Online Teaching Competencies among Faculty Members at Modern College of Business and Science (MCBS) Sultanate of Oman

Venkat Ram Raj Thumiki and Hesham Magd

***Abstract*—Online education has become an imperative not only due to the technological innovations but also due to the emerging social conditions arising out of COVID-19. Technological competencies are essential among the instructors for successful online teaching. Modern College of Business and Science (MCBS), Sultanate of Oman is one of the pioneering institutions in the Middle East region in adopting hundred percent online education with the onset of COVID-19. Main aim of this research is to evaluate the online teaching competencies of instructors at MCBS. Competencies identified through the benchmarking exercise and from literature, were divided into pedagogical and technical competencies, spread across three stages of online teaching: before, during and after an online teaching session. A self-administered questionnaire was circulated among 80 instructors selected through the systematic random sampling technique, out of which 53 valid responses were received and used in the data analysis. Descriptive statistics along with paired and independent sample *t* tests and ANOVA were conducted for evaluating the online teaching competencies of the instructors at MCBS. Linear regression analysis was conducted to evaluate the relationship between qualification or certification in online instructional methods (independent variable QC) and online teaching competency (dependent variable OTC). Findings indicated lower/less technical competencies than the pedagogical competencies. Stage-wise analysis revealed that the technical competencies are lower in Stage 1. A regression model that explained 43 percent of variation in dependent variable revealed that OTC is dependent on QC. Thus, it is recommended that the instructors need to be supported in acquiring qualification or certification in online instructional methods. While theoretical implications relate to innovation diffusion theory and theory of distance education, practical implications of this research relate to the ongoing hundred percent online instruction method. This study can be extended to evaluating the impact of personal factors on the online teaching competency and to the wider participants in the higher education sector.**

***Index Terms*—Online education, technical competencies, Instructional methods, online student engagement.**

I. Introduction

Innovations in teaching and learning in higher education essentially include usage of computer technology [1]. Though adoption of computer technology in higher education started more than five decades ago in the form of simulations, it's widespread use started only after 1990 [2]. But as teaching and learning were happening in the traditional model, competencies required for the stakeholders were limited to understanding the new computer-based software and use them as a value-addition to the physical classroom setup. The current internet era has disrupted the higher education in several forms, one of which is moving from physical classroom to virtual classroom [3]. Some of the proactive higher educational institutions (HEIs) have been using the blended form [4], in which a few courses are offered in physical face-to-face method and a few courses offered in online mode. But the shift was incremental and needed limited expertise or competency among the instructors and learners to adopt the new model and this was progressing gradually and not radically. But the current situation of COVID-19 crisis forced the HEIs, both proactive and reactive, to adopt a full-fledged emergency remote teaching through online (for survival) which raises a question whether the instructors possess related and relevant competency for effective online teaching. Modern College of Business and Science (MCBS) being the pioneer in adopting online teaching methodology, too has been responding to the changing demands arising out of COVID-19. A hundred percent online instructional methodology has been adopted by MCBS with the onset of COVID-19 and is not exempted from the challenges of online course delivery. The main research question whether the instructors at MCBS possess reasonable online teaching competencies remains unanswered and needs to be addressed. This research is mainly conducted to fulfil this objective.

II. Background of the Study

Higher education is the lifeline of any economy. This sector supplies the required manpower with relevant skills to enable the economy function Effectively and achieve the desired objectives. Major components of higher education are, learning material – that requires reading [5], teaching and learning – that happens in classroom [6], practically testing and trying the learnt theories – that happens in labs or through internships [7] and assessment of learning outcomes – that happens in classroom [8] along with scaffolding activities – that include, administration, student support services and advising [9]. Even in the current era of internet and technological advancement, these main components remain the same, but ways in which they are performed will change dramatically. Learning material is now available in the form of e-books and audio-visual tools compared to the traditional way of reading. Teaching and learning now happens in a

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virtual classroom setup compared to the traditional face-to-face physical classroom setup. Labs increased the use of simulations that significantly enhanced student learning experience and enabled practical testing and trying of learnt theories [2], [10] and online internships are now accepted in several universities, as students too have been showing interest in e-internships [11]. Traditional assessment tools too are altered to fit the online model of education [12]. Thus, a major shift in higher education sector from brick-to-click model has forced HEIs to be flexible and adopt online education model which is found to be more effective as well [13]. But the key issue is that, while HEIs have been actively responding to the changing scenario by building infrastructure such as computer labs and smart classrooms [14], equal emphasis needs to be given for building competencies among instructors to cope up with and adopt the emerging online teaching model [15].

According to International Board of Standards for Training, Performance, and Instruction (IBSTPI), competency refers to the ability of a person to perform an act in an optimal manner so that the desirable output is achieved. Instructors need additional qualifications and qualities to deliver online courses as a part of competency building [16]. While qualifications refer to technical aspects related to online teaching, qualities refer to behavioural aspects such as ability and willingness [17]. Competencies required by instructors for effective delivery of online education or remote or distance education include awareness and knowledge of – computer technology, related software and online tools [18]. It also includes instructor's ability to effectively manage virtual classrooms, design online courses and assessments along with the ability to deal with specific issues emerging out of online teaching.

