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# Technological Transition in Higher Education Institution in the Time of Covid-19

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## Abstract

This research aims to investigate the transition in the Higher Education Institution (HEIs) as a result of Covid-19 pandemic and how the HEIs in the Sultanate of Oman reacted to this change. It seeks to explore and analyze the online teaching and learning, online assessment and examinations, technical and non-technical support at HEIs during Covid-19 qualitatively. The study found that HEIs have faced constraints such as adaptation to the new system, infrastructure, etc., but they are now more prepared for technology acceptance and use than before. It is suggested to work on enhancing infrastructure, software platforms/tools, online class management, assessment and examinations, and capacity building.

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## 1. Introduction

The education system has seen many transformations and growth since 1950. The higher education market was worth USD 65.40 billion in 2019 and is expected to expand to USD 117.95 billion by 2027, with a Compound Annual Growth Rate of 8.25 percent between 2020 and 2027 [1]. New educational terminologies, tools, and technologies have been introduced to support face-to-face education such as Correspondence learning, Distance education, Digital learning, Virtual learning, Internet-based learning, E-learning, Mobile learning, and Ubiquitous

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learning. These education systems have their own merits and spheres of influence in specific situations. The universities around the world have flipped to online learning due the Covid-19 which started in November 2019 in the Wuhan province of China [2, 3]. The HEIs system is completely in disarray. Recognizing the urgency, researchers and educators have employed a variety of approaches to better understand the problem and provide solutions. There are scarce and limited studies on HEIs functioning during Covid-19 and adoption of the online learning [4, 5].

In Oman, with the announcement of the first lockdown on 15th March, 2020 and subsequent extension, the Ministry of Education asked HEIs to switch to online mode of learning. The impact of Covid-19 was seen starting from the fall semester of the 2019/2020 academic year. Abushammala et al. [6] found low satisfaction with online learning, higher workload, examination cancellation, and inability to pay tuition fees in Oman. Guangul et al. [7] identified assessment fraud, academic dishonesty, low learning outcomes, lower motivation of learners to submit tasks, and hardware/software compatibility issues after surveying 50 instructors at an Omani college. The existing studies in Oman have not covered in-depth qualitative analysis considering management team, instructors, and learners' perspectives. Thus, this research aims to investigate the teaching, learning, and examination environment during the time of Covid-19 at HEIs in Oman. The learners, instructors, and management team from the Gulf College, Oman were invited to participate in the study through semi-structured interviews and focus group discussions. This paper is structured as follows: Section 2 constitutes literature review. Section 3 explains epidemics, pandemics, and online learning. Section 4 describes the materials and methods. Section 5 presents the outcomes. Section 6 discusses the findings and highlights actions required. The last section concludes the study.

## 2. Literature Review

There is a significant increase in learning apps, video conferencing tools, and online learning software due to Covid-19. For instance, Microsoft Teams, Blackboard, Google Class, Big Blue Button, Schoology, Moodle, Sakai, and Canvas. An epidemic is defined as an outbreak of disease that spreads rapidly and simultaneously, affecting a large population. The disease in the epidemic situation remains confined to specific regions of a geographical area [8]. For instance, the Zika virus outbreak in the tropical areas from 2016 to 2017 and the Ebola outbreak in West Africa from 2014 to 2016. On the contrary, a pandemic happens over a wide geographic region where everyone is susceptible to becoming infected. For example, Covid-19, Spanish influenza (H1N1 infection) of 1918.

