly because of the administrations of universities were closed during COVID19 period, the difficulty to control quality assurance requirements, to control exams and quiz cheatings, to assess the reliability of students excuses of not attending classes, to use books for course support, in addition to the lack of self-discipline to deliver the course, lack of personal computer skills for online teaching, or to the fact that online courses tend to focus on theory rather than practice.

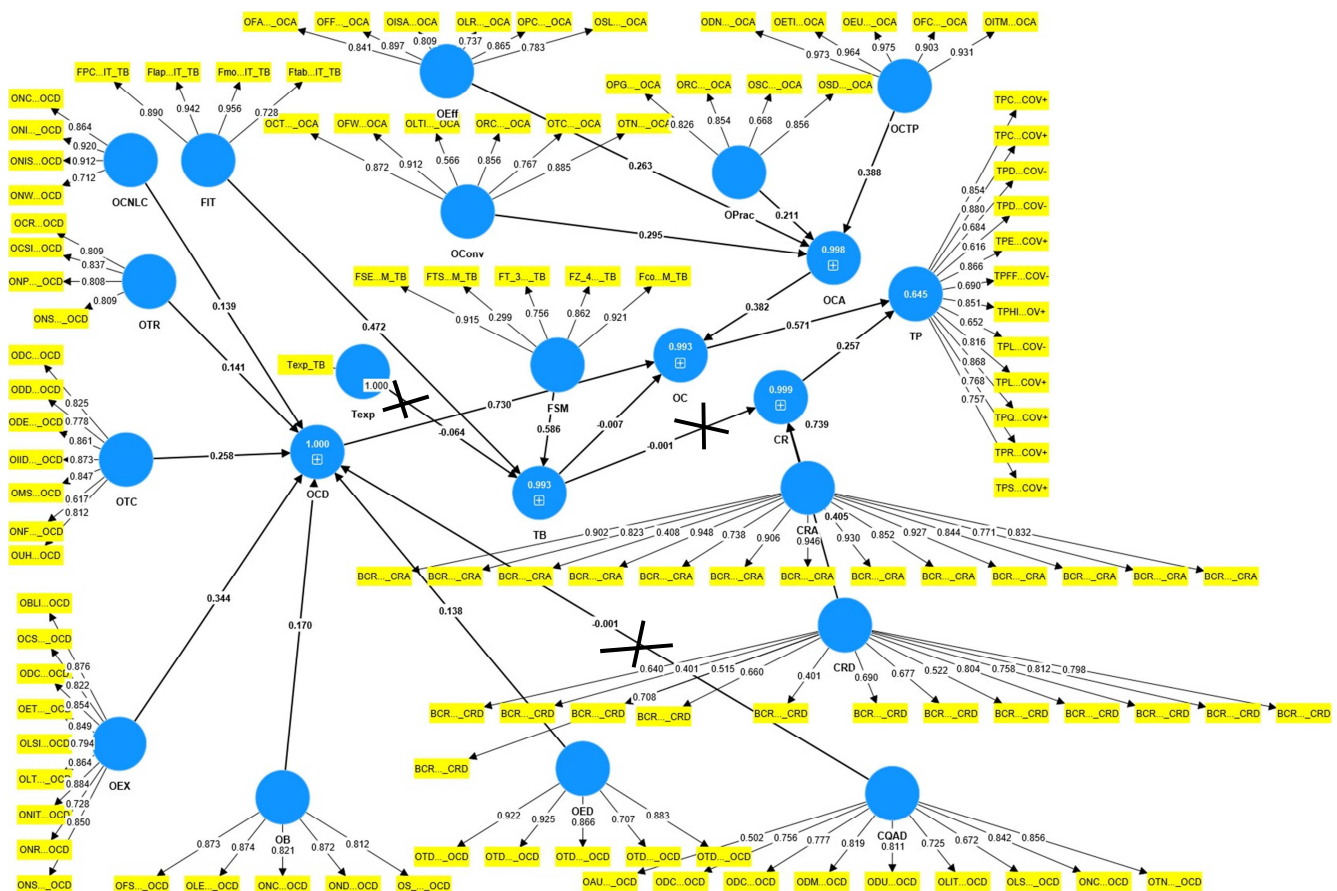


Figure 3. Path Diagram with bootstrap procedure.

