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COVID-19 Pandemic and Online Teaching: An Evidence from Universities of Pakistan

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Abstract
Owing to technological developments in artificial intelligence (AI), virtual reality (VR), augmented reality (AR), and cloud computing (CC), teaching at the university is moving from traditional to online sphere. This research article investigates how the university teachers teach students online across specific demographic variables. Through stratified sampling selection, 206 university teachers participated in the self-developed questionnaire survey. The reliability coefficient of the questionnaire was .91 by employing Cronbach's alpha. t-test and ANOVAtechniques executed to analyze the data.It was found that the male university teachers than females, the sciences' department than social sciences, the assistant professors than professors, and lecturers, and the university teachers with any teaching experience can teach

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students online. Continued research needs to conduct to analyze the university teachers' intentions and attitudes towards online teaching adopting a standardizedsurvey Unified Theory of Acceptance and Use of Technology (UTAUT).

Keywords: University teachers, learning management system (LMS), course designing, online-teaching, e-learning, e-assessment.

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1. Introduction

Teaching online has become an integral part of higher education in this era of digital technology. It is the essential knowledge and skill at university-level teaching. Developing pedagogical capacity of university teachers in online teaching is a very elevated academic, professional and instructive competence. This abilityrequires a lot of skills, strategies, devices, and gadgets(Thompson, 2003). Teaching online is defined as to carry out a course/subject partially or throughthe internetor on any learning management system for the students (Ko & Rossen, 2017). The manipulation of online technology is rapidly growing and increasing in universities (Maor, 2006). According to the scholarly researches on online teaching, the university teachers have to demonstrate the essentialskills such as to structure virtual learning environment (VLE), design a course, conduct the class, engage and assess students (Alsina, 2002;Jonson, 2015; Kearns, 2016; Lesli, 2020; Martin, et al, 2019).

The professional competenceof university teachers in online teaching is to assume and structure a learning management system or virtual learning environment at the university (Asamoah, 2020; Findik-Coskuncay, et al, 2018; Gonen & Basaran, 2012; Trestini, 2018). Learning management system (LMS) is an internet/web-based software for learning andit contains theschedule of coursework, keep and manage a student' data, assignments, progress, web pages for sharing the texts, videos, and links to other resources, and discussion forum (Al-Ajlouni, 2015; Goomas & Czupryn, 2019).Teachers consider the students' perceptions and attitudes before using the learning management system. Students show their approbation on the efficacy of pedagogical methods, content, and learning in the learning management system (Al-Neklawy, 2017). Some modern learning management systems are Moodle, Blackboard, Canvas, Zoom, and Google classroom. Using this technology revamps teachers' modern approach to teaching online (Jones, 2019; Marachi& Quill,2020; Horvat, et al, 2015; Zhang, 2016). An increasing number of learning management system is confounding and daunting for teachers. However, the university teachers should choose a modern learning management system and software equipped with state-of-the-art facilities and resources. It helps to derive the learning of students and enrich teachers' competence inonline teaching.

Designing the course in online teaching is the paramount professional skill of university teachers (Gunn, 2013). Online course designing contains elements such as students learning outcomes, content presentation, student activities, assignments, assessment, and feedback (Vai & Sosulski, 2016). A well-developed course develops deep learning and engages students with the content, class fellows, teachers,discussion forum, and resources (Arthurs, 2016). Further,

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incorporating effective communication and meaningful interaction require in online course design (Tallent-Runnels, et al, 2006). Course designing is an ongoing process and be updated after a semester/year (Harrison & Bergen, 2000). If the course is not developed efficiently, the students' dropout rate may increase. Thus, it is necessary to overcome this factor by providing quality courses and activities for students (Lee & Choi, 2011). The teaching and learning process does not proceed without effective course designing and content. Course design provides a prudent guideline for effective pedagogy in online teaching.

In online teaching, university teachers can interact with students through a variety of media. One of them is that the university teachers conduct live lectures and have direct audio/video tutorial discussions with the students (Caladine, 2008). University teachers can answers students' raised questions in live forums (Weiser, et al, 2018). So students can better comprehend difficult concepts of the lesson and course. When teachers and students are live on an internet forum, this is the synchronous online teaching. The synchronous online teaching mode is attaining the similar outcomes when compared with the traditional and face-to-face teaching (Szeto, 2014). This mode of online teaching increases the engagement and motivation level of students (Martin & Martin, 2015). University teachers record their lectures and provide them to students online. Students will try to understand the recorded lectures when they see fit. Students record their questions about the lessons and post them to the teachers. And when teachers have time, they record and post the students' responses. In this way of teaching, teachers and students need not be online simultaneously. This is the asynchronous online teaching. Finally, there is another way of teaching online. In this third way of teaching, teachers and students combine the first two methods to continue their teaching and learning. This is the hybrid online teaching. In online teaching, the hybrid form is also becoming very significant in terms of its usefulness. Students should be given a central position whatever method is adopted.