The sudden migration to online system due to fear of Covid-19 pandemic has presented a number of challenges to HEIs. For example, Internet stability, delivery cost, and instruction design [9], communication issue in video-conferencing [10], learners' engagement [11], new assessment systems [12], digital divide [5, 13], lack of training [14, 15], online learning experience [16], extra workload [13, 14], and availability of Internet and electricity in rural areas [17, 18]. A study conducted by Mishra et al. [19] in India, reported the need for infrastructure development, training, and financial support. Singh et al. [20] reported Internet stability, electricity shutdown, device sharing, digital skills, number of learners in classes, learners' assessment, and space sharing at home as the main obstacle in India. Sasere and Makhasane [21] demonstrated the need of infrastructure and digital skills for online learning. In some universities there were other issues, for example the learners in Romanian universities felt loneliness [22]. In German Universities learners were not prepared for online learning in terms of digital skills, devices, stress, and loneliness [23]. A number of researchers have expressed mixed outcomes of Covid-19 and technological transformation in HEIs. Gradišek and Polak [24] reported that the first year learners at the University of Ljubljana indicated more time to prepare for the online examination (no need to travel), no distraction from nearby learners. The Internet connection, exam submission difficulty, and monitoring by instructors via web camera, organizational issues, technical issues, work overload, and difficulty to access learning materials were some of the challenges. Ruiz et al. [25] observed that previous digital skills and use of technology in learning at a Technological University in Spain, proved helpful in during the pandemic. Stukalo and Simakhova [26] recommended training to instructors and continuous monitoring of learners' satisfaction by management in Ukrainian universities. Oliveira et al. [14] found a positive impact on ICT usage while negative on personal adaptation at HEIs in Portugal and Brazil during Covid-19. Benito et al. [27] observed a preference for blended learning during Covid-19.

Aristovnik et al. [17] assessed the impact of Covid-19 on HEIs in 62 countries. The study revealed satisfaction among learners, however few challenges were found including increased workload, digital skill gaps, loneliness, and

stress. Mukaram et al. [16] reported infrastructure and adaptive leadership the reasons of online learning success at public universities in Pakistan. Kabir et al. [12] found that adoption of online learning is influenced by instructor willingness, learners' willingness, and financial support in Bangladesh. Smooth governance and communication ensured the education continuity in Italian HEIs [28]. A number of HEIs used the online method for assessment including MCQs, quizzes, feedbacks, oral examination, auto-grading, and synchronous communication [29]. Marinoni et al. [30] summarized the impact of Covid-19 on HEIs into ten components such as teaching, learning, examination, research, new registration, conference/workshops, scientific collaboration, funding, and travelling.

### 3. Materials and Methods

The study has used semi-structured interviews and focus group discussion techniques, which is a preferred method of data gathering in qualitative research [31]. Fifty learners (undergraduate and master's classes of Computer/IT, Management, and Foundation courses), ten instructors, and seven management team (staffs) from Gulf College, Oman participated in the study. The participants had already used the online system during the spring (2020) and summer semesters (2020). The questions for the interviews and group discussion were designed after thoughtful analysis of the existing literature and inputs from the research team. There were five questions IQ1 to IQ5. The content analysis based on inductive approach was used to organize, categorize, and summarize the analysis since it suits the qualitative research [32]. The identity of the participants were kept anonymous and confidentiality was ensured aligned with the ethical norms set by Crow and Wiles [33].

### 4. Findings

#### 4.1. IQ1-How did you find communication and collaboration throughout the semester?

The learners stated that the communication with instructors was far better and getting in touch with them was easy through Microsoft (MS) Teams. Unlike before when they had to wait until they got a chance to see their instructors because of the number of learners standing at their door. The management team found that most of the instructors were interactive and collaborative in the new system. The majority of learners reported that the instructors were very interactive, collaborative, and communicative 24/7. The learners from the foundation program stated, "It facilitated communication between learners and instructors besides sharing the necessary information...easier interaction with the instructors than before."

The instructors on the other hand found one-to-one discussion with learners beneficial to learners who had any difficulty with the subject after classes. The instructors found it easy to provide all the necessary information, send reminders, and notify the learners on via emails and WhatsApp groups. The learners reported that the instructors were very understanding and helpful during lectures. The instructors stated that they preferred giving answers to queries after the session ended rather than in between the lectures to avoid disruption. When enquired about the communication with the management team during online classes, the instructors found positive. The instructors stated, "It permitted flexibility in consultations and queries with learners. Learners' interaction was much better online than on campus.. There was cooperation and full-time support from the management." When the opinion of management team was sought, the team explained easier communication with instructors, 100% online attendance rate, and more committed to study. The learners were very expressive and asked questions from instructors. The management received regular feedback on the learners' academic performance. The management team stated, "In many cases learners, surprisingly achieved better results than ever before, due to: 1) fast communication and feedback, and 2) replaying lectures at ease."