After applying these modifications and using the algorithm PLS-SEM by SmartPLS software [version 4.0.8.7], the final model may be dressed as follows as shown in “Figure 4”:

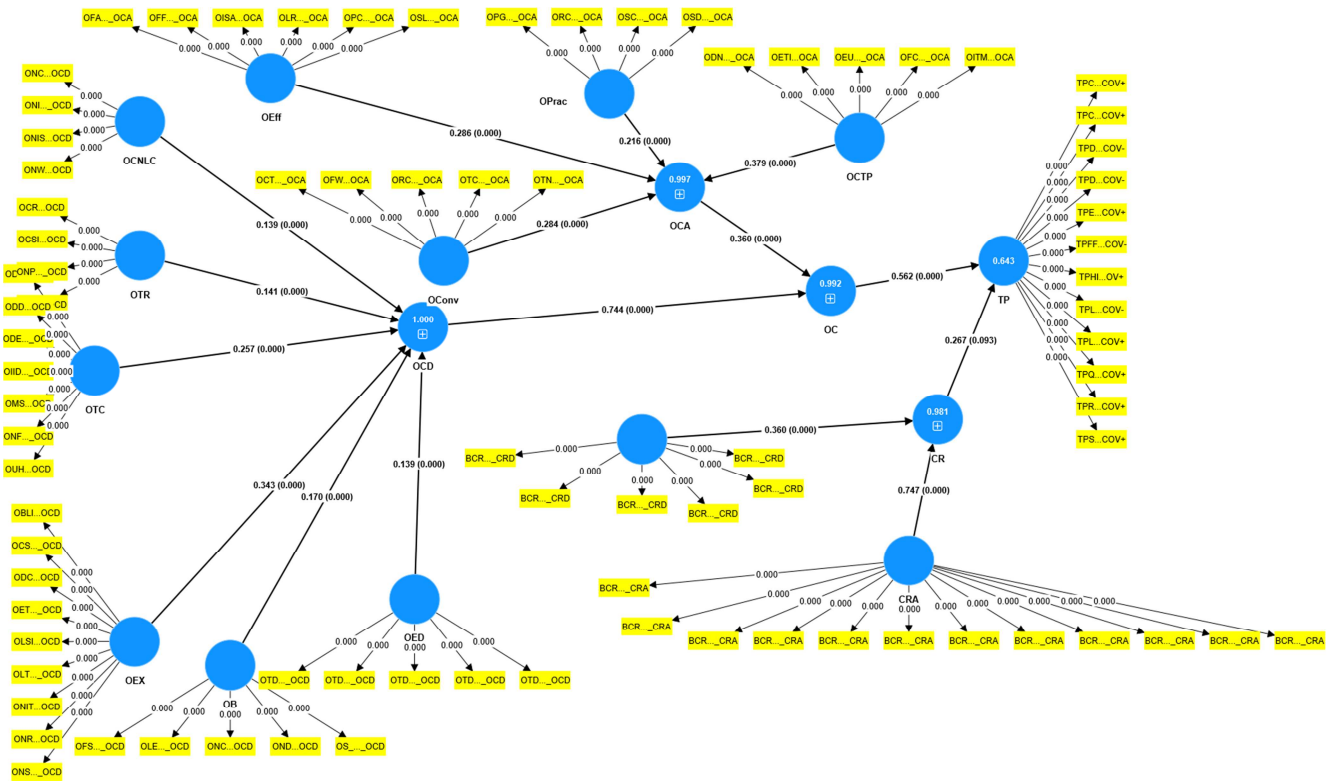


Figure 4. Final Path Diagram.

The composite reliability and Cronbach's alpha, represented in Table 1, are greater than 0.7 for all latent variables (Fornell & Larcker, [9]) The AVE is either borderline or slightly above the threshold, except for OC. The coefficient of determination (R<sup>2</sup>) of the endogenous constructs is here 0.643, significantly

higher than 0.24 (Vinzi et al., [28]), letting say that online and classroom teaching explain 64% of the variance of teaching performance. The GoF of the model (Tenenhaus et al., [25]) is equal to 0.671, which is significantly above the good quality model threshold of 0.36 (Wetzels et al., [29]).

Table 1. Quality measures for PLS-SEM model.

| Latent Variables | Cronbach's alpha | Composite reliability (rho_a) | Composite reliability (rho_c) | Average variance extracted (AVE) | R-square | Communality | Redundancy |
|------------------|------------------|-------------------------------|-------------------------------|----------------------------------|----------|-------------|------------|
| CR               | 0.941            | 0.963                         | 0.944                         | 0.423                            | 0.981    | 0.423       | 0.414963   |
| OC               | 0.975            | 0.978                         | 0.976                         | 0.396                            | 0.992    | 0.396       | 0.392832   |
| OCA              | 0.956            | 0.964                         | 0.960                         | 0.522                            | 0.997    | 0.522       | 0.520434   |
| OCD              | 0.967            | 0.969                         | 0.969                         | 0.484                            | 1.000    | 0.484       | 0.484      |
| TP               | 0.940            | 0.943                         | 0.949                         | 0.609                            | 0.643    | 0.609       | 0.410234   |
| CRA              | 0.971            | 0.973                         | 0.974                         | 0.760                            | 0.9226   | 0.49        | Avg        |
| CRD              | 0.896            | 0.918                         | 0.924                         | 0.678                            |          | 0.671       | GoF        |
| OB               | 0.904            | 0.908                         | 0.929                         | 0.724                            |          |             |            |
| OCNLC            | 0.874            | 0.881                         | 0.916                         | 0.733                            |          |             |            |
| OCTP             | 0.973            | 0.973                         | 0.979                         | 0.902                            |          |             |            |
| OConv            | 0.917            | 0.920                         | 0.939                         | 0.757                            |          |             |            |
| OED              | 0.914            | 0.923                         | 0.936                         | 0.747                            |          |             |            |
| OEX              | 0.946            | 0.947                         | 0.954                         | 0.700                            |          |             |            |
| OEff             | 0.905            | 0.914                         | 0.927                         | 0.679                            |          |             |            |
| OPrac            | 0.817            | 0.836                         | 0.879                         | 0.648                            |          |             |            |
| OTC              | 0.908            | 0.911                         | 0.928                         | 0.649                            |          |             |            |
| OTR              | 0.832            | 0.833                         | 0.888                         | 0.665                            |          |             |            |