Online teaching at the university level cannot assume success unless it achieves its goals and objectives. For this purpose, students' performance in the course assessesthroughthe tests. Tests are formative or summative, both are beneficial for evaluating the student's performanceand learning (Adeshola & Abubakar, 2020; Thormann & Zimmerman, 2012). In online teaching, different tests are conducted by university teachers. These include thetests, questions, quizzes, e-portfolios, journals, projects, assignments, presentations(Boettcher & Conrad,2016; Conrad & Openo, 2018; Kurdi, et al, 2020).). It is expected that university teachers need to know and master every new method of assessment and testing. Highly advancedtechnologies in artificial intelligence (AI), virtual reality (VR), augmented reality (AR) and cloud computing (CC) have deeply affected education, especially teaching and learning in higher education (Abdullahfattah, 2019; Liu, et al, 2017; Thompson, Kaser & Grijalva, 2019; Kinshuk, et al, 2016; Porayska- Pomsta, 2016; Roll, et al, 2018)). Conceptual framework illustrates of the study in figure 1.

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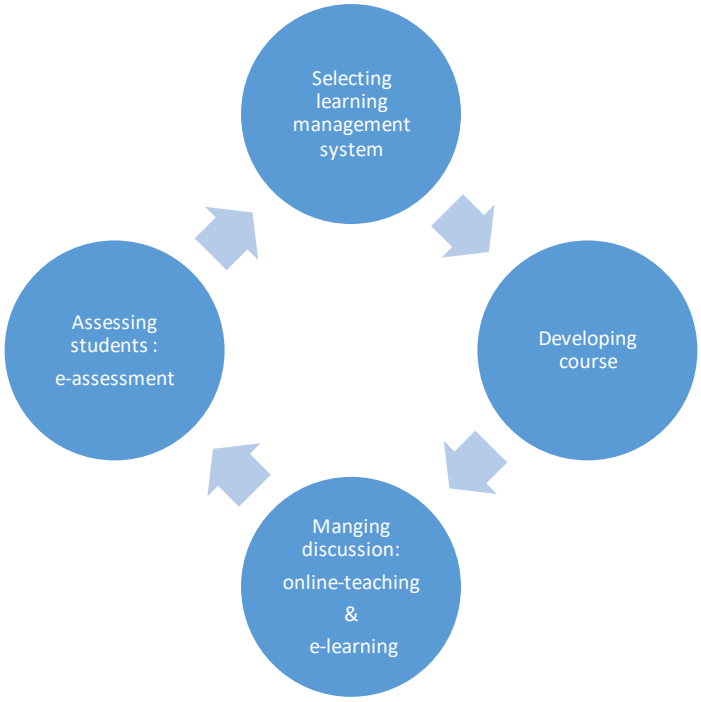

Figure 1: Conceptual framework of online teaching for university teachers

The illustration in figure 1 depicts that online teaching comprises four steps such as selecting the learning management system, designing and developing the course, conducting lectures, and managing discussion and assessing students learning. So, university teachers must adopt and demonstrate these skills to meet the challenges of digital and online teaching.

Keeping in view this scenario, university teachers have to adapt teaching combined with new technologies to drive the learning of students and to reshape their professional competence. This research conducted to analyze the university teachers' competence to teach online in Pakistan .Based on the rationale of the study, theobjectives of the study were:

1. To measure the online teaching of university teachers during pandemic.
2. To analyze the differencein demographic variables ofuniversity teachers in online teaching during pandemic.
3. To find out the difference between social sciences and sciences teachers in online teaching during pandemic.

Based on the objectives, the study formulated the following key research question:

1. To what extent the university teachers teaches online classes during pandemic?
2. What is the difference in the demographic variables of university teachers in online teaching during pandemic?
3. To what extent the teachers of social sciences and sciences teaches online classes during pandemic?