#### 4.2. IQ2-What kinds of challenges did you face in online teaching and learning?

The learners and instructors faced difficulty in explaining/understanding some technical subjects such as mathematics, programming, and accounting when delivered online. These courses contain a lot of practical needs, notably in terms of written work, which was extremely difficult for the learners to complete online, particularly arithmetic calculations. The learners expressed, "Accounts and Finance Courses had a lot of practical requirements,

especially in the written work and mathematical equations. It was difficult to do some modules online in Computer courses due to practical nature and thus required labs.” The instructors agreed with the concerns on the difficulty of teaching practical modules. The college administration came up with a solution of blended learning where some courses could be delivered online while others require learners to attend classes on campus.

The management team and instructors had similar views on difficulties in handling/controlling online classes. The instructors conveyed “online classroom etiquette.” Thus, the management designed a set of rules to regulate online teaching. The instructors were worried about the size of class in online learning. An instructor said, “It was difficult to manage and track 60 learners online due to limitations of computer screen size. At some instances learners were seen in the online session, just for the reflection of their attendance, but they did not pay proper attention to the lecture.”

The management team found that a large section of instructors and learners were not fully acquainted and competent with the learning tools, besides phobia in using technology. The instructors, especially the older generation, encountered difficulty in changing their style of teaching that had been evolved over many years. According to a management staff, “The instructors lack the expertise to design online courses and convert traditional curriculums into interactive online content. .... Likewise, there is a shortage of qualified technical staff to support the implementation of online learning mechanisms and solve technical problems.” The learners argued, “Sometimes technical problems were not resolved by the instructor as he/she did not have experience with the MS Team or Android Compiler. There should be someone experienced to help with these issues.” The instructors suggested that skills in utilising technology should be strengthened through training sessions to both instructors and learners. Similarly, the learner requested to introduce online/E- learning courses in the foundation. Furthermore, instructors should be trained and additional supportive technical staff should be available. The instructors and management team highlighted that MS Team software helped to carry on with the semester without delay or postponement.

#### *4.3. IQ3-What kinds of challenges did you face in online assessment and examinations?*

The instructors and management team expressed similar thoughts on exam/assignment’s cheating by learners. At several points, while checking learners’ assignments and presentations on Turn-it-in software, the instructors discovered highly plagiarized passages. On further investigation, it was found that, although learners had not copied the content, the titles and books they referred to while writing assignments were the same. This caused a reduction in marks unknowingly. A member of the management team and instructors highlighted the shortcomings such as plagiarism, external help in assessments, “Plagiarism was a problem. In Computer/IT there were 20 cases of cheating through sharing, but instructors managed to find out who cheated and from which learner. Online exams raise some suspicions such as the possibility of getting external help”

The instructors informed the management about constraints with the process of doing online exams and assessments. Some of the instructors suggested auto-grading-assessment, while others did not agree in using it due to reliability issues. When enquired about cheating and plagiarism, the learners stated that a number of them outsourced the assignments due to lack of time. The learners also complained about the time allotted to exams, set of instructions on uploading and downloading of files. The learners told, “Too many assignments and lack of time. Presentations and assignments were being uploaded in Turn-it-in many times causing plagiarism with already stored files. Exam time was not enough and without clear instructions on how to write the exam.” The instructors observed that online classes required additional time and effort, especially in dealing with learner queries.