Context of culture cannot be ignored while understanding the dynamics of teaching and learning in higher education, whether in online or face-to-face methods. Instructor and student relationships are core to any academic process, can affect the desirable outcome of teaching and to a large extent depend up on the cultural issues such as expectations regarding initiative [19], ethnic congruence or shared culture between instructors and the students [20], and may vary from country to country [21].

A. Market for Higher Education in Oman: Current and Future

With an increasing need for skilling and re-skilling, the market for higher education is on the rise across the world [22] with increasing number of HEIs offering a range of education from commerce and manufacturing to business management and industry convergence. Oman is not an exemption for ever expanding higher education scenario. In the past half century, the number of HEIs in Oman have increased from a countable few to more than 60 by the end of March 2019 [23]. Basis for this positive scenario can be traced from the long-term plans of the Government to transform Oman into a knowledge economy [24]. Growth in Oman's higher education sector started with the objective of increasing access in the beginning and progressed to improving quality [25] and further to adopting technology [26], [27]. Privatization of higher education has enabled the regulator to meet the challenges of supply and demand [28] through offering more than 350 academic programs covering a range of higher education in Oman [29]. Such a focus on expansion further attracted more interest and investment in the higher education sector while adding in-country value, ICV [30].

The current generation's inclination towards technology and digital aspects, is matching with the industry's digitalization of business processes. Hence, it would be appropriate if teaching and learning methodologies of HEIs in Oman are congruent with the ongoing digitalization [31]. Further, the Government of Oman has demarcated the importance of introducing innovation in the education sector that would contribute to the industry in its National Strategy for Research and Development 2040 [32]. The Sultanate of Oman has been emerging as a regional leader in the areas of e-Government and e-services, with its foray into technological developments and improvement to the IT infrastructure. Significant improvements have been happening to the Omani economy in the form of digitalization which calls for contribution by the higher education sector to train students to cater to this emerging digital ecosystem [33].

B. Impact of Covid-19 on Higher Education Sector — Pioneering Role of MCBS

COVID-19 has been a push factor to enforce the adoption of online and digital technology in higher education [34] that made emergency remote teaching an educational imperative [35]. Digital mode of the education has not only enabled continuity but also added value in the form of modernization of education sector [36]. HEIs have geared-up for the task and started building online teaching and learning skills to suit the online mode of education [37] and MCBS is a pioneer in this aspect. MCBS is the first institute to quickly respond to the pandemic affected situation and started operating hundred percent online. MCBS adopted a range of digital technological tools to support its Learning Management System (LMS) that is used for online teaching, uploading material, conducting online exams, sharing learning material, communicating with learners, and uploading grades. Further MCBS uses a plagiarism tool for checking the similarity and a proctoring software for conducting examinations fairly and through ethical means [38]. Having understood the need for reskilling the instructors, MCBS has been providing extensive training to its faculty members. Thus, MCBS has been demonstrating an exemplary online education model in the Sultanate of Oman.

C. Competencies Required to Succeed in Online Teaching

Literature review related to the online teaching competencies emphasizes on both pedagogical as well as technical competencies of instructors. Pedagogical competencies include, compliance, respond to student queries, mastery in course content, subject expertise, communication, feedback, student engagement, mentoring, managing student progress, etc. One of the important tasks in this pursuit was to identify a set of desired online teaching competencies of instructors. For this purpose, we referred to two sources, a) the literature and b)the benchmarked universities. Though the list of competencies is extensive and

vast, we have identified some of the most recommended competencies. Table I below presents the set of desired online teaching competencies of instructors (used in this study) derived from the above two sources, i.e., literature and benchmarking. Some of the competencies include, IT skills, use of LMS, multimedia skills, use online polls, conduct online discussion forums, develop a course shell, Knowledge of how students learn online – online learning styles [17], [39].

TABLE I: DESIRED ONLINE TEACHING COMPETENCIES IDENTIFIED FROM LITERATURE AND BENCHMARKING

Competency	Sources
• Personalize content • Use of online tools such as polling, proctoring, etc. • Student engagement in online sessions • Knowledge of OER • Design and use rubrics for online assessments • Assessing the online learning journal or log • Basic IT skills • Use of LMS • Multimedia skills • Conduct online discussion forums • Develop a course shell • Knowledge of online learning styles • Troubleshoot technical problems faced by self and students • Maintain records on various cloud and computer platforms • Deal with disruptive students in online sessions	[40], [41], [16], [17], [42], [16], [39], [43], [44], [45], [46], [47], [48],