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2. Review of the related literature

Revolutionary changes are happening in universities owing to rapid development in cutting-edge and smart technologies. These fast-growing technologies are changing the ways of learning and teaching.University teaching has to combine these technologies to meet the challenges and needs of online teaching. To address the state-of-the-art approach of teaching online, the university teachers need to be efficient on a computer and of word processing, PowerPoint, Excel, social networking, discussion forum, audio-video conferencing, and blogs (Major, 2015). Besides these basic computer literacy skills, they can also choose a learning management system. In the modern era of digital technology, several tools of learning management systems have developed for online teaching. These include the Whiteboard, WordPress, Canvas, Moodle, YouTube, WhatsApp, Facebook, Edmodo, Skype, Gmail, Google Classroom and Zoom and social robots for education (Belpaeme, et al, 2018; Meintjes & Wyk, 2020; Muhammad, et al, 2015; O'Sullivan, 2012; Zhang, 2016). The apps and software selection plays an outstanding role in providing a positive teaching and learning experience for teachers and students in online teaching All software and applications have different unique characteristics and online teaching purposes. University teachers can execute these applications by installing on Androids, mobile phones, tablets, and laptops, depending on the necessity of the courses and teachers' teaching strategies.

University teachers develop the courses, which they will teach online (Cuevas, 2019; Dunlap & Lowenthal, 2018). Course design and development in online teaching is, normally, contain four distinctive approaches such as lecture-based, case-based, group/team/class-based and hands-on-based courses (Anderson & Schiano, 2014; Bauer, 2019; Chandler, et al, 2013; Craig, Nodeland, et al, 2020; Lou, 2004; Phillips, 2015; Rubenking & Dodd, 2018; Zheng, et al, 2020). Different faculties e.g., sciences and social sciences have different courses and subjects designing and development. Diversification requires that the method of developing courses is feasible. Adopting the conventional approach, the course includes objectives of the subjects, a scheme of study, course content, and reading material. However, it does not work and enhance students' performance, motivation, and attitude towards online teaching and courses. But using new technologies needs different approaches towards course planning and development with goals, resources, and tools (Lisa & Punya, 2004). By manipulating the planning model, the teachers can use objectives, discussions, learning activities, and assessment after consulting with quality matter rubrics or any other intended standards (Cross & Polk, 2018). The videos, discussion forums, and authentic assignments in course designing and development increase students' active participation (Baldwin, 2019). Option, personalization, self-direction, variety, and a learning community are useful indicators to design the course (Ausburn, 2004). The quality of the course design may be increased by focusing on complex tasks and considering multiple perspectives of the subjects (Schweizer, et al, 2002). And the university teachers evaluate the quality of courses through evaluating the peer-reviewed assessment, attaining informal feedback, and quality matter standards (Ding, et al, 2017; Gibson & Dunning, 2012; Meikleham & Hugo, 2020). Because the quality concerns is fundamental to developing the courses at university.

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University teachers have adopted many teaching methods in online teaching (Mayadas,et al, 2009). Usually,they conduct the discussion methodin the online platforms.It is an asynchronous online activity and is a primary online teaching strategy (Smith, 2019). It is an alternative of lecturing strategy and replaced the face-to-face (F2F) interaction of the traditional classroom (Andresen, 2009; DiYanni & Borst, 2020). Discussion is a dialogue/conversation between teachers and students on a specific concept from the course. Students; responses on teachers/students' questions and posts on the related topic. Through this strategy, teachers scaffold the learning, encourage the interactions, extend the engagement and develop the new concepts.Chatroom, video-conferencing, and social media are managed for discourse and debate (Bender, 2003; Boulder, 2020; Wikle & West, 2019). Students' critical thinking developswhen effective questions are employed by the teachers (Williams & Lahman, 2011).Discussion forum solicits the cognitive presence and promotes higher-order thinking skills as well (Darabi, et al, 2013).The role of the teachers in the discussion is very significant. They set objectives, post rules, engage students through challenging questions, ensure the discussion stirs up the discourse occasionally, createa positive attitude, and finally assess students learning (Mitchell & Shepard, 2014). To perform the role of facilitator in the discussion, the university teachers motivate, support, and scaffold the learning and achievement of students.