#### *4.4. IQ4-Do you think that the recorded lectures are beneficial in online teaching and learning?*

The learners and instructors reported that recorded lectures were very beneficial as this allowed them replay the recordings if they could not attend the class or were late, and even to understand the course discussion better. The management team agreed that the recorded lectures helped learners who could not attend the lectures for any reason to listen to them at their own convenience. While the instructors agreed that recorded classes helped learners to better understand the module, but they highlighted a shortcoming. The instructors for the masters Computer/IT course stated, “Recorded lectures allowed learners to return to the content if they couldn’t attend the class or to understand the course discussions better. For some learners the recorded classes were a good excuse to not attend

class.” But the attendance rate improved in some courses and the learners felt more committed to attend classes and were on time. Learners suggested that if the recordings had the title of the course on them, they would be easier to find. The management team informed that the college is in the process of developing a Lecture Bank.

#### *4.5. IQ5-What sort of technical and non-technical support is needed to overcome the challenges of online teaching, learning, and examination/assessment?*

The learners, particularly from the rural areas, complained of slow Internet; sudden/unexpected interruption of connectivity; and the inability to afford a learning device such as laptop/tablet. The instructors observed poor Internet connection as well. The instructors found that some of the learners had difficulty in registering with the MS Team for online classes, “The Wi-Fi connection was often poor, especially among learners living in remote villages. The downloading of lectures was slow. It is required to have a technical team available for resolving issues.” The college administration took note of it and informed that a help desk is available on the website for any queries. Additionally, learners faced issues of device compatibility. An instructor told, “Some learners were not equipped with laptops and used their mobile phones to join MS Team classes. The devices used by learners did not support the white board.” The learners, instructors, and administration levels faced many challenges in terms of teaching and learning during Covid-19. A very few challenges need to be solved at the country level.

## **5. Results and Discussion**

Online learning is undoubtedly a very large and thorny subject, from both instructors and learners perspectives. For a smooth handling of the current and future calamity, it is important to focus on infrastructure, virtual class management, examination/assessment system, capacity building, etc. as discussed below.

### *5.1. Digital infrastructure and software platforms/tools*

It is important to have digital infrastructure for uninterrupted learning. In an online learning environment learners must have a stable and fast Internet connection, digital learning devices, and learning application. Alasmari [34] in his study on online learning during the pandemic in Saudi Arabia reported the need of digital infrastructure. The Ministry of Higher Education, Oman took initiative to provide laptops and devices, subsidized Internet connections. The German universities have upgraded their infrastructure to meet the current need [35]. Even though various platforms/tools are available for online education, their selection and continuous usage depend on a on several factors, such as audio quality, video quality, connectivity, usability, multiplatform support, screen-sharing options, whiteboard availability, chat options, meeting recording options, subscription cost, number of users allowed to use the system at a time, and security and privacy threats. HEIs are finding difficulty in the selection of these tools from the available alternatives. The institutions can either choose commercial/open source or have their own customized tools. However, the former option has some security and privacy concerns. The recommendation is to have a unified platform for all institutions in the country as local products have always enjoyed more trust and acceptability. It will ease in learning, since learners moving from one institution to another will use the same.

### *5.2. Virtual class management*

The discipline issues were raised by both the learners and instructors in online class. Even an indiscipline act by a single learner could distract all others. The distraction might also be due to less engaging lectures, limitations of technology, and inability of the instructors to control learners in the virtual classroom. A small distraction in the class can destroy the learning atmosphere. One of the instructors said that the learners were not mentally present in the online class. This is one of the drawbacks of online classes. The management suggested that instructors should motivate the learners, especially where their participation is less. Similar argument was made by Aguilera-Hermida [36]. Furthermore, use of infographics could help learning experience more fun and understanding. The length of the classes could be reduced in online learning since online classes are different from face-to-face. One of the issues of online learning is isolation which could be reduced by making collaborative learning groups using social media and

WhatsApp. In the Gulf College, the learners studying Mathematics created a group through WhatsApp and then created another one through MS Team with the instructor, which gave them additional support. Sobaih et al. [37] found that in developing countries without LMS the social media usage for formal learning proved useful during pandemic. In the present study the management, instructors, and learners reported timely completion of semesters and examinations. This contradicts the findings by Mittal et al. [38].

