STEM FACULTY MEMBERS' PERSPECTIVES AND CHALLENGES TOWARDS DISTANCE LEARNING AND VIRTUAL CLASSES DURING COVID-19 OUTBREAK

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ABSTRACT

The study aims at investigating the STEM faculty members' perspectives and challenges towards distance learning and virtual classes during COVID-19 outbreak. The results are compared with those of non-STEM faculty members from the same institution. Data collection was performed at the United Arab Emirates University in view of four demographic independent variables: Faculty Gender, Experience, Academic Rank, and Academic Track. The researchers adopted and implemented a questionnaire where its validity and reliability for collecting data have been verified. Mean, standard deviations, and one-way ANOVA tests were conducted. The results indicate that the overall of faculty members' perspectives towards distance learning and virtual classes and for both tracks (STEM, and humanities and social sciences) are Medium. The results do not show a significant difference at the level (α = 0.05) for the independent variables: gender, and experience. However, we observe significant differences for the academic track and academic rank. We notice some significant differences in favor of full professors and associate professors as compared to lecturers. We also observe some significant differences between STEM and non-STEM tracks in favor of the former one. The results show that the calculated means for the challenges in using distance learning and virtual classes for the STEM, and humanities and social sciences tracks are Weak. This indicates that there are no apparent challenges that hinder the effort in teaching. The results do not show a significant difference at the level (α = 0.05) for all independent variables: faculty gender, experience, academic rank, and academic track. The study concluded with few recommendations. The university should continue supporting the current efforts to provide all the requirements of teaching and learning via distance learning and virtual classes such as suitable infrastructure, internet, smart apps, and technical support. There is always a need for continuous updates of the teaching and learning platforms in line with ongoing development and training for instructors and students.

Keywords: Faculty members' preference, challenges, distance learning and virtual classes, UAEU, COVID-19.

INTRODUCTION

The COVID-19 pandemic has significantly affected the learning and teaching environment in K-12 and higher education at a worldwide scale. The closure of teaching institutions and the sudden reliance on distance learning have completely changed the normal teaching practice in favor of a technology-based teaching environment. The impact on teaching and learning practices and outcomes during the COVID-19

era should provide a rich field for research (Iyer, et al., 2020). In some cases, a negative impact on students' learning and teacher's role is expected; according to Code et al (2020), the switch has impacted the teachers' ability to support hands-on competency development, affecting student motivation and engagement Bawaneh (2010 a). On the other hand, according to Anaturk Tombak (2019) teachers believe that using technology-based teaching facilitates reaching different sources and creates enjoyable experience. Students are influenced by the widespread use of technology; according to Shatri (2020), and students can use information technology more effectively to reach new information and improve communication.

Research on Science, Technology, Engineering, and Mathematics (STEM) education before the COVID-19 pandemic has been widespread. Ulger and Cepni (2020) have reviewed and analyzed studies on STEM education contexts, such as schools and programs, career choices, talent development, and scientifically gifted student characteristics. According to Samsudin et al (2020), STEM Project-Based Learning increases effectiveness creates meaningful learning and influences student attitudes in future career pursuit. Surtano et al (2020) and Bawaneh (2010 b) have shown a positive correlation between students' problem-solving abilities and academic learning achievement in favor of STEM education. According to Sari et al., (2020) STEM education performed in the simulation-based inquiry-learning environment positively affects the development of scientific process skills and STEM awareness. Sellami et al (2017) suggested that student's interest in STEM is influenced by teachers, perceptions of homework assignments, self-confidence, and intention to pursue further study. It is no surprise that STEM education is impacted and limited by the availability of expertise, resources, and knowledge in developing countries (Badmus & Omosewo, 2020).

It is necessary to study the perspectives and challenges faced by faculty members during the fully online teaching and learning environment induced by the COVID-19 pandemic. In particular, it is more interesting to study these perspectives and challenges held by STEM faculty members as compared to non-STEM faculty members. We are exploring the different viewpoints and attitudes for STEM faculty members as compared to others. Therefore, we built a survey that aims to measure these factors among faculty members. We collected data at the United Arab Emirates University (UAEU) during the academic year 2020/2021. The study should be of considerable importance to measure the feedback of faculty members towards the new environment of distance learning and virtual classes. In particular, we are looking for the significant difference in STEM faculty members' responses compared to others. The survey results are analyzed and presented in this study. In a previous study, Malkawi et al (2020) analyzed the attitudes and challenges faced by students at the same teaching institution. The previous results indicated that the students' satisfaction level and attitudes towards distance learning and virtual classes were strong in general with varying degrees between specific items. The new study will add more value to the previous study from the perspective of faculty gender, experience, academic rank, and academic track.