D. Identifying Online Teaching Skills through Benchmarking

TABLE II: BENCHMARKING EXERCISE

University	Characteristics of the university's online education model	Competencies emphasized
Stanford University	• Interactive platforms that mirror classroom experience • Students present their work, participate in group discussions, raise hand and ask doubts, etc. just like in a classroom • Personalized feedback	• Deal with low performers • Give quick feedback • Personalize content • Use online tools: polling and quizzes
University of the People	• Online reading material and videos, use of OER • Student engagement, collaborative peer work and peer interaction in online discussion forums. • Peer-to-peer reviews • Online community • Online learning journal which is graded	• Knowledge of OER • Check personal performance and attention • Design and use rubrics • Knowledge of assessing the online learning journal or log
UMass online	• Flexibility and blended format • Communication between faculty and students • Discussion boards • Frequent update of courses	• Writing skills • Updating skills • Knowledge of managing discussion boards
Sources: [45]-[47], Complied by the authors		

MCBS understood that a HEI's sustainability is based on continuous improvements through identifying the best or most accepted practices and benchmark with them. Therefore, in this research, competencies required among instructors to succeed in online education, were identified from the literature as well as from the benchmarking universities' online programs. Though Table I presented the desired competencies from literature as well as from the benchmarking exercise, this section (Table II and subsequent narrative) is dedicated to elaborating the benchmarking exercise. As selection of the best universities for benchmarking should be based on some acceptable criteria [49], in this research, the criterion used for selecting benchmarking universities included, accredited universities, universities that are popular and pioneers in online education, and the universities that provided clear description of online education model on their website. Benchmarking universities' online education models were captured from their websites, and based on the characteristics mentioned, key competencies required among instructors were identified. First column presents the benchmarking university, and the subsequent two columns present various characteristics and teaching competencies emphasized in their online education models.

E. Overview of the Theoretical Framework

Table III elaborates key theories considered for the study. Innovation Diffusion Theory [50] propounds that the diffusion of innovation is the process through which a new idea is spread and used in a social system and individual differences do affect the adoption of innovation. Theory of Distance Education [51] highlights the supportive role of institution and use of self-learning material. Discovery Learning Theory [52] proposes that the instructional method should encourage students to learn through interaction with the environment, and through finding solutions for research problems.

TABLE III: THEORETICAL FRAMEWORK

Theory	Key characteristics	Relationship with current research
Innovation Diffusion Theory	• Process through which the new idea is spread and use in a social system. • Individual differences affect the adoption of innovation.	• HEI is a social system • Study of individual differences in online teaching competency between male and female, between instructors with varied years of work experience, etc.
Theory of Distance Education	• Supportive role of institution. • Self-learning material.	• Facilitating online teaching and learning process through hardware and software, training and orientation, etc. • Use of OER, uploading video lessons and learning material, etc.
Discovery Learning Theory	• Students learn through interaction with the environment • Finding solutions for research questions, performing experiments, etc.	• Students participate in the online discussion forums, interact with instructors and peers in an online setup, etc. • Use of simulations (business courses), programming and coding (computer courses)
Sources: [50]-[52], Complied by the authors		

III. PROBLEM DESCRIPTION

Instructors need competencies desirable in online teaching to succeed in the recently emerged online format. But, as it is a nascent area, the decision makers in the higher education sector are uncertain about the level of online teaching competency of instructors. Hence, a study needs to be undertaken to identify whether the instructors possess competencies that are critical to success [15], [53]. Such a study would provide a clarity on the type of competencies to

focus on, and type of competencies to build among the instructors [40]. For a better understanding of the problem, the online education process is presented in three phases, viz., before, during, and after [39] an online teaching session. This categorization would enable managers to identify specific areas of improvement and plan developmental activities in a systematic manner and in all aspects of online teaching. This research aims at finding out the answer for the research question, i.e., what is the current level of online teaching competency among the instructors at MCBS? Thus, the main objective of this research is to identify the current level of online teaching competencies of instructors at MCBS.

IV. Research Methodology

This section describes the scientific research design and approaches adopted in investigating the online teaching competencies of instructors at MCBS. Random sampling technique was adopted to identify a sample of 80 instructors and a self-administered questionnaire was circulated to them [54]. At the end of data collection phase, 53 valid responses were considered for data analysis. The questionnaire was adopted after the approval of Academic Integrity and Ethics Committee of the institution [38]. Secondary sources used for identifying desirable competencies include, published research articles and industry reports.

A. Validity and Reliability

The instrument used to collect primary data from the instructors was tested for validity through the face validity method to ensure whether it measured what was intended to measure. The validity measurement included, content validity to test whether the instrument adequately covered the investigative questions, criterion validity to evaluate whether the questionnaire can accurately predicted the behaviour of subjects (instructors in this case) and construct validity to know whether the questionnaire is able to identify the current level of online teaching competencies of instructors [54]. The primary data was subjected to the reliability testing using Cronbach's co-efficient [55] that would establish by taking into consideration the stability and internal reliability of the responses. Table IV presents the reliability analysis. A high Cronbach's co-efficient value of 0.934 for all items on the questionnaire indicates that the instrument was fit to collect the data and the data collected using this instrument can be used in the analysis. The categorization of the variables into pedagogical and technical competencies along with three stages of online teaching, i.e., Stage 1 before, Stage 2 during and Stage 3 after an online teaching session, too was subjected to the reliability testing. Alpha values of the composite variables of these categories presented in Table 4 indicated high internal consistency and approve further statistical analysis.