The correlations between the latent variables are given in Table 2, where an important correlation between «OR», «OC»,

«OCD» and «TP» is shown.

**Table 2.** Correlations between endogenous latent variables.

| Correlation | CR    | OC    | OCA   | OCD   | TP |
|-------------|-------|-------|-------|-------|----|
| CR          | 1     |       |       |       |    |
| OC          | 0.853 | 1     |       |       |    |
| OCA         | 0.661 | 0.789 | 1     |       |    |
| OCD         | 0.823 | 0.952 | 0.576 | 1     |    |
| TP          | 0.746 | 0.790 | 0.659 | 0.724 | 1  |

Bootstrap with resampling of 1000 repeated subsamples is also carried out as part of the scrutiny process in Table 3. Only the relation between classroom teaching CR was a weak significant predictor of on teaching performance (TP) during the pandemic (tvalue = 1.679; p-value = 0.093). However, all other construct had a strong effect and relationship, their p-values were below 0.005 threshold.

**Table 3.** Summary of hypothesis testing.

| Hypothesis   | Original sample | mean (M) | Standard deviation | T test | P values |
|--------------|-----------------|----------|--------------------|--------|----------|
| CR -> TP     | 0.267           | 0.248    | 0.159              | 1.679  | 0.093    |
| CRA -> CR    | 0.747           | 0.747    | 0.042              | 17.902 | 0.000    |
| CRD -> CR    | 0.360           | 0.358    | 0.032              | 11.323 | 0.000    |
| OB -> OCD    | 0.170           | 0.169    | 0.011              | 15.303 | 0.000    |
| OC -> TP     | 0.562           | 0.585    | 0.157              | 3.580  | 0.000    |
| OCA -> OC    | 0.360           | 0.359    | 0.035              | 10.350 | 0.000    |
| OCD -> OC    | 0.744           | 0.743    | 0.040              | 18.420 | 0.000    |
| OCNLC -> OCD | 0.139           | 0.138    | 0.011              | 12.969 | 0.000    |
| OCTP -> OCA  | 0.379           | 0.379    | 0.025              | 15.161 | 0.000    |
| OConv -> OCA | 0.284           | 0.283    | 0.019              | 14.808 | 0.000    |
| OED -> OCD   | 0.139           | 0.137    | 0.018              | 7.655  | 0.000    |
| OEX -> OCD   | 0.343           | 0.343    | 0.017              | 19.777 | 0.000    |
| OEff -> OCA  | 0.286           | 0.285    | 0.029              | 10.006 | 0.000    |
| OPrac -> OCA | 0.216           | 0.217    | 0.015              | 14.263 | 0.000    |
| OTC -> OCD   | 0.257           | 0.257    | 0.018              | 14.465 | 0.000    |
| OTR -> OCD   | 0.141           | 0.141    | 0.009              | 16.303 | 0.000    |

\*Note: p-value was considered significant at the 0.05 level.

Consequently, this study supported all hypotheses with significant t-tests at a 10% risk.

Accordingly, the main equations sorted out by the model are presented as follows:

$$OC = 0.744_{(0.000)}OCD + 0.36_{(0.000)}OCA \quad (1)$$

$$CR = 0.36_{(0.000)}CRD + 0.747_{(0.000)}CRA \quad (2)$$

$$OCD = 0.139_{(0.000)}OCNLC + 0.141_{(0.000)}OTR + 0.257_{(0.000)}OCT + 0.343_{(0.000)}OEX + 0.17_{(0.000)}OB + 0.139_{(0.000)}OED \quad (3)$$

$$OCA = 0.216_{(0.000)}OPrac + 0.379_{(0.000)}OCTP + 0.284_{(0.000)}OConv + 0.286_{(0.000)}OEff \quad (4)$$