Research Questions

1. What is the STEM-faculty members' perspectives towards distance learning and virtual classes during the COVID-19 outbreak?
2. Do the STEM-faculty members' perspectives towards distance learning and virtual classes during the outbreak of COVID 19 differ according to specific variables (gender, experience, academic rank, and teaching track)?
3. What challenges do STEM-faculty members face in distance learning and virtual classes during the outbreak of COVID 19?
4. Does the level of challenge faced by STEM-faculty members in distance learning and virtual classes during the outbreak of COVID 19 differ according to specific variables (gender, experience, academic rank, and teaching track)?

Importance of the Study

The importance of this study lies in identifying the perspectives and challenges held by STEM-faculty members as compared to non-STEM faculty members toward distance learning and virtual classes. The results of this study are expected to serve many relevant groups and beneficiaries such as university professors,

students, workers in the field of educational technology and curriculum design. It is also supposed to provide recommendations to decision-makers in higher education regarding the effectiveness of distance learning and virtual classes, possible mechanisms to enhance students learning, whether during the Corona pandemic or beyond, and to work possibly to overcome the challenges that instructors face in teaching using distance learning and virtual classes.

Limitations of the Study

Place Boundaries: United Arab Emirates University (UAEU)/UAE.

Time Limits: The first semester of the academic year 2020/2021.

Situational Boundaries: The spread of the Corona pandemic (COVID19).

Instrumentations: The validity, reliability, and the distribution of the items under the different dimensions.

Operational Definitions

Distance learning: The system adopted by UAEU in light of the Corona pandemic to deliver the educational content electronically through Blackboard. In particular, Blackboard Collaborate Ultra is utilized as a real-time video conferencing tool that allows uploading files, sharing applications, and using a virtual whiteboard to interact. For online exams, the LockDown browser is used within the Blackboard environment. In addition, Respondus Monitor is used in online exams to build upon the LockDown browser technology to minimize cheating during a non-proctored exam.

Distance learning and virtual class challenges: Properties (logistical, technical skills, material design, or access to platforms) that hamper faculty members' effectiveness in distance learning.

STEM: A common acronym for four closely connected areas of study: science, technology, engineering, and mathematics. It encompasses a vast array of subjects that fall into each of those terms. The fields are often associated due to the similarities that they share both in theory and practice.

STEM-faculty members: University professors at UAEU, who teach science (physics, chemistry, biology, geology, mathematics, engineering, and technology), in 2020/2021 academic year during the Corona pandemic.

LITERATURE REVIEW AND PREVIOUS STUDIES

The impact of the COVID-19 pandemic on STEM education represents an important field of research. According to Pintaric & Kravanja (2020), COVID-19 has created a major challenge, especially for study programs in STEM areas. Results show that even though the adapted learning process is effective, there is uncertainty of how successful students will pass exams. Zulirfan et al (2020) have studied the various barriers to science learning using an online system during the COVID-19 pandemic. The result shows that there is a great chance that STEM project-based science learning can be successfully carried out online by students.

The faculty member plays a major role in implementing distance learning and virtual classes; he/she plays the role of the motivator and facilitator on employing the technology through which learning is taking place. He/ She also plays the role of feedback provider regarding students' improvement levels, provider of necessary tests in a timely way, and as the one formulating the learning environment for this type of learning (Xia, 2020; Zhou, et. al., 2020; Abu Sarah, 2020). However, the students' role is summarized in watching the lessons offered by faculty members electronically and via recordings of lessons, presentations, and assignments. Students then re-listen and re-watch the lessons as many times as they wish and send the assignments/ homework electronically as well. Distance learning and virtual classes provide the space for conversation and discussion among students themselves and with their faculty members (Goldstein, 2020; Khlaif, 2020; Abu Sarah, 2020).

In studying the impact of distance learning and virtual classes on student's learning, views, perspectives, and challenges, researchers reviewed the correlated literature (Ozgur Yilmaz, 2015; Miltiadou and Savenye, 2003; Glenda, Joslyn, & Mariel, 2019) and confirmed that distance learning and virtual classes form an effective way in enhancing students' performance, motivation, preferable, and interest. On the other hand, some studies (Abu Aqel, 2012; Trotter, 2007; Al Shummari, 2007) indicated that although distance learning has a positive impact, it faces many challenges that differ according to the place, the goal used for, the time of its use, as well as the appearant statistically significant differences between male and female faculty members.