TABLE IV: Reliability Analysis

Description	Cronbach's Alpha	N of items
Overall reliability (all items)	0.934	31
Pedagogical competencies	0.914	12
Technical competencies	0.909	12
Stage 1 competencies	0.889	10
Stage 2 competencies	0.903	7
Stage 3 competencies	0.858	7

B. Data Analysis Tools and Techniques

Data relating to online teaching competencies of MCBS instructors was analyzed using the SPSS software (version 17.0). Various statistical analyses conducted as a part of data analysis include descriptive statistics, paired and independent samples *t* test, ANOVA and regression analysis. Descriptive statistics was used for identifying the level of competency in various online teaching activities. Paired and independent sample *t* tests along with ANOVA were conducted for evaluating the difference between pedagogical and technical competencies, competencies during different stages of online teaching and difference between the groups. Linear regression analysis was conducted to find out whether qualification or certification in online instructional methods (independent variable QC) is an antecedent for enhanced online teaching competency (dependent variable OTC).

C. Ethical Considerations of Research

Literature suggests that the researchers should follow data privacy rules while analyzing institutional data [56]. Hence, only relevant and required information about the subjects was collected and information such as their date of birth, name and ID were not collected adhering to the data privacy policy of MCBS [38]. The questionnaire contained an informed consent form, and it was assured that the findings will be shared with the subjects if they seek.

TABLE V: Demographic Characteristics of Sample (*N*=53)

Demographic variable		#	%
Gender	Male	24	45.3
	Female	29	54.7
Overall teaching experience	Less than 5 years	5	9.4
	5 to 10 years	13	24.5
	More than 10 years	35	66
Experience at MCBS	Less than 5 years	40	76.9
	5 to 10 years	1	1.9
	More than 10 years	11	21.2
Qualification	Doctorate	22	41.5
	Master's	26	49.1
	Bachelor's	5	9.4
General qualification in teaching	Yes	41	80.4
	No	10	19.6
Qualification / Certification in online teaching	Yes	47	88.7
	No	6	11.3

Missing values in: Overall teaching experience-1, Experience at MCBS-1, General qualification in teaching-2

V. Results and Discussion

A. Demographic Analysis

Demographic characteristics of the sample explained in Table V indicate that the gender distribution of the sample was almost equal with 45.3 percent male and 54.7 percent female instructors. The number of full-time instructors at MCBS, during the period of data collection were 80 out of which around 65 percent are female instructors. Thus, our sample (*N*=53) characteristics match with the population characteristics. Most of the instructors (66 percent) have more than 10 years of teaching experience in their career. But most of them are relatively new to MCBS with less than 5

years of experience at the institution. This could be a reason behind their high academic or pedagogic skills and relatively lower online or technical skills. Most of the respondents (80.4 percent) have a certification or qualification in general teaching. A higher percentage of the respondents (88.7) have acquired a certification or a formal qualification in online instructional teaching methods. This could be a reason for their high competencies in online teaching.

B. Online Teaching Competency — Self-Rating

This self-rating question was asked at the beginning of the survey to find out whether there is a difference between the competency that the instructors believe they possess and the competency that they really possess. The data was coded as, 1: very low competency, 2: slightly low competency, 3:moderate competency, 4: slightly high competency and 5:very high competency (a scale of 1 to 5). An average of lower than 3 would indicate low self-rating whereas an average of above 4 would indicate high self-rating. In the current analysis, an average rating of 4.18 indicates that the instructors at MCBS, irrespective of gender, teaching experience and qualification rated themselves high on online teaching competency (no statistically significant difference was found between these groups). Low co-efficient of variation of 0.24 (CV<1.0) indicates that the responses were not deviating a lot and the opinions were close to one another. Further, the skewness co-efficient of -1.362 (a value less than -1.0) indicates that the data is skewed to the left indicating high self-rating by the respondents. This finding is consistent with the findings of earlier studies, wherein, Centra [57] concluded that college teachers have the tendency to rate themselves high on their teaching competencies and in another recent study, Taheri *et al*. [58] too found that faculty self-rating was significantly higher than that of the rating by the students. Similarly, in this study, though statistically not significant, a difference was found between the instructors' self-rating of their online teaching competency (4.18) and their online teaching practices (3.99) which reflect the real competency.