The causality scheme (figure 4) shoes that teaching performance is explained by two latent variables, OC and CR, with a risk of 10%, as expressed in the following equation:

$$TP = 0.562_{(0.000)}OC + 0.267_{(0.093)}CR \quad (5)$$

Thus, the inner model suggests that, in COVID-19 circumstances, online course OC (0.562) has the strongest effect on teaching performance (TP), followed by classroom teaching CR (0.267). It appears that online teaching turned out to be such an important factor for teaching performance than the classroom. Moreover, while online courses are greater affected by disadvantageous (OCD: 0.744) than advantageous (OCA: 0.36) factors, classroom mode of teaching in COVID-19 context is more influenced by advantageous (CRD: 0.747) than disadvantageous (CRD: 0.36) factors. Disadvantageous factors of online courses have similar impact

of advantageous factors of classroom mode of education (OCD: 0.744, CRA: 0.747), and vis-versa (OCA: 0.36, CRD: 0.36). Finally, it seems that even if online (0.562) has greater effect than classroom mode (0.267), both of two teaching modes have moderate positive effect on teaching performance in COVID-19 context. The important positive effect of disadvantageous factors on online courses (OCD: 0.744) is due to the slight impact of its negative components, showing that teachers surpassed the difficulties of online teaching. It seems that teachers were easily adapted to their promptly changing environment. They adopted controlled behavior and auto fitted themselves to new strict rules they fixed for themselves in order to reduce distracting circumstances of working at home (OED: 0.139), like social media, texting, visitors and family members, phone calls, wifi disconnections. They succeeded also to acclimatize with online prevailing boring context (OB: 0.170) due to the narrative nature of courses, the lack of on-board presentation, lack of enthusiasm and motivation to make online classes, the stressful conditions of being bounded in houseroom, with no space for distraction topics and issues, and addressing fictive students behind screens. Teachers overpassed as well comprehensively technical challenges of online courses (OTC: 0.257) due to the absence of faculty structure and support, and to logistics and technological issues of online teaching mode, like the big deal to choose right technology and apps, the difficulty to draw graphics on the spot, to support long screen-time, to face course interruption by internet disconnection and electricity shortage, and to the fact that online courses are totally unsuitable for hands-on-fields. Moreover, it appears that teachers assumed very well the



increased responsibility associated to online courses (OTR: 0.141) and related to safety, security and privacy, mainly for sharing publicly teachers and students' names, and eventually critical information, and due to courses recording. Teachers seem also having maintained comprehensive relationship with students through online platforms (OCNLC: 0.139), in contrast with what was argued in the literature that generally in online courses teacher doesn't lead the class, because of there is no possibility to control students' attention, interaction and assiduity, due to the absence of interaction with students, the absence of interaction in group lessons, in addition to the lack of the warmth of face-to-face interaction. However, teachers felt somehow exhausted by online courses delivery (OEX: 0.343) because of not having a rest time in class, lack of interaction time space with students, continuously speaking all along the class period, difficulty to keep classes for longer duration, impossibility to observe face to face students feedback, lack of interest and involvement the students show during online classes, which require also a bigger load of information to fill the class time, a larger time to prepare comprehensive courses, then a need for extra time self-investment. In the same time, online courses are slightly impacted by advantageous factors (OCA: 0.36) because of the lack effect of their components. In fact, teachers haven't remarked great online effectiveness (OEFF: 0.286) allowing students to learn more and faster, and assure decreased retention rates, or faster and frequent feedback and assessments. They didn't see also in the online courses a way to increase search of methods and activities to engage students or to enhance administrative control of punctuality and courses content because of the possibility to review registered course sessions. They didn't observe in the online course great convenience (OCONV: 0.284) since it reduces contact and contagious risk, requires lesser time investment, lesser transportation and displacement costs, and allows teachers flexibility to work whenever and wherever with more control over schedule since they are not bounded by geography. Teachers haven't noted a great practicality in online course (OPRAC: 0.216) for it permits generally to create parallel discussion group by class to share information and documents with students, save displacement time to university, save courses' preparation time, and requires continuous adaptation and readiness. Technical Platforms constitutes the best advantage the teachers benefit in performing online classes (OCTP: 0.379), because of online classes help teachers to use innovative teaching methods, enhance teachers' IT knowledge, allow discovering newest communication apps. Technology use allows also teachers to focus on their core tasks, save time and resources, and have easy use of documents downloaded online. On the other side, classroom advantages were highly scored (CRA: 0.747). They favorized students to be more engaged and accountable, and authorized better assessment of their assiduity and attention. Moreover, classroom enhances teaching responsibility, good relationship and direct support to students, easy access to libraries and research materials, freedom and liberty of expression because of no need for courses recording, and promotes collaborative teaching and

knowledge transfer, extra-curricular activities. Classroom teaching also allows teachers addressing non awakened students. Face to face enhances as well interaction with all students, mainly with those majors that couldn't be taught online. However, back to classroom teaching has been assigned some disadvantages by teachers (BCRD: 0.360) mainly related to the difficulty to follow COVID-19 safety protocols, to teach with mask on face, to the absence of sufficient space to respect social distancing norms, to support mask on face all classroom time. With classroom teaching, administration increases control and pressure, and teachers loose class organization and time saving technology tools, familiarity with social media, easiness of contact with students, automatic attendance registering, saving courses through recording app, flexibility in scheduling classes, and tools of online chat, discussion forums and online meetings.