In order to study the requirements of distance learning and virtual classes and corresponding challenges, some researchers (Al Saif, 2009; Al Shahrani, 2010) have identified the importance of distance learning and virtual classes despite the many managerial and teaching challenges, overlapping of academic associations, lack of opportunities to attend preselection development programs for faculty members with regard to distance learning and virtual classes, and the employment of technology in teaching and learning. All of these factors reduce the faculty members' abilities and motivation to use technology in teaching and learning.

Malkawi et al (2020) have investigated the satisfaction level and attitudes of undergraduate students, towards distance learning and virtual classes during the COVID-19 crisis. The results indicated that the students' satisfaction level and attitudes towards distance learning and virtual classes were strong in general with varying degrees between specific items. In the current work, we evaluate the perspectives and challenging factors faced by faculty members concerning the adopted measures of distance learning and virtual classes at the same institution, UAEU. The total number of faculty members is 626 while the number of instructors is 294 distributed among nine colleges: Business and Economics; Education; Engineering; Food and Agriculture; Humanities and Social Sciences; IT; Law; Medicine and Health Sciences; and Science. Blackboard is the Learning Management System (LMS) that has been fully supported and utilized in the learning and teaching environment. All faculty members and instructors have good knowledge and experience of the basic tools within Blackboard needed for the learning and teaching process. Blackboard Collaborate Ultra is utilized as a real-time video conferencing tool that allows faculty members and instructors to add files, share applications, and use a virtual whiteboard to interact. Online lectures on the same platform are recorded for students' later views. Besides, online exams, homework, and quizzes are fully implemented for all courses. For online exams, the LockDown browser is used within the Blackboard environment. LockDown Browser is a custom browser that locks down a student's computer or iPad during an online examination in Blackboard. In addition, Respondus Monitor is used in online exams which builds upon the LockDown browser technology to ensure the computing device isn't used to cheat during a non-proctored exam. Such tools are available to all faculty members and instructors to be implemented during online quizzes and exams (UAEU, 2020).

Despite the big efforts of UAEU to implement excellent measures to smoothen the teaching and learning process, there is a clear need to investigate the outcomes of the university effort through faculty members utilizing such resources. This study aims at identifying the perspectives and challenges held by STEM-faculty members as compared to non-STEM faculty members toward distance learning and virtual classes.

METHODS AND PROCEDURES

To achieve the aims of the study, the researchers follow the descriptive analytical design.

Population and Sample

The population of this study comprised all UAEU faculty members during the academic year 2020/2021. The current study targets all faculty members' tracks at UAEU, which are classified into two main tracks: the first is STEM track, while the second is humanity and social sciences track. The study questionnaire was sent as an electronic link via the official university email for all faculty members. According to Gay and Airasian (2003), all the individuals in the defined population have equal and independent chance of being selected. The results were analyzed in light of the sample as shown in Table 1.

Table 1. Study sample of faculty members

	Variable	Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	202	75.9	75.9	75.9
	Female	64	24.1	24.1	100.0
	Total	266	100.0	100.0	
Experience	(1-5) Years	53	19.9	19.9	19.9
	(6-10) Years	41	15.4	15.4	35.3
	(11-15) Years	61	22.9	22.9	58.3
	More than 15 Years	111	41.7	41.7	100.0
	Total	266	100.0	100.0	
Academic rank	Full Professor	57	21.4	21.4	21.4
	Associate Professor	73	27.4	27.4	48.9
	Assistant Professor	56	21.1	21.1	69.9
	Lecturer	80	30.1	30.1	100.0
	Total	266	100.0	100.0	
Track	STEM	153	57.5	57.5	57.5
	Humanities and Social Sciences	113	42.5	42.5	100.0
	Total	266	100.0	100.0	

According to Table 1, the study sample includes 266 faculty members, of which 202 Males and 64 Females. The sample is divided according to teaching experience into four categories: 19.9% (1 - 5) years of experience, 15.4% (6 -10) years of experience, 22.9%, (11 - 15) years of experience, and 41.7% for those having more than 15 years of experience. The sample is distributed over four academic ranks: 21.4% full professors, 27.4% associate professors, 21.1% assistant professors, and 30.1% lecturers. Finally, the sample includes 57.5% (153) faculty members out of 266 from STEM track and 42.5% from the humanities and social sciences track. The sample of this study is representative of all the existing social classes at UAEU in terms of gender, experience, academic rank, and teaching track.