C. Knowledge and Application of Online Instructional Practices that Reflect Online Teaching Competency

To identify the online teaching competencies of MCBS instructors, the online teaching activity was divided into three stages viz., before the online teaching session begins, during an online teaching session and after completing an online teaching session [39]. Further, these competencies were divided into, pedagogical competencies and technical competencies [59]. This means, each stage has pedagogical as well as technical competencies. Pedagogical competencies include, teaching style, understanding students' learning styles, designing learning material, evaluation methods, etc. Whereas, technical competencies include making introductory videos, use of Open Educational Resources (OER), multimedia skills, IT skills, use of LMS, use of online polls, use of proctoring and plagiarism tools, etc.

Each competency was presented in the form of an activity and the instructors were required to identify their level of competency in each activity with reference to their practice of that activity. These activities were not presented in the groups but individually. Thus, the respondents would not know whether a practice falls under stage 1 or 2 or 3 or whether under pedagogical or technical category. As indicated in the research methodology section, these online instructional practices were taken from the literature as well as from benchmarked universities. More practices were included in technical aspect as the whole issue is about integrating the traditional teaching practices with the emerging online technology that has become an influencing factor [60]. Hence, the idea was not to evaluate their generic teaching competencies but to evaluate their online teaching competencies through the application or practice of the online instructional methods. The reason is that their practices are a good measure of their competency level. Hence, it was decided to capture their current practices to evaluate their competency in online instructional methods.

TABLE VI: ONLINE TEACHING COMPETENCY (OTC) REFLECTING IN INDIVIDUAL ACTIVITIES (ARRANGED IN ASCENDING ORDER)

No	Activity	Mean	Std. dev.
OTC1	Use online reflective journal or learning log	3.47	.912
OTC2	Multimedia related activities	3.49	1.012
OTC3	Prepare online reflective journal or learning log	3.53	.890
OTC4	Use of Open educational resources (OER)	3.58	.825
OTC5	Troubleshoot technical problems faced by self and students	3.66	.706
OTC6	Match teaching to students' online learning styles	3.69	.883
OTC7	Evaluate online reflective journal or learning log	3.70	.749
OTC8	Use online tools such as polling during an online session	3.74	.923
OTC9	Design multimedia learning material	3.85	.949
OTC10	Maintain records on various cloud and computer platforms	3.88	.855
OTC11	Prepare an online course template	3.96	.791
OTC12	Deal with low performers	3.96	.831
OTC13	Design rubrics for online assignments	3.96	.839
OTC14	Break students in to groups in an online session	3.98	.888
OTC15	Deal with disruptive students during an online session	4.00	.863
OTC16	Use various academic records related to online mode of education	4.04	.808
OTC17	Use Moodle based LMS	4.08	.874
OTC18	Monitor students' performance and attention in an online session	4.11	.824
OTC19	Engage students in an online session	4.21	.723
OTC20	Assess online work	4.25	.731
OTC21	Give feedback	4.28	.794
OTC22	Upload recorded lessons	4.32	.827
OTC23	Communicate with students through various online platforms	4.36	.736
OTC24	Basic IT activities	4.43	.747

D. Online Teaching Competency — Overall

With an average of 3.94 (on a scale of 1 to 5) findings indicate that the instructors at MCBS possess moderate to high overall competency in online teaching. A relatively low standard deviation of 0.581 indicates that there is no much deviation in the competency levels. Further, a negative value of coefficient of skewness, -1.272 (Skp<-1) indicates that the

data was skewed to the right. Thus, it can be interpreted that although most of the instructors at MCBS are reasonably competent in online teaching, there are a few instructors who are less competent. There is a need to identify those instructors and strengthen their online teaching competencies. Comparative analysis revealed that no statistically significant difference was found between gender, years of teaching experience and qualification of the respondents. This finding is inconsistent with the study by Varank and Ilhan [61] who found that educational technology skills were associated with gender and years of experience. But they have considered only classroom management skills in a physical set up and not the online teaching setup.

E. Competency — Individual Activities and Practices

Table VI presents the individual competencies based on the practice of various activities related to online teaching. The mean values indicate the implementation of online teaching practices on a scale of 1 to 5 wherein 1 indicates no implementation at all and 5 indicates regular practice of that activity. Though all 24 practices are presented in Table 6, only key practices are explained hereafter. The averages are presented in ascending order for the purpose of easy understanding. Findings indicate that the faculty members at MCBS possess high basic IT skills such as uploading documents, creating tests on online platforms, using proctoring tools, etc. (highest average of 4.43). They are also highly competent in communicating with students through the LMS platform and other online modes (4.36). Other important technical aspects such as uploading the recorded lessons (4.32), engage students in an online session (4.21) are being effectively performed by the instructors which indicate that they possess these competencies.