## 4. Conclusion

The paper aimed to assess the impact of COVID-19 on the teaching performance in Lebanese public and private universities. In addition to personal and teaching issues, attention is allowed to the socioeconomic and psychosocial environment associated to the COVID-19 context. Determinant factors of teaching performance with both teaching modes were founded by screening opinions regarding teaching behavior and conditions during COVID-19 pandemic. Modeling approach is used to elaborate comprehensive relationships among the explained teaching performance variable and multiple explanatory variables associated to challenges and potentials governing online and classroom modes.

It appears that while both of teaching modes have positive impact on teaching performance (H1 validated, H2 infirmed), online teaching mode has greater impact than classroom mode (H3 confirmed). At the same time, technical issues of online and offline teaching modes have had higher impact on teaching performance than socioeconomic and sociopsychological conditions environing COVID-19 (H4 infirmed). However, teachers' experience and background have a tiny impact on teaching performance during the pandemic (H5 validated). Moreover, while disadvantageous factors have greater effect on online courses than advantageous factors, they have lesser effect on classroom teaching mode. Teachers retained generally positive thinking regarding both of the two teaching modes, because they succeeded to acclimate their own personal and work life to the prevailing pandemic environment, surpassing the difficulties of online and offline teaching modes and benefiting in the same time from their experience with such a challenging period of COVID-19. During online teaching mode, they adopted controlled behavior to reduce distracting circumstances of working at home, avoided boring context, overpassed technical challenges of online courses, assumed very well the increased responsibility associated to online courses, and maintained comprehensive relationship with students through online platforms, even they felt somehow

exhausted by online courses delivery, reinforced by some advantageous factors increasing online effectiveness, convenience, practicality assured by technological platforms. During classroom attending period, teachers employed their experience and accustomed knowhow to grasp students' attention, engagement, assiduity and accountability, by maintaining good relationship and direct support to students and enhancing as well interaction with and within groups of students, and by avoiding universities pressure on their paid hours and inconvenience related to some online tools and COVID-19 safety and social distancing protocols.

Now, the hardest of the pandemic period, in which the whole education system was inclined to turn towards full online teaching, has passed away, but not without consequent great change in teaching behaviors. Homework experience is yet generalized, and not limited to a restricted number of individuals and institutions in some specific domains. However, in the education, fears of COVID-19 being moderate with time, allowed a bold comeback to classroom. Hence, shall the education sector reject easily all the benefits of the online generalized experience taking over the education system all along the previous period?

The present paper's results showed positive impact of both

education modes on teaching performance, with greater impact of online teaching mode, marked by a notable influence of online and offline' technical issues on teaching performance. These outcomes let to think that education system's practices should be revisited to move progressively towards a combined mode of education in order to benefit from the technical advancements in communication and educational tools in terms of flexibility for all education stakeholders.

In these regards, future work will tackle herewith highlighted limitations of online and offline courses, in a tentative manner to make corrective measures allowing to establish a comprehensive combined system management to assure a fully integrated and homogeneous learning whatever is the teaching mode.

In such perspective, coming work will open the way for more worldwide-developed studies to enlighten the academic deciders to the determinant factors of teaching performance in both educational modes, in a way to consider them in choosing the convenient education system either to enhance performance in future normal circumstances or to avoid total paralysis in case of pandemics or any other kind of crisis.

## Appendix

**Table 4.** List of all variables and abbreviations.

| Construct                           | Item         | Description                                                                                |
|-------------------------------------|--------------|--------------------------------------------------------------------------------------------|
| Teacher background – TB             |              |                                                                                            |
| Teaching experience                 | Texp         | Teaching experience (years' number)                                                        |
| Familiarity with IT – FIT           |              | Familiarity with electronics, digital and IT tools                                         |
|                                     | Flap_1FIT    | Familiarity with laptop                                                                    |
|                                     | FPC_2FIT     | Familiarity with personal computer                                                         |
|                                     | Fmob_3FIT    | Familiarity with mobile phone                                                              |
|                                     | Ftab_4FIT    | Familiarity with I-pad / tablet                                                            |
| Familiarity with social media – FSM |              | Familiarity with technology and social media                                               |
|                                     | FTSM_1FSM    | Easiness                                                                                   |
|                                     | FSE_2FSM     | Search engines (Google, altavista,...)                                                     |
|                                     | FT_3FSM      | Teams                                                                                      |
|                                     | FZ_4FSM      | Zoom                                                                                       |
|                                     | Fcom_5FSM    | WhatsApp / Viber / Emo / messenger,...                                                     |
|                                     | Ffac_6FSM    | Facebook                                                                                   |
| Online Classes Advantage – OCA      |              |                                                                                            |
| Online Effectiveness – OEFF         |              | Online classes are more effective than classroom teaching mode                             |
|                                     | OSLMF_1OEff  | Students learn more and faster                                                             |
|                                     | OLRR_2OEff   | Retention rates are lesser                                                                 |
|                                     | OFAss_3OEff  | Allow frequent assessments                                                                 |
|                                     | OFFF_4OEff   | Feedback is faster and frequent                                                            |
|                                     | OISAE_5OEff  | Increase search of methods and activities to engage students                               |
|                                     | OPCCC_6OEff  | Enhance administrative control of punctuality and courses content                          |
| Online Convenience – OC             |              |                                                                                            |
|                                     | OLTI_1OConv  | Require lesser time investment]                                                            |
|                                     | OTCS_2OConv  | Teachers have more control over schedule                                                   |
|                                     | OTNBG_3OConv | Teachers are not bound by geography                                                        |
|                                     | ORCCR_4OConv | Reduce contact and contagious risk                                                         |
|                                     | OFWWW_5OConv | Flexibility to work whenever and wherever                                                  |
|                                     | OCT_6OConv   | Costless in transportation                                                                 |
| Online practicality – OPRAC         |              |                                                                                            |
|                                     | OPGSI_1OPrac | Create parallel discussion group by class to share information and documents with students |
|                                     | OSDTU_2OPrac | Online classes save displacement time to university                                        |
|                                     | OSCPT_3OPrac | Online classes save courses' preparation time                                              |