The assessment provides some useful information about the students' learning and performance. It is the most significant and integral component of teaching. Assessment is a process to measure the performance and achievement of students in a specific coursethrough employing many techniques such as tests, interviews, observations, etc. Essentially, it is carried out during the teaching to improve the learning and at the end of the teaching to measure the learning of students. For this teachers use tests, quizzes, assignments, projects, portfolios, and presentations (Ryan, 2016). However, there is more emphasis on e-assessment in online teaching. It is conducted online (Azevedo, et al, 2019; Gipps, 2005;Shaheen, 2019). Learning analytics is a widely used techniqueand emerging field in education by collecting and analyzing the data to better understand and optimize the learning performance of students (Lodge, et al, 2019; Singh, 2018). So, if university teachers intend to clarify and strong fact-based decision-making on students' performance, they must adopt new assessment techniques.

3. Research Methodology

The research is quantitative and uses a survey, whichaddresses the online teaching of the university teachers. The university teachers of four public universities in Faisalabad, Punjab, Pakistan was the population of the study. 428 university teachers were working in these universities. The data about the population was taken from the respective university websites from 2018-2019. Through stratified sampling selection, a total of206 university teachers participated in the survey. The university teachers were divided into different strata such as gender-wise (male and female), faculty-wise (sciences and social science), designation-wise (lecturers, assistant professor, associate professor, and professor), and teaching experience-wise (1-5 years, 6-10 years, 11-15 years and over 16 years). Then, the simple random technique was

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used to obtain the sample. Table 1 illustrates the selected sample' demographic and characteristics in frequency and valid percent.

Table 1

Frequency and valid percent of university teachers across the selected demographic and its characteristics

Demographics	Characteristics	Frequency	Valid Percent
Gender	Male	88	42.7
	Female	118	57.3
Faculty	Sciences	82	39.8
	Social Sciences	124	60.2
Designation	Lecturer	82	39.8
	Assistant Professor	107	51.9
	Associate Professor & Professor	17	8.3
Teaching Experience	1-5 Years	111	53.9
	6-10 Years	56	27.2
	11-15 Years	33	16.0
	Over 16 Years	6	2.9

The self-developed questionnaireconsisted of demographic information and online teaching of university teachers. The university teachers responded to their agreement and disagreement on the five-point Likert scale ranging from strongly agree to strongly disagree in the questionnaire.The expert'sopinion and the pilot study techniques conducted to validate the questionnaire. The reliability coefficient of the questionnaire was .91 by employing Cronbach's alpha.The researchers visited the public universities and distributed questionnaires among university teachers to achieve their responses on online teaching. And the informed consent attained from all the participants of the study before distributing the questionnaire.

Results

Table 2

One-Sample T-Test for University Teachers Teach Students Online

Statement	*N*	Mean	*SD*	*df*	*t*	*Sig.*
Teachers teach students online	206	4.07	.95	205	61.05	.00

Table 2 shows thata one-sample t-test applied to test the statement about university teachers teach students online. The data in Table 2 shows (t (205) = 61.05, p = .00 < .05) that for university teachers teaching students online, this result is significant.

Table 3

Independent Sample t-test for Male and Female University Teachers Teach Students Online

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Gender	*N*	Mean	*SD*	*df*	*t*	*Sig.*
Male	88	4.22	.78	204	2.01	.04
Female	118	3.95	1.05			

Table 3 depictsthere are significant differences between male and female university teachers teaching students online (t (204) = 2.01, p = .04 < .05). It has also been observed thatmale university teachers (M = 4.22, SD= .78) support online teaching than female university teachers (M = 3.95, SD= 1.05).

Table 4

Independent SampleT-Test for Department of University Teach Students Online

Faculty	*N*	Mean	*SD*	*df*	*t*	*Sig.*
Sciences	82	4.12	.80	204	.598	.55
Social-Sciences	124	4.04	1.04			

Table 4 shows there is a no significant difference between the online teaching sciences and social-sciences departments of university teachers (t (204) = .598, p = .55> .05). Hence, it was found that university teachers in the department of social sciences and university teachers in the school of sciences teachonline.

Table 5

One-way ANOVA for University Teachers by Designation Teach Students Online

	Sum of Squares	*Df*	Mean Square	*F*	*Sig.*
Between Groups	6.504	2	3.252	3.639	.028
Within Groups	181.404	203	.894		

Table 5 displaysthere are significant differences between the university teachers corresponding to designated online professors (F = (2, 203) = 3.639, p = .02 < .05). However, it is believed that compared with the professors (M = 3.94, SD= .24) and the lecturers (M = 3.87, SD= 1.11), the assistant professors (M = 4.24, SD= .86) tend to teachonline.