Instrumentation

The researchers reviewed the literature related to teaching and learning in the higher education level and in the school level via distance learning, distance learning and virtual classes (Ozgur Yilmaz, 2015; Miltiadou and Savenye, 2003; Olt, 2018; Al-Shorman, and Bawaneh, 2018; Bawaneh, 2020; Bawaneh, 2019, Malkawi, Bawaneh, and Bawaaneh, 2021; AlSalman, Alkathiri, and Bawaneh, 2021). The researchers adopted Al-Shorman and Bawaneh (2018) and Bawaneh (2021) questionnaires. For translating the instrument from English to Arabic and Arabic to English, word-by-word translation was avoided. Initially, The Arabic translation of the questionnaire was prepared by three translators holding Ph.D. degree in educational technology, English teaching methods, and educational psychology, respectively, and who are graduates from the UK and USA, currently teaching in Jordanian, Saudi, and United Arab Emirate universities. As expected, there were some differences in the generated versions, especially those related to the words used among the translators in translating the instruments. The researchers, then, compared and contrasted these translations, formulated initial items that served the study objectives by changing, deleting and adding some items. Later, the translators agreed on the final instrument and the translation format. This process resulted in 17 items based on Likert-type 6-point scale with (strongly agree (6), agree (5), slightly agree (4), slightly disagree (3), disagree (2), strongly disagree (1)). Some items were written assertively, whereas others were worded passively. The questionnaire aimed at measuring the faculty members' perspectives level

towards distance learning and virtual classes and the challenges they faced during the COVID-19 crisis. The questionnaire included two parts: part one involved 11 items (1-11) and aimed to investigate the faculty members' perspectives towards distance learning, while part two included 6 items (12-17) and aimed to measure the challenges faced by faculty members in using distance learning and virtual classes during the COVID-19 crisis.

Validity and Reliability of the Instrument

To examine the validity of the instrument, the initial version was validated by a panel consisting of six experts holding a Ph.D. degree (one of them is in science education, two in educational technology, one in English education, one in physics, and one in psychology) from Yarmouk University, Jordan University, UAEU, and Imam Abdulrahman Bin Faisal University-KSA. The experts were asked to express their feedback regarding the suitability of items in terms of wording and appropriateness for measuring the goals designed to measure. Some items were deleted and several items were reworded based on recommendation and feedback. The number of items in the final version is 17. To compute the reliability index, the researchers calculated the Cronbach Alpha coefficient for the whole questionnaire which is found to be 0.751. The reliability coefficient for the first part which aimed to investigate faculty members' perspectives towards distance learning and virtual classes is 0.870, while the reliability coefficient for the second part which targeted to measure the faced challenges is 0.792. These values are considered acceptable in social sciences to achieve the purpose of the current study (Gay, Mills, & Airasian, 2009; Obiedat et al., 2016; Al-Kellani; and Al-Shraifeen, 2011).

Statistical Standard

The items of the questionnaire are classified into three categories designating weak (W), medium (M) and strong (S) according to the numerical value of the mean (M) of the individual items. For item classification, we adopt the following equation (Bawaneh and Moumene, 2021; AlSalman, Alkathiri, and Bawaneh, 2021) to obtain the item class width P;

$$P = \frac{U-L}{N},$$

where U and L represent the upper and lower limits of the scale, respectively, and N represents the number of required categories. To obtain the numerical value of P we substitute for U, L and N in the above equation, which yields;

$$P = \frac{6-1}{3} = 1.67$$

Using the numerical value of P, namely P = 1.67, the three category intervals are determined within the range between 1.00 and 6.00. The catagories were found to take the following values; $W \in (1.00, 2.67)$, $M \in (2.68, 4.35)$, and $S \in (4.36, 6.00)$ representing weak, medium and strong, respectively. As an example, a paragraph whose mean (M) lies within the range of 4.36 to 6.00, i.e., it satisfies the inequality ($4.36 < M < 6.00$) which is categorized as S, denoting strong (See the last column on the right in Tables 2, and 5).

FINDINGS

To answer the first question, the researchers calculated the mean and the standard deviation of the instrument items (1 - 11) prepared for this purpose, and the results were listed in Table 2.

Table 2. Means, SD, and the Category for faculty members' perspectives items 1-11, (N=266)

NO	Items	Mean		Overall		
		STEM	Humanities and social sciences	Mean	SD	Category
1	I need more training on how to use distance learning and virtual classes	3.43	3.38	3.60	1.41	**M**
2	Distance learning and virtual classes increase the interaction with my students	4.28	4.21	4.44	1.39	**S**
3	I believe distance learning and virtual classes will gradually replace conventional teaching	3.82	3.64	3.98	1.51	**M**
4	Distance learning and virtual classes improve student's achievement and grades	4.19	4.16	4.29	1.31	**M**
5	I enjoy the experience of distance learning and virtual classes	2.69	2.63	2.93	1.42	**M**
6	Distance learning and virtual classes offer additional value to teaching experience	2.84	2.80	2.86	1.42	**M**
7	Distance learning and virtual classes lead to better teaching practices	3.57	3.51	3.63	1.46	**M**
8	Distance learning and virtual classes help to organize my course content	3.08	2.99	3.23	1.36	**M**
9	Distance learning and virtual classes speed the delivery of knowledge to students	3.59	3.60	3.68	1.41	**M**
10	Online exam can differentiate between students	3.69	3.60	3.74	1.50	**M**
11	Online exams save instructors' time and efforts	3.36	3.25	3.44	1.56	**M**
	Overall	**3.50**	**3.43**	**3.62**		**M**