| Construct                                                                                                   | Item           | Description                                                                                         |
|-------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------|
| Online Platform – Oplat                                                                                     | ORCAR_4OPrac   | Online courses require continuous adaptation and readiness                                          |
|                                                                                                             | OPUT_Oplat     | Online teaching platform and facilities are mainly controlled by university or afforded by teachers |
| Online classes technical platform – OCTP                                                                    | OITM_1OCTP     | Online classes help teachers to use innovative teaching methods                                     |
|                                                                                                             | OEUDD_2OCTP    | Easy use of documents downloaded online                                                             |
|                                                                                                             | OETIT_3OCTP    | Online courses enhance teachers IT knowledge                                                        |
|                                                                                                             | ODNCAApp_4OCTP | Online courses allow discovering newest communication apps                                          |
|                                                                                                             | OFCT_5OCTP     | Technology use allows teachers to focus on their core tasks                                         |
|                                                                                                             | OSTR_6OCTP     | Technology use allows save time and resources                                                       |
| Online classes disadvantages due to COVID – OCD<br>In online courses teacher doesn't lead the class – OCNLC | ONCIA_1OCNLC   | No possibility to control students' attention, interaction and assiduity                            |
|                                                                                                             | ONIS_2OCNLC    | No interaction with students                                                                        |
|                                                                                                             | ONIGL_3OCNLC   | No Interaction in group lessons                                                                     |
|                                                                                                             | ONWFtF_4OCNLC  | Lacks the warmth of face to face Interaction                                                        |
|                                                                                                             |                |                                                                                                     |
| Online courses increase teachers' responsibility – OTR                                                      | ONSSM_1OTR     | Online classes are not safe and secure method                                                       |
|                                                                                                             | ONP_2OTR       | Sharing publicly teachers and students' names is passing on privacy                                 |
|                                                                                                             | OCSI_3OTR      | Teachers should be careful of what to share of information with students                            |
|                                                                                                             | OCR_4OTR       | Recording courses arise teachers' responsibility                                                    |
| Technical challenges of online courses – OTC                                                                | ONFSS_1OTC     | No faculty structure and support                                                                    |
|                                                                                                             | ODDG_2OTC      | Difficulty to draw graphics on the spot                                                             |
|                                                                                                             | OMST_3OTC      | Online teaching means more screen-time                                                              |
|                                                                                                             | OUHS_4OTC      | Unsuitable for hands-on-fields                                                                      |
|                                                                                                             | ODCT_5OTC      | Big deal to choose right technology and apps                                                        |
|                                                                                                             | OIID_6OTC      | Online courses are interrupted by internet disconnection                                            |
|                                                                                                             | ODES_7OTC      | Online courses can't be performed with electricity shortage                                         |
|                                                                                                             |                |                                                                                                     |
| Online courses are exhausting because – OEX                                                                 | ONRTC_1OEX     | No way to permit rest time in class                                                                 |
|                                                                                                             | ONITSS_2OEX    | Lack of interaction time space with students                                                        |
|                                                                                                             | OCSCP_3OEX     | Continuously speaking all along the class period                                                    |
|                                                                                                             | ODCLP_4OEX     | Difficult to keep classes for longer duration                                                       |
|                                                                                                             | ONSF_5OEX      | No way to observe face to face students feedback                                                    |
|                                                                                                             | OLSH_6OEX      | Students show lack of interest and involvement during online classes                                |
|                                                                                                             | OBLI_7OEX      | Require a bigger load of information to fill the class time                                         |
|                                                                                                             | OLTCP_8OEX     | Require larger time to prepare comprehensive courses                                                |
|                                                                                                             | OETSI_9OEX     | Need extra time self investment                                                                     |
| Online classes are boring – OB                                                                              | ONC_1OB        | Courses are narrative and lack of on-board presentation                                             |
|                                                                                                             | OLEM_2OB       | Feel lack of enthusiasm and motivation to make online classes                                       |
|                                                                                                             | OS_3OB         | Bounded in houseroom is stressful                                                                   |
|                                                                                                             | ONDSTI_4OB     | No space for distraction topics and issues                                                          |
|                                                                                                             | OFSBS_5OB      | Addressing fictive students behind screens                                                          |
| Teachers get easily distracted during online classes by – OED                                               | OTDSM_1OED     | Social media                                                                                        |
|                                                                                                             | OTDT_2OED      | Texting                                                                                             |
|                                                                                                             | OTDFV_3OED     | Family and visitors                                                                                 |
|                                                                                                             | OTDPC_4OED     | Phone calls                                                                                         |
|                                                                                                             | OTDTI_5OED     | Technical issues disrupt the flow and pace of online classes                                        |
|                                                                                                             |                |                                                                                                     |
| Online classrooms quality assurance disadvantages – OCQAD                                                   | ODMST_1OCQAD   | Difficulty to meet standards of teaching                                                            |
|                                                                                                             | ONCQAR_2OCQAD  | No possibility to control quality assurance requirements                                            |
|                                                                                                             | OTNP_3OCQAD    | Online courses tend to focus on theory rather than practice                                         |
|                                                                                                             | OLITDT_4OCQAD  | Lack of personal computer skills cause difficulties in online teaching                              |
|                                                                                                             | ODUB_5OCQAD    | Difficulty to use books for course support                                                          |
|                                                                                                             | OLSD_6OCQAD    | Lack of self-discipline to deliver the course                                                       |
|                                                                                                             | ODCES_7OCQAD   | Difficulty to control exams and quiz cheatings                                                      |
|                                                                                                             | ODCAC_8OCQAD   | Difficulty to assess the reliability of students excuses of not attending classes                   |
|                                                                                                             | OAUC_9OCQAD    | The administration of the university is closed during COVID19 period                                |
| Classroom Advantages – CRA                                                                                  |                |                                                                                                     |
| Back to classroom teaching advantages in COVID period – BCRA                                                |                |                                                                                                     |