Table 6

One-way ANOVA for Teaching Experience of University Teachers Teach Students Online

	Sum of Squares	*Df*	Mean Square	*F*	*Sig.*
Between Groups	3.488	3	1.163	1.273	.258
Within Groups	184.420	202	.913		

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Table 6 demonstrates there is no significant difference between online teaching and teaching experience among university teachers (F = (3, 202) = 1.273, p = .25 > .05). According to analysis, the university teachers with any teaching experience can teach students online.

4. Discussion& Conclusion

The study aimed at examining the university teachers teach students online across selected demographic variables such as gender, department, designation, and teaching experience. Based on the objectives, the study formulated the following key research question: do university teachers teach students online?The results of the study revealed that the university teachers teach students online. There can be many reasons for this, but here are some of the most significant ones. First, the present age is the age of technology. University teachers know the importance of this. That's why they make online teaching a part of their teaching activities. It makes teaching effective and enhances students learning. Second, the teacher-student relationship further strengthensthat builds confidence and trust among students. Finally, three media can teach in online teaching such as synchronous, asynchronous, and hybrid. In synchronous online teaching, teachers and students live online whereas, in asynchronous teaching, teachers and students record their conversations and post them online. The synchronous and asynchronous online teaching was strongly favored by students of different disciplines (Malik, et al., 2017). While in hybrid teaching live and recorded lectures can be taken. It is up to them which medium of teaching to operate for their convenience. So, the current study supports the findings of Chiou (2007) that the teachers were satisfied with teaching online. The finding was consonant with the Hussain & Qaiser (2017) that university teachers were prepared and would manipulatetechnology for learning.It is also in harmony with the research of Gonzalez & Moore (2020), which reported that 92. 3% of teachers regard the online teaching.

Significant results found among male and female university teachers on teaching online. Male university teachers teach more online than women. However, Wang, et al., (2019) concluded that gender had no significant influence on online teaching. But, the finding of the current study differs in that many other studies had found that male university teachers used online teaching less (Martin et al., 2019; Kelling et al., 2019). This contradiction develops due to some cultural values and normspreventingfemale teachers to teach students online. The findings of Lampman (2012) reported the uncivil and aggressive behavior by students. By profession, the less use of online teaching by female university teachers was due to the non-availability of proper pedagogical training. So, the university management should arrange effective training programs to elevate female teachers' competency in online teaching.

The findings on the departments depicted there were no significant differences between sciences and social sciences on online teaching.It harmonizes with the research of Beverly (2018) reported the positive attitude of the department of sciences for online teaching. However, the online option is not proper for science courses that contain hand-on-laboratory work. The current research finds there are significant differences between the university teachers corresponding to designated online professors. The finding harmonizes with the study of Krug, et

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al., (2016) that teachersshow positive readiness toward online teaching. In another reflective study, Perrotta & Bohan (2020) find that teachers access online teaching. The current research finds there is no significant difference between online teaching and teaching experience among university teachers. The university teachers with any teaching experience can teach students online. This finding is also consonant with the study of Hung & Jeng (2013) that teaching experience play a significant and mediating role in online teaching.

Henceforward, the research concludes that university teachers perform online teaching activities to teach students. However, male university teachers are better than female teachers, assistant professors are better than professors and lecturers and university teachers with any teaching experience can teach students online.

Limitations of the study

The research had certain limitations. One of them is that it gathers data from teachers of public universities from a city. It minimizes the generalizability of research on other populations and settings. Thus, further researches may assume to gather data throughout the province of Punjab for comprehensive review and analysis of online teaching at the universities. The private university teachers may include to obtain the more view about online teaching. The mixed-method research design may provide a better understanding of the research problem.

5. Recommendations

The key aim of this study to promote the approach and theory of online teaching at the university level in Pakistan. For the promotion of this online teaching, this study recommends thatresearch may conductinvolving the university students to reflect on the quality of online teaching at the university level. More, a study maycarry out to analyze the problems of females' university teachers on online teaching. The current research implemented the self-developed questionnaire. Whereas, there is a dire need to investigate the university teachers' attitudes on a standardized tool. So, future research may examine adopting the international survey "Unified Theory of Acceptance and Use of Technology" (UTAUT) to determine the university teachers' intentions and attitudes towards online teaching. Because it analyzes the university teachers'for important variables such as performance expectancy, effort expectancy, social influence, and facilitating conditions in universities.

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