But there is a need to review the areas that the instructors need to be up-skilled, and their competencies need to be improved. Our findings indicate that the instructors at MCBS have low competency in preparing and using an online reflective journal. Though some of them might know how to prepare an online reflective journal (3.53), the usage is lower (3.47) than the knowledge to prepare (p<0.01), which clearly indicates the gap in the related competency. Multimedia related competencies too are low (3.49) which indicate low competency in the areas of preparing introductory videos, video lessons, etc. One of the key areas that need attention is knowledge and application of OER, one of the lowest rated items with an average of 3.58. As the OER have been gaining significance in the higher education spectrum, the instructors at MCBS need to be trained in the use of OER in teaching. Further, the instructors have indicated having low competency in troubleshooting technical problems faced by themselves as well as for students and peers (3.66). The difference (gap in competence in this case) was significant between those who have acquired qualification or certification in online instructional methods and those who have not. The difference was noticed in their understanding of 'students' online learning styles' (3.98 and 3.33 respectively; t49=5.370; p<0.05). This finding can be considered as a triangulation of what was found using the regression analysis, i.e., qualification and certification in online instructional methods add value and enhances online teaching competency among instructors. These results are consistent with the findings of Metz and Bezuidenhout [62] who surveyed the e-tutors in South Africa and concluded that, there are gaps in online teaching competencies in the areas of understanding learner's online learning styles, multimedia skills and using online discussion forums.

F. Competency — Pedagogical and Technical

Though Bahriah and Yunita [63] in their Technological Pedagogical Content Knowledge (TPACK) model and Sopegina *et al.* [59] emphasized on the integration of the pedagogical and technical aspects for effective teaching, in this research, online teaching practices are divided into pedagogical and technical (Table VII) as several researches have analyzed these two aspects separately [48], [64] and other researchers have recommended the compatibility of pedagogical aspects with the technical aspects [65]. Pedagogical activities include, preparing a reflective journal, matching the instructor's teaching style to the students' learning styles, design and develop content, prepare a course template, deal with low performers, deal with disruptive students, design rubrics, monitor students' performance, student engagement and assessment. Instructors at MCBS are reasonably good in their pedagogical competencies (3.99). Technical activities include, use of an online reflective journal, multimedia activities, use of OER, troubleshoot technical problems, use of online tools such as polling, maintaining records on cloud platforms, use of LMS, along with basic IT activities which are utmost important in an online teaching setup. MCBS instructors are slightly lower in technical competency (3.89). The paired sample t test indicated that pedagogical and technical competencies are strongly and positively correlated (r=0.914, p<0.01) but there is a statistically significant difference between these two categories (t52=2.894, p<0.01). It was found that on an average, the competency level in technical is 0.098 lower than pedagogical competency (95% CI [0.03, 0.17]). This finding is consistent with Zou *et al.*'s [66] research of EFL instructors who identified low implementation of technical aspects such as use of recorded teaching materials and other novel methods in online teaching.

TABLE VII: GROUPING OF COMPETENCIES

Pedagogical competency	Technical competency
OTC3, OTC6, OTC9, OTC11, OTC12, OTC13, OTC15, OTC16, OTC18, OTC19, OTC20, OTC21	OTC1, OTC2, OTC4, OTC5, OTC7, OTC8, OTC10, OTC14, OTC17, OTC22, OTC23, OTC24
Av: 3.99; SD: 0.592	Av: 3.89; SD: 0.596
t Test results: r = 0.914, p < 0.01; t_{52} = 2.894, p < 0.01; 95% CI [0.03, 0.17]	

G. Stage-Wise Technical Competency

As indicated earlier, the online teaching was divided into three stages, before starting a session, during a session and after completing an online teaching session. Item numbers mentioned in Table VIII indicate the activities related to technical competencies under each stage. Paired samples t test revealed that the competency is low in the stage 1 compared to stage 2. Correlation between competency in technical activities related to stage 1 and stage 2 is strong and positive (r=0.778, p<0.01) but there is a significant difference between technical competencies in stages 1 and 2

(t52=-3.344, p<0.05). Technical competencies in stage 1 are -0.213 lower than the technical competencies in stage 2 (95% CI [-0.34, -0.08]). Thus, it can be interpreted that there is a need to increase the competency of MCBS instructors in technical aspects falling under Stage 1. Metz and Bezuidenhout [60], have indeed recommended training prior to beginning the e-tutoring, i.e., in Stage 1.

TABLE VIII: TECHNICAL COMPETENCIES - STAGE-WISE

Stage 1: Before starting an online teaching session	Stage 2: While conducting an online teaching session	Stage 3: After completing an online teaching session
OTC1, OTC2, OTC4, OTC17, OTC24	OTC8, OTC14, OTC23	OTC5, OTC7, OTC10, OTC22
Av: 3.81; SD: 0.673	Av: 4.03; SD: 0.707	Av: 3.89; SD: 0.583

t Test results: Stage 1 & 2: $r = 0.778$, $p < 0.01$; $t_{52} = -3.344$, $p < 0.01$; 95% CI [-0.34, -0.08]

H. Qualification or Certification in Online Instructional Methods (QC) as an Antecedent of Online Teaching Competency (OTC)

For the past ten years, the instructors at MCBS have been using blended teaching methodologies, that include both face-to-face and online modes and moved to a hundred percent online teaching after the pandemic began. Though most of them have undergone formal certification in online instruction, at the time of data collection, a few of them have indicated that they haven't yet undergone any formal qualification or certification. Based on this feedback, and the literature [60], [66], [67], it was decided to evaluate the relationship between formal qualification or certification (independent variable QC) and the online teaching competency of the instructors (dependent variable OTC) in order to conclude whether a formal qualification or certification would be an antecedent to enhanced online teaching competency. For this purpose, linear regression analysis was conducted, and the results are presented to test the null hypothesis that qualification or certification in online instructional methods does not enhance the online teaching competency.