The results in Table 2 indicate that there are three items within the STEM track having the largest mean, namely, (item 2: M = 4.28, item 4: M = 4.19, and item 10: M = 3.69). This result is identical with the case of the humanities and social sciences track (item 2: M = 4.21, 4: item M = 4.16, and item 10: M = 3.60). It is remarkable to note that the two tracks have close means throughout the whole items. Table 2 shows that the overall mean of the faculty members' perspectives towards distance learning and virtual classes is (3.62) which is Medium according to statistical standards (Bawaneh and Moumene, 2021; AlSalman, Alkathiri, and Bawaneh, 2021). The conclusion is similar for both individual tracks [STEM: Mean = 3.50, and humanities and social sciences: Mean = 3.43]. By reading all instrument items, we can see that there is only one item considered Strong, while the rest are Medium, and no Weak items out of all 11 items. The largest overall mean is 4.44 corresponding to item 2, indicating that using distance learning and virtual classes increase the interaction with students. This was followed directly by item 4 (M= 4.29), indicating that distance learning and virtual classes improve student's achievement and grades. Item number 10 (M= 3.74), indicates that online exams can differentiate between students, according to faculty members. In summary, the previous results are similar between STEM and humanities and social sciences tracks, with the highest means are for items 2, 4, and 10, respectively.

Next, we look at the 3 lowest means of all item. We observe that item 6 has M= 2.86 which is the smallest mean among all items. This item addresses that distance learning and virtual classes offer additional value to the teaching experience. This is followed by item number 5 with a mean of 2.93, which measures that faculty members and instructors enjoy the experience of distance learning and virtual classes. Finally, item 8 has a mean of 3.23, which measures that distance learning and virtual classes help to organize the instructor's course content. It is good to mention that the lowest-mean items in the individual groups (STEM, and humanities and social sciences) have the same arrangement (5th, 6th, and 8th). This result almost is aligned with the overall results.

To answer the second question, the researchers calculated the means and standard deviations associated with the independent variables as shown in Table 3.

Table 3. Means and standard deviations of faculty members' preference level towards distance learning and virtual classes.

	Variable	Mean	SD
Gender	Male	3.67	1.00
	Female	3.45	.93
	Total	3.62	.98
Experience	(1-5) Years	3.57	.86
	(6-10) Years	3.49	1.06
	(11-15) Years	3.65	.98
	More than 16 Years	3.68	1.02
	Total	3.62	.98
Academic rank	Full Professor	3.81	1.05
	Associate Professor	3.76	1.00
	Assistant Professor	3.68	.92
	Lecturer	3.32	.91
	Total	3.62	.98
Academic track	STEM	3.76	.99
	Humanities and social sciences	3.43	.95
	Total	3.62	.98

Table 3 shows the mean and standard deviations for faculty members' perspectives level towards distance learning and virtual classes according to the variables: members' gender, experience, academic rank, and academic track. Results show a small difference (0. 22) in the calculated mean between members' gender. The calculated mean of female members is smaller with a value of 3.45 and where the standard deviation is 0.93. In comparison, the mean of male members is 3.67 with a standard deviation of 1.00. Regarding years of experience, the results show that the mean of the faculty members' with more than 15 years of experience is the highest among all the experience levels with a mean of 3.68 and a standard deviation of 1.02. The next group is the one with (11-15) years of experience, with a mean of 3.65 and standard deviation of 0.98. The lowest mean is 3.49 for the category of (6-10) years of experience.

According to the academic rank, Table 3 indicates that there are some differences in the means. The maximum difference is between the full professor and the lecturer categories (0.49), the next large difference is between the associate professor and the lecturer categories (0.44). The lowest mean is for lecturers and assistant professors, with a Mean of 3.32 and 3.68, respectively. The results in Table 3 show that the mean of the STEM faculty members group is (M=3.76) with a standard deviation of 0.99 higher than the mean of Humanities and social sciences group (M=3.43) and with a standard deviation of 0.95, and with a difference in the mean by (0.33).