| Construct                                                                                                  | Item             | Description                                                                                             |
|------------------------------------------------------------------------------------------------------------|------------------|---------------------------------------------------------------------------------------------------------|
| Classroom Disadvantages – CRD<br>Back to classroom teaching disadvantages in COVID period – BCRD           | BCRSEA_1BCRA     | Students are more engaged and accountable                                                               |
|                                                                                                            | BCRBAA_2BCRA     | Better assessment of students' assiduity and attention                                                  |
|                                                                                                            | BCRER_3BCRA      | Classroom enhances teaching responsibility                                                              |
|                                                                                                            | BCREDSS_4BCRA    | Classroom enhance direct support to students                                                            |
|                                                                                                            | BCRGRS_5BCRA     | Classroom allows good relationship with students                                                        |
|                                                                                                            | BCREIS_6BCRA     | Face to face enhances interaction with students                                                         |
|                                                                                                            | BCRCT_7BCRA      | Classroom promotes collaborative teaching and knowledge transfer                                        |
|                                                                                                            | BCRNAMO_8BCRA    | Not all majors can be taught online                                                                     |
|                                                                                                            | BCREAL_9BCRA     | Easy access to libraries and research materials                                                         |
|                                                                                                            | BCRECA_10BCRA    | Classroom promotes extra-curricular activities                                                          |
|                                                                                                            | BCRNRF_11BCRA    | Stop recording courses allow freedom and liberty of expression                                          |
|                                                                                                            | BCRANAS_12BCRA   | Classroom teaching allows teachers addressing non awakened students                                     |
|                                                                                                            | BCRBP_13BCRA     | Classroom teaching hours are paid better than online hours                                              |
| With back to classroom teaching                                                                            | BCRSP_1BCRD      | Difficult to follow COVID-19 safety protocols                                                           |
|                                                                                                            | BCRMP_2BCRD      | Difficult to teach with mask on face                                                                    |
|                                                                                                            | BCRNSD_3BCRD     | No sufficient space to respect social distancing norms                                                  |
|                                                                                                            | BCRMF_4BCRD      | Difficult to support mask on face all classroom time                                                    |
|                                                                                                            | BCRACP_5BCRD     | Administration control and pressure increase with classroom teaching                                    |
| Teaching performance in COVID context – TPCOV<br>Teaching performance in COVID context (Positive) – TPCOV+ | BCRLT_6BCRD      | Teachers loose technology tools                                                                         |
|                                                                                                            | BCRLFSM_7BCRD    | Teachers loose familiarity with social media                                                            |
|                                                                                                            | BCRLECS_8BCRD    | Teachers loose easiness of contact with students                                                        |
|                                                                                                            | BCRLCOT_9BCRD    | Teachers loose class organization tools                                                                 |
|                                                                                                            | BCRLAAR_10BCRD   | Teachers loose automatic attendance registering                                                         |
|                                                                                                            | BCRLSCR_11BCRD   | Teachers loose saving courses through recording app                                                     |
|                                                                                                            | BCRLTST_12BCRD   | Teachers loose time saving technology tools                                                             |
|                                                                                                            | BCRLFSC_13BCRD   | Teachers loose flexibility in scheduling classes                                                        |
| Teaching performance in COVID context (Negative) – TPCOV-                                                  | BCRLOM_14BCRD    | Teachers loose tools of online chat, discussion forums, online meetings                                 |
|                                                                                                            | TPRETA_1TPCOV+   | Recording courses arise teachers' awerness                                                              |
|                                                                                                            | TPHITM_2TPCOV+   | Online classes help teachers to use innovative teaching methods                                         |
|                                                                                                            | TPECTSW_3TPCOV+  | Online classes enhance consciousness about teachers' skills and weaknesses                              |
|                                                                                                            | TPLP_4TPCOV+     | Online classes allow larger productivity in teaching period                                             |
|                                                                                                            | TPSDT_5TPCOV+    | Online courses save distraction time of normal classes                                                  |
|                                                                                                            | TPCF_6TPCOV+     | Online courses require continuous formation to formator sessions                                        |
|                                                                                                            | TPQOTM_7TPCOV+   | Online courses require quitting oldest teaching methods                                                 |
| OC/CR performance, personal opinion, PO                                                                    | TPCCR_8TPCOV+    | Online courses require continuous courses content refreshment                                           |
|                                                                                                            | TPDDSLTS_1TPCOV- | Difficulty to deliver same length of teaching session                                                   |
|                                                                                                            | TPLGA_2TPCOV-    | Low grades achievements because of COVID19 online learning                                              |
|                                                                                                            | TPDLRLAP_3TPCOV- | Digital learning tools are responsible for low academic performance                                     |
| Impact on teaching performance (personal opinion) – ITPPO                                                  | TPFFBAA_4TPCOV-  | Face-to-face interaction contributes to boost students' academic achievement                            |
|                                                                                                            | OCTP_1PO         | In your opinion, during COVID19 period, have online courses improved or decreased teaching performance? |
|                                                                                                            | OCC RTP_1PO      | In your opinion, do online or classroom courses have better impact on teaching performance?             |
|                                                                                                            | FOCCRCOV_1PO     | After your experience, are you in favor of online or classroom teaching, during COVID19 period?         |
|                                                                                                            |                  | In your opinion, who is mainly responsible of the improvement of online teaching performance?           |
| Conditions to improve online classrooms teaching Performance – COCTP                                       | ME_1ITPPO        | Ministry of education                                                                                   |
|                                                                                                            | AI_2ITPPO        | Academic institutions                                                                                   |
|                                                                                                            | T_3ITPPO         | Teachers                                                                                                |
|                                                                                                            | S_4ITPPO         | Students                                                                                                |
|                                                                                                            | HTC_5ITPPO       | High-tech companies                                                                                     |
|                                                                                                            | RCC_1COCTP       | In your opinion, what should be made to improve online teaching performance?                            |
|                                                                                                            |                  | Redesign curriculum's content                                                                           |