### 5.3. Examination/Assessment system

Conducting online examinations and their grading is a major obstacle the management and instructors reported. Both of them agreed that the instructors require training for grading online exams and assignments. How to prevent cheating and control unfair behavior in online examinations is a major threat to online implementation worldwide. The study found learners using various means to write online examinations, such as taking expert help, Internet resources, and asking others to write their examinations. The study is supported by Azmi and Khoshaim [39] who demonstrated un-reliability of auto-grading-assessment for online exams. Thus, there is a need for a nationwide assessment mechanism such as development of remote evaluation instruments and grading systems (e.g., report submission with online presentation, oral examination, open questions). The marks could be specified for participation in order to encourage learners. Learners should be educated on collusion, and told that there is a penalty if exam answers are found to have been shared. The learners should share a draft of their assignment with the instructor before uploading it in 'Turn-it-in' as a must to monitor their progress. They can be asked about the argument made or the content to find out if it is genuinely their work. Additional option could be assessment graded based on attendance as well.

### 5.4. Capacity building and framing online learning policy

A national legislative ecosystem needs to be developed about online learning: both instructors and learners should be trained, sharing the best practice among the staff and institution, and should adopt software to produce fair and accurate exam results, and documents on learners' and instructors' etiquette during an online class. There must be unrestricted access to learning/conferencing platforms. The HEIs and government should invest in the manpower to manage online learning. The institutions should provide tools and training in online delivery and content design process and make the overall learning environment engaging. A study by Oliveira et al. [14] observed training as a major obstacle in online learning. Government legislation and the development of quality standards are the need of the hour. Additionally, key performance indicators should account for institutional ICT infrastructure, Internet connectivity, and the ability of both instructors' and learners' to use online learning tools. Freeman et al. [40] emphasized the design of a National Educational Policy in the USA for online learning. This is also in agreement with another suggestion by Aristigueta [41] who felt the need for proper public policy. The Australian higher education have recommended structural changes in the educational system in view of the pandemic [42]. Another important aspect to look into is the copyright and privacy protection through block chain. Moreover, the HEIs should look into the tuition fees since in the online learning environment HEIs physical infrastructure such as library, sport centers are not used.

### 5.5. Opportunities

Online learning is not the complete replacement of face to face, instead it is needed to support the existing education system. It is not only the challenges, the pandemic has created a number of opportunities as well. The pandemic has presented an opportunity to HEIs [43] such as HEIs have been forced to digitalize [35] leading to accelerated online learning [44]. Thus the pandemic has a positive impact on the digitalization of universities. Online learning is beneficial to learners with regard to teaching, time management, independent management skills and providing accessibility to instructors at all times. The recorded lectures can be played repeatedly to revise and understand the concepts as when required. During the pandemic many universities underwent quick transformation to E-learning [45]. Gonzalez et al. [46] found improvement in the learners' performance and improved habit of continuous learning due to Covid-91 lockdowns besides 100% attendance [12]. A number of the stakeholders

believes that the pandemic is the cause of accelerating the utilization of the fourth Industrial Revolution (Industry 4.0) tools and technologies.

## 6. Conclusion

Although the study is qualitative, it provides an opportunity for driving change in the online learning context. The developing countries including Oman should strive for transformation from traditional learning to online learning. The actions that need to be taken include infrastructure development, virtual class management, examination/assessment system, and capacity building and framing of national online learning policy. In addition, instructional design, learning design, human computer interaction features, training for both instructors and learners, and unrestricted access to learning/conferencing tools would help. The combination of face to face and online learning model can work in the long run. A national educational policy framework is required to manage HEIs during crisis and future pandemic. The other developing countries can take lessons and re-develop their teaching and learning mechanism. This study has not been able to cover all the institutions inside Oman due to the unavailability of participants. However, future research directions could focus on exploring other HEIs in Oman and the GCC countries with a large-scale sampling of both qualitative and quantitative data. The present results will possibly be complemented by further studies carried out in other institutions and countries.

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