Based on the above results, the findings of the current study show that there are apparent differences in the calculated mean of the faculty members' perspectives level towards distance learning and virtual classes according to their gender, experience, academic rank, and academic track. To determine the validity of the differences, the researchers perform the ANOVA analysis, and the results are presented in Table 4.

Table 4. ANOVA test of faculty members' preferable level towards distance learning and virtual classes

	Sum of Squares	df	Mean Square	F	Sig.
Gender					
Between Groups	2.369	1	2.369	2.434	.120
Within Groups	256.870	264	.973		
Total	259.238	265			
Experience					
Between Groups	1.340	3	.447	.454	.715
Within Groups	257.898	262	.984		
Total	259.238	265			
Academic rank					
Between Groups	10.635	3	3.545	3.736	.012
Within Groups	248.603	262	.949		
Total	259.238	265			
Academic track					
Between Groups	7.305	1	7.305	7.654	.006
Within Groups	251.934	264	.954		
Total	259.238	265			

Table 4 shows that there are statistically significant differences for two independent variables in the current study, namely, academic rank and academic track. The statistical significance values at ($\alpha < 0.05$) were (0.012, F = 3.736), and (0.006, F= 7.654), respectively. Whereas, the inferential statistics showed that there are no statistically significant differences for the rest of the independent variables in the current study, namely, faculty members' gender and their experience. The statistical significance values at ($\alpha > 0.05$) were (0.120, F = 2.434), (0.715, F= 0.454), respectively. Finally, to explore where the statistical difference of the academic rank variable exists, the researchers conducted Post Hoc Tests, using Tukey HSD as shown in Table 5.

Table 5. Post Hoc Tests, using Tukey HSD of the academic rank variable

(I) Academic Rank	(J) Academic Rank	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Full Prof	Associate Prof	.05126	.17218	.991	-.3939	.4964
	Assistant Prof	.12833	.18328	.897	-.3456	.6022
	Lecturer	.48499*	.16884	.023	.0484	.9215
Associate Prof	Full Prof	-.05126	.17218	.991	-.4964	.3939
	Assistant Prof	.07708	.17304	.970	-.3703	.5245
	Lecturer	.43373*	.15767	.032	.0261	.8414
Assistant Prof	Full Prof	-.12833	.18328	.897	-.6022	.3456
	Associate Prof	-.07708	.17304	.970	-.5245	.3703
	Lecturer	.35666	.16972	.155	-.0822	.7955
Lecturer	Full Prof	-.48499*	.16884	.023	-.9215	-.0484
	Associate Prof	-.43373*	.15767	.032	-.8414	-.0261
	Assistant Prof	-.35666	.16972	.155	-.7955	.0822

*. The mean difference is significant at the 0.05 level.

The results in Table 5 indicate that there were two statistically significant differences between the full professors and associate professors compared with lecturers in favor of full professors and associate professors.

To answer the third question, the researchers calculated the mean and standard deviation of the instrument items (12-17) prepared for this purpose, and the results are shown in Table 6.

Table 6. Means, SD, and the category for faculty members' challenges level items 12-17, (N=266)

No	Items	Mean		Overall		
		STEM	Humanities and social sciences	Mean	SD	Category
12	Distance learning and virtual classes provide a challenging environment for teaching	2.56	2.58	2.52	1.29	**W**
13	Distance learning and virtual classes add more pressure on the instructor	2.33	2.39	2.26	1.07	**W**
14	Distance learning and virtual classes has increased the burden on the instructor	2.37	2.43	2.34	1.10	**W**
15	Online exams are more challenging for instructors	2.31	2.32	2.16	1.31	**W**
16	Online exams are more challenging for students	3.06	3.06	3.07	1.51	**W**
17	Online office hours are ineffective and useless	3.58	3.65	3.55	1.47	**M**
	Overall	**2.71**	**2.74**	**2.65**		**W**

The researchers would like to point out that all the 6 items in Table 6 which aim to investigate the challenges faced by faculty members in distance learning and virtual classes are formulated negatively. The results in Table 6 show that the overall mean for the challenge level in using distance learning and virtual classes is (2.65). It is also clear from the table that the mean of the STEM track is 2.71, which is classified within the Weak category. Similarly, the classification for the humanities and social sciences tracks with a Mean of 2.74 is also classified Weak. This shows that the challenge level towards using distance learning and virtual classes in learning is generally Weak. In other words, university professors see that there are no considerable challenges that hinder their effort in teaching their students using distance learning and virtual classes.