I. Determining the Fitness of the Model

The model summary of regression analysis presented in Table IX shows r = 0.656 and r2 = 0.430 with a standard error of 0.44260. It can be interpreted that the correlation between the dependent and independent variables is moderate to high and that the model explains a variation of 43 percent of the dependent variable. This moderate effect could be increased if, a) more independent variables (k) be added to the model, and b)if the sample size (n) be increased. In the first case, available literature indicates that even if the instructors have general teaching qualifications, their online teaching competency to a large extent depends upon additional training or qualification or certification in online instructional methods [68]. However, other personal factors such as level of involvement and dedication, socio-demographics of the faculty members, online teaching experience, confidence in their ability to use technology [69], etc. too may contribute to the online teaching competencies [70] that could be covered in future research.

TABLE IX: REGRESSION ANALYSIS - MODEL SUMMARY

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	Durbin-Watson
1	.656[a]	.430	.419	.44260	2.198

a. Predictors: (Constant), Qualification or certification in online instructional methods b. Dependent Variable: Overall online teaching competency

This study included only one independent variable as the main purpose of this research is to recommend the HEIs in general and MCBS in particular about the actions that can be taken to enhance the online teaching competencies of the instructors. Modification of behaviour can be taken up in the long run. Hence, only one independent variable, i.e., qualification or certification in online instructional methods, is included in this study. In the second case, the study can be extended to the overall higher education spectrum or to the university level and the data can be collected from a bigger sample. Thus, 0.44260 value of the standard error of the estimate would decrease in case of increase in adjusted R^2. Further, the Durbin-Watson d = 2.198 that falls between the two critical values of 1.5 and 2.5 (1.5<d<2.5) indicates that there is no first order autocorrelation which validates the regression analysis.

J. Explaining the Statistical Significance of the Model

Further, to determine the adequacy and reliability of the model, ANOVA test is conducted to test the hypothesis that there is no linear relationship between the variables. In this case, a linear relationship is needed between the independent and the dependent variables so that we can explain that the former causes changes in the latter. Data presented in Table X below clearly indicates that there is a statistically linear relationship between the variables as the hypothesis is rejected. The F value of 38.540 with p<0.01 at 51 degrees of freedom indicates that the model that explains the antecedence of qualification or a certification in online instructional methods before the online teaching competency is statistically significant. Thus, it can be concluded that the regression model is a good fit for the data.

TABLE X: REGRESSION ANALYSIS - SIGNIFICANCE OF THE MODEL

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	7.550	1	7.550	38.540	.000[a]
Residual	9.991	51	.196		
Total	17.540	52			

a. Predictors: (Constant), Qualification/certification in online instructional methods b. Dependent Variable: Overall online teaching competency

K. Explaining the Model Coefficients

Table XI presents the statistical significance of the regression coefficients and the intercept of the model (1). Our regression analysis explained the linear regression function as

$$OTC = \alpha + \beta * QC \quad (1)$$

OTC is the Online teaching Competency

QC is the Qualification or Certification in online instructional methods

α is the regression constant

β is the beta coefficient

The equation is translated as:

Online teaching competency = 2.343 + (0.902 * Qualification or certification in online instructional methods)

TABLE XI: REGRESSION ANALYSIS — MODEL COEFFICIENTS[A]

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	2.343	.265		8.852	.000
Qualification or certificate in online teaching	.902	.145	.656	6.208	.000

a. Predictors: (Constant), Qualification/certification in online instructional methods b. Dependent Variable: Overall online teaching competency

A unit change in qualification or certification in online instructional methods will have a positive effect of 0.902 times of online teaching competency. Thus, it can be interpreted that qualification or certification can add up to an increase up to 1-point in the online teaching competency which is measured on a scale of 1 to 5 (1 lowest to 5 highest competency). Let us take an example of an instructor's online teaching competency as 3 points (low to moderate competency). In such case, if the instructor undergoes training or certification in online instructional methods, there is a possibility of him/her moving to 3 + 0.902 = 3.902 (from moderate to high competency). Hence, the HEIs should provide training related to the online instructional methods to their instructors and support their certification enrolments. This finding is consistent with the recent literature. Zou *et al*. [66] who studied the effectiveness of online EFL teaching during COVID-19 indicated that when teachers undergo training, which builds confidence in them, they could deliver more effective online teaching. Further, according to Metz and Bezuidenhout [60], additional training and support are needed before starting e-tutoring sessions.