| Construct                                                    | Item          | Description                                                                                     |
|--------------------------------------------------------------|---------------|-------------------------------------------------------------------------------------------------|
| Preference to teaching modes during COVID19 period – PTMDCOV | NTM_2COCTP    | Introduce new teaching methodology                                                              |
|                                                              | FSHT_3COCTP   | Do formation sessions to familiarize with high-Tech                                             |
|                                                              | HFWC_4COCTP   | Assure high and for free wifi connection                                                        |
|                                                              | TOCT_5COCTP   | Add more teaching options to communication tools                                                |
|                                                              | CTF_6COCTP    | Render communication tools more friendly                                                        |
|                                                              | IOCCSE_7COCTP | Innovative options in communication tools to assure control on students' engagement and conduct |
| Preference to teaching modes after COVID19 period – PTMACOV  | OC_1PTMDCOV   | Express your preference to each of the teaching modes during COVID19 period.                    |
|                                                              | CR_2PTMDCOV   | Online courses                                                                                  |
|                                                              | C_3PTMDCOV    | Classroom courses                                                                               |
|                                                              |               | Combination of online and classroom                                                             |
|                                                              | OC_1PTMACOV   | Would you prefer to continue with online, classroom or a combination mode after COVID19 period? |
|                                                              | CR_2PTMACOV   | Online courses                                                                                  |
|                                                              | C_3PTMACOV    | Classroom courses                                                                               |
|                                                              |               | Combination of online and classroom                                                             |

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