The results in Table 6 indicate that the lowest 3 means within the STEM track belong to (item 15, M = 2.31, item 13, M = 2.33, and item 14, M = 2.37). This is fully consistent with the 3 lowest means of the humanities and social sciences track, (item 15, M = 2.32, item 13, M = 2.39, and item 14, M = 2.43). What is noticeable is that this result is similar for all items as a whole. By reading the means of the challenges faced in distance learning and virtual classes during the COVID-19 crisis, we find that the means of the six challenges have values close to each other within the range (2.16 – 3.55). The lowest mean is related to the challenges of conducting online exams (Item 15, M=2.16, and SD=1.31). The second-lowest Mean is related to item 13, with (M=2.26, and SD=1.07) which indicates that distance learning and virtual classes add more pressure on the instructor side. Similarly, item 14 refers to the increased burden on faculty members with (M=2.34, and SD=1.10). According to faculty members, distance learning and virtual classes have increased the burden on parents in terms of the cost of the Internet and the requirements for distance learning (Item 12, M=2.52 and SD=1.29). Finally, faculty members feel that the online exams are more challenging for students (Item 16, M=3.07, and SD=1.51). The category for all items of the instrument in this dimension is Weak except item number (17) which indicates that the online office hours are ineffective and useless, in other words, faculty members feel that the normal face-to-face office hours could be more effective and engaging.

To answer the fourth question, the researchers calculated the statistical means and standard deviations associated with the independent variables as shown in Table 7.

Table 7. Means and standard deviations of faculty members' challenges level towards distance learning and virtual classes.

Variable		Mean	SD
Gender	Male	2.63	.750
	Female	2.72	.658
	Total	2.65	.729
Experience	(1-5) Years	2.83	.770
	(6-10) Years	2.59	.508
	(11-15) Years	2.67	.713
	More than 16 Years	2.58	.779
	Total	2.65	.729
Academic rank	Full Professor	2.64	.707
	Associate Professor	2.50	.790
	Assistant Professor	2.71	.637
	Lecturer	2.76	.736
	Total	2.65	.729
Academic track	STEM	2.59	.750
	Humanities and social sciences	2.74	.693
	Total	2.65	.729

Table 7 refers to the mean and standard deviations of faculty members' challenges level towards distance learning and virtual classes according to the variables: members' gender, experience, academic rank, and academic track. Results show a very small difference (0. 09) in the calculated mean between members' gender. The mean of male members is smaller with a value of 2.63 and a standard deviation of 0.75 whereas the mean for female members is 2.72 with a standard deviation of 0.658. The results show that the mean of faculty members' with more than 15 years of experience was the lowest among all the experience level catagories with a mean of 2.58 and a standard deviation of 0.779. The next group is (6-10) years, with a mean of (2.59) and standard deviation (0.508), This indicate that the challenges facing professors with long experience are fewer than those with less experience, whereas, the highest mean is (2.83) for the category (1-5) years.

Regarding the faculty members' challenges towards distance learning and virtual classes according to the academic rank, Table 7 indicates that there are differences in the means. The largest difference is between the associate professor category and the lecturer category with a value of (0.26), in favor of the lecturers. The next large difference is between the assistant professor category and the associate professor category (0.21) in favor of the assistant professor respectively. This result indicates that the lecturers and assistant professors face more challenges than other higher two categories. The means related to the challenges faced by the full and associate professors were the lowest with values of (2.64, 2.50), and a standard deviation of (0.707, 0.790), respectively. Finally, the results in Table 6 show that the mean for the STEM faculty members (M=2.59) with standard deviation of (0.750) is lower than the mean of Humanities and social sciences group (M=2.74) with a standard deviation of (0.693). This indicates that the challenges faced by the STEM track are slightly less than challenges faced by the Humanities and social sciences track.

Based on the above results, the findings of the current study show that there are apparent differences in the calculated mean of the faculty members' challenges level towards distance learning and virtual classes according to their gender, experience, academic rank, and academic track. To determine the validity of the differences, the researchers used the ANOVA test, the results were presented in Table 8.

Table 8. ANOVA test of faculty members' challenges level towards distance learning and virtual classes

	Sum of Squares	df	Mean Square	F	Sig.
Gender					
Between Groups	.451	1	.451	.847	.358
Within Groups	140.547	264	.532		
Total	140.998	265			
Experience					
Between Groups	2.458	3	.819	1.550	.202
Within Groups	138.539	262	.529		
Total	140.998	265			
Academic rank					
Between Groups	2.821	3	.940	1.783	.151
Within Groups	138.176	262	.527		
Total	140.998	265			
Academic track					
Between Groups	1.399	1	1.399	2.646	.105
Within Groups	139.598	264	.529		
Total	140.998	265			

The inferential statistics in Table 8 show that there are no statistically significant differences for all the independent variables in the current study: faculty members' gender experience, academic rank, and academic track on the challenges level towards distance learning and virtual classes. The statistical significance values at (α = 0.05) were (0.358, F = 0.847), (0.202, F= 1.550), (0.151, F= 1.783), (0.105, F= 2.646), respectively.