VI. CONCLUSION AND RECOMMENDATIONS

Online teaching competencies are an imperative in the modern educational system. HEIs have realized this and started equipping their organizations with modern technology in terms of hardware and software. But the HEIs should understand that they should improve the online teaching competencies of their instructors so that the facilities created be put to best use and the desired results be achieved. Emphasis on enhancing the online teaching competencies among faculty members would require a study of their current level of competency and identifying the gaps. The current research attains significance in the light of MCBS focusing on online education not only as a response to the ongoing COVID-19 crisis, but also to meet its long-term goal of pioneering the online educational system in Oman and its vision to be a prominent HEI in the Middle East region.

Instructors at MCBS possess moderate to high (but not very high) overall online teaching skills. As regards technical aspects, they are highly competent in activities such as using online proctoring tools, operating on Moodle-based LMS platform, communication, uploading documents, online course delivery, and student engagement in online sessions. But one of the main areas that need attention is their competency in preparing and using an online reflective journal. As this aspect falls under both pedagogical as well as technical categories, firstly, the instructors need to be taught about designing and using a reflective journal in the off-line method (pedagogical competency) and secondly about doing the same in an online setup (technical competency). This is important because, a reflective journal is one of the highly recommended ways of identifying and tracking the students' learning process, which has become a difficult or critical aspect in hundred percent online teaching. Further, other technical aspects that need to be addressed include, multimedia related competencies, use of OER, troubleshooting problems (of self and students) particularly during critical times of online exam or presentation, breaking students into groups during online sessions, etc. As it was found that the instructors' technical competencies are less than their pedagogical competencies, it calls for building technical competencies mentioned above.

With reference to stage-wise online teaching competencies, most of the workshops and training sessions focus on skills related to Stage 2 (conducting an online session); whereas a lot needs to be done to build skills related to Stage 1 (before starting an online session), as it was found that the instructors at MCBS have low technical competencies related to this stage. A formal spaced-training program could be scheduled before the beginning of every semester and assisting the instructors at the beginning of the semester could be highly helpful for the smooth conduct of online teaching through-out the semester. Further, it is recommended to facilitate or support a formal qualification or certification program for instructors as the findings indicated that formal qualification or certification is an antecedent of online teaching competency. These suggestions are consistent with the existing literature. König *et al*. [71] researched the relationship between teacher education and technical adaptation, i.e., adoption of information and communication technologies (ICT) by instructors and found that knowledge and use of ICT tools are instrumental in successful online teaching during COVID-19. [72] recommended that the universities must develop training programs or support the certification of their faculty members to enhance their online teaching performance. Thus, this research has identified gaps in the online teaching competencies of the instructors at MCBS which would enable the administration to enrich the instructors with needed competencies and fill the gaps.

A. Theoretical Implications

This paper has implications of theories presented in Chart 1. Some of the important aspects emphasized in the Innovation Diffusion Theory by Rogers [50] are addressed in this research paper. An HEI (MCBS in this case), is a social system through which the contemporary and modern online instructional practices are spread. Further, contrary to the theory, it was empirically proven in this research that individual differences such as gender and overall teaching experience are not linked to the knowledge and application of innovation such as use of OER learning material. This paper also covers key issues explained in the theory of Distance

Education by Holmberg [51] by highlighting the supportive role of MCBS in building the online teaching and learning environment in the institution, providing orientation to the instructors, use of LMS platforms and OER, etc. This paper has implications related to the Discovery Learning Theory by Ormrod [52] by referring to the student participation in discussion boards (dealing with questions by professor or peers) and performing online experiments with the help of simulations.

B. Practical Implications

This research related to evaluating online teaching competencies of instructors has high relevance in the current one hundred percent online education model adopted by MCBS. It would benefit the college administration and management in making decisions related to the professional development of the employees, instructors in this case. This research is also expected to contribute to the other important stakeholders in the higher education spectrum, i.e., the sponsors, in the form of understanding the futuristic online education scenario. This research attains its significance in the light of MCBS transforming into the major online education provider and pioneer in online education in the Sultanate of Oman and would contribute to its vision to become the most prominent institution of higher education in the Middle East region.

C. Scope and Limitations of the Study

This study includes responses from the instructors teaching in various programs at MCBS. The period of the study was the academic year, 2020-2021. Only one independent variable, i.e., qualification or certification in online instructional methods, is included in this study.

D. Future Scope of the Study

Personal factors such as level of involvement, ability to cope with the changes, and individual differences too may contribute to the online teaching competencies that could be covered in future research. This study can be extended to the overall higher education spectrum or the university level.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Venkat Ram Raj Thumiki analysed the data; Hesham Magd conducted literature review; both the authors had proof-read the manuscript and approved the final version.

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