DISCUSSION AND RECOMMENDATIONS

In this work, the researchers investigate the faculty members' perspectives and challenges towards distance learning and virtual classes during COVID-19 Outbreak. We compare results between STEM and non-STEM faculty members. In general, we find results with no major differences between the STEM track and other tracks. This indicates that faculty members of all tracks share similar opinions on their perspectives and the possible challenges in the teaching process. Nevertheless, significant differences are observed once we perform the ANOVA test for particular categories within the sample.

The results indicate that the overall faculty members' perspectives towards distance learning and virtual classes and for both tracks (STEM, and humanities and social sciences: non-STEM) are Medium. The results do not show a significant difference at the level (α = 0.05) for the independent variables: gender, and experience. However, we observe significant differences between the academic track and academic rank. We notice some significant differences in favor of full professors and associate professors as compared to lecturers. This may be well understood by the fact that lecturers have less experience with new technology and the fact that most lecturers are involved in teaching labs and hands-on activities, which create far more challenges in teaching than regular lectures. We also observe some significant differences between STEM and non-STEM tracks in favor of the former one. This may be understood by the fact STEM faculty members are more engaged with technology in their teaching experience. Therefore, STEM faculty members have been less distracted by the online environment due to COVID 19.

Regarding the challenges faced by faculty members in distance learning and virtual classes, we observe similarities in results between STEM and non-STEM tracks. The results show that the calculated means of all challenges for the STEM and humanities and social sciences track (non-STEM) are Weak. The results do not show a significant difference at the level (α = 0.05) for all the independent variables: faculty gender, experience, academic rank, and academic track. According to the results, faculty members do not face big

challenges that hamper their teaching delivery and performance. This could be understood through the adequate training, accessibility, and availability of sufficient tools provided by the university during the COVID-19 era.

This confirms that higher education institutions in general, and the UAE University in particular, have been keen for a long time to employ technology with an added value in teaching and learning, regardless of academic path, gender, or experience. This, of course, indicates the great importance of continuing this approach and the continuous initiative in employing the latest and best technological applications in university education and learning.

The result of the current study is consistent with the results of many studies (Badmus, and Omosewo, 2020; Bawaneh, 2021; Malkawi, Bawaneh, and Bawa'aneh, 2021; Al Salman, and Bawaneh, 2021; Goldstein, 2020), that the level of satisfaction, expectations, trends, motivation, and viewpoints of workers in the educational sector, whether in public education - schools - or higher education - universities and institutes in general, is medium. This indicates many indicators, some of which are related to institutions and their lack of readiness for distance education and virtual classes, and some of them are related to people's lack of readiness in terms of knowledge and skills. The results of this study also agree with many studies in the absence of statistically significant differences for gender and the professor's experience. The same applies to the challenges faced by the university and public education sector with regard to distance education and virtual classes. The result of the current research was consistent with the results of many previous studies in this field (Bawaneh, 2021; Malkawi, Bawaneh, and Bawa'aneh, 2021; Al Salman, and Bawaneh, 2021; Iyer, Aziz, and Ojcius, 2020; Subreen Al Salman, Mohammed Alkathiri and Ali Khaled Bawaneh, 2021; Zulirfan, Yennita, and Rahmad, 2020). The challenges are common regardless of the professor's gender, experience and academic path, despite the presence of some minor differences in the arithmetic averages that did not rise to fundamental differences.

The study concludes with few recommendations. The university should continue supporting the current efforts to provide all the requirements of teaching and learning via distance learning and virtual classes such as suitable infrastructure, internet, smart apps, and technical support. There is always a need for continuous updates of the teaching and learning platforms in line with ongoing development and training for instructors and students. On the other hand, the researchers call for the importance of holding forums, conferences, and workshops for academics and educators in higher education and general education as well to think about creating new teaching methods that are compatible with the digital generation in terms of employing technology as well as maintaining the continuity of education regardless of the circumstances and conditions such as weather factors, wars , global cross-border diseases and epidemics, and so on, taking into account maintaining the quality of education.

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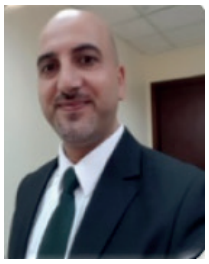

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