Exploring Teaching Experience in Distance Learning during COVID-19: A Qualitative Case Study

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Abstract—**This study sought to explore the awareness of teachers in K-12 during the pandemic about several aspects of online learning: instructional strategies, motivational factors for students, and the application of Universal Design for Learning (UDL) to lesson plans produced by teachers. This exploratory case study used a focus-group discussion and an evaluation form with a sample of thirty (N=30) teachers. The results showed that the teachers were unaware of some of the instructional strategies for online learning. The teachers and their students were not sufficiently prepared or qualified for the emergency transition to online learning. The results suggest that it is important to prepare professional development for teachers about instructional strategies and learning theories for online learning and blended learning.**

Index Terms—**Emergency remote teaching, motivation, online learning, stimulus, Universal Design for Learning (UDL)**

I. INTRODUCTION

The COVID-19 pandemic imposed disruptions in the educational systems in more than 190 countries worldwide, this effect resulted in the closure of schools and universities for more than 94% of students in the world [1]. The situation called for finding alternatives for the continuity of education at all levels. Thus, distance education was adopted, in that period, it was called emergency remote teaching [2]. Roblyer and Edwards [3] defined distance learning as "the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance". Emergency remote teaching is defined as a temporary transmission mode of instructional delivery due to the outbreak of the Coronavirus pandemic [4]. During this emergency transmission mode, schools and universities encountered many obstacles such as psychological instability, difficulty controlling learning time, poor infrastructure, and lack of readiness for digital content [5].

Distance learning is not a new concept. It started in the 1990s, as reported by international agencies such as the World Bank and UNESCO [6]. Nonetheless, the emergency transformation to distance learning constituted a burden on all teachers, even teachers with experience in using learning required skills from teachers such as these: using a variety technologies in their teaching and learning practices [2, 7]; Adapting distance learning during the pandemic of learning technologies and ensuring ease of navigation among them;

maintaining a continuous presence to answer students' inquiries on social media and other communication tools; commenting on students' work; motivating students to learn; solving problems facing their students; creating and designing interactive digital content; staying up-to-date on technological development; and working on their professional development [7]. Dhawan [2] noted that COVID-19 made institutions move from traditional offline education to online education; institutions that were reluctant to use technology in the educational process had to accept the use of advanced technology tools. Bond [7] pointed out that a school's role in distance learning during the pandemic focused on preparing the infrastructure for this kind of learning, supporting teachers and staff in adopting it and adapting to it, supporting parents, making policies that work in light of this pandemic, increasing partnerships with the local community, and analyzing the school's needs and submitting that information to the appropriate authorities.

Despite the obstacles brought by the pandemic, the application of distance learning during emergency remote teaching has encouraged teachers to search for, learn about, and use a variety of learning technologies such as a Learning Management System (LMS) and several educational software applications, to continue interacting with their students. Many teachers have joined with their colleagues in social groups through social media, to learn more about aspects of emergency remote teaching such as pedagogy, content, strategies for online teaching, and applications.

It is paramount that teachers can use learning technologies effectively in their daily educational practices. This can happen through the integration of a suitable technology aligned with proper instructional strategies and learning activities in learning settings [8]. Therefore, an online learning approach must receive attention at all times, not just in crises, disasters, or wars, to meet the rapid development in education worldwide. Dhawan [2] stated that "online teaching is no longer an option, it has become a necessity". The learning environments in distance education must be characterized by ease of use, accessibility, the presence of social and collaborative communication, acceptance of integrating a variety of technologies, an attractive design, support for students' learning, infusion of digital content, and assessment features [7]. The Universal Design for Learning (UDL) framework has been developed for use in designing a teaching and learning environment that "often capitalizes on the power and flexibility of modern technologies to address the needs of the broadest possible range of students" [9]. The UDL model is based on three main principles from recent neuroscience research [10]: multiple, flexible concepts of "what we learn"; multiple, flexible choices of tools for the expression and performance of "how we learn"; and multiple, flexible ways to engage learners in "why we learn". It was

stated that when a course is planned with UDL principles, many of the specific needs of learners are covered to suit the majority of learners in the class regarding the compatibility and accessibility of the supporting resources [11].

In the Sultanate of Oman, after the change to emergency remote teaching during the COVID-19 pandemic, we found that teachers adopted a variety of initiatives to use learning technologies in the instructional process. Therefore, the current study aimed to explore three areas: the teachers' awareness of instructional strategies for online learning; the teachers' knowledge of the factors that contribute to motivating students toward learning; and how well the lesson plans produced by the teachers align with UDL principles.

In this study, the terms "online learning" and "distance learning" are used interchangeably.

II. LITERATURE REVIEW

Traditional instructional strategies stress the importance of students' memorization, and technology is used only to present content with projectors inside a classroom [12]. However, the implementation of instructional strategies for information and communication technology in education boosts twenty-first-century student skills such as problem-solving, higher-order thinking skills, and communication. Technology promotes the use of interactive eBooks, multimedia resources, teamwork, and peer evaluation, and lifelong learning [13].

Gulbahr and Alper [14] identified four important factors to engage and motivate students in online learning: create a positive learning environment; build a learning community; give feedback over an appropriate period of time; and select the right technology to deliver quality content relevant to the subject. Bond [7] stated that students doing distance learning because of the pandemic should focus on five topics: allocating time to study in proportion to the school schedule; performing the required activities; enhancing technology skills; motivating themselves; and interacting with peers. Dabbagh and Marra *et al.* [15] identified five principles to use in online learning: 1) Active learning provides an opportunity for students to practice practical experiments and observe results. This principle encourages students to be active participants in the learning process and not just passive recipients of knowledge. 2) Constructivist learning supports students to build simple mental models of how things work to explain what they observe, then translate their understanding by reflecting and explaining. 3) Cooperative learning encourages students to participate with other students in conversations, dialogues, and negotiations with the teacher and peers to exchange ideas and construct their own knowledge. 4) Authentic learning lets students participate with other students in studying real, complex problems through discovering and understanding the problem, then setting hypotheses and evaluating them. 5) Intentional learning involves defining and explaining the learning objectives and instructions to students, so that the necessary steps to implement the required tasks are clear and the students can take ownership of their learning.

Another significant factor in motivating students in distance learning is using interactive technology tools. A qualitative study carried out by Fackler and Sexton [16] relied on the analysis of secondary documents of science teachers through online learning during the pandemic. The analysis took place via social media, websites, and posts of blogs, photos, podcasts, news articles, and videos. The participants were 391 science teachers and doctoral students in science education from the United States and other countries around the world. The results of the study indicated that one of the factors that supported this sudden transition was the adoption of interactive tools and programs. It was observed that Zoom and YouTube were the best programs preferred by science teachers to enrich their lessons and the diversity of online teaching methods for science subjects. Specifically, these programs can run on a variety of devices such as computers, iPads, tablets, and telephones, which enables students to readily access learning. In addition, the results of this study showed the importance of building learning communities among science teachers and educators to share ideas, lesson plans, instructional materials (such as tutorial videos), and assessment models.

With respect to the instructional strategies of distance learning, Ralph [17] investigated the teaching strategies used by winners of online teachers' awards. This study found five teachers' strategies for distance learning: 1) Select digital content related to the topic of the lesson to make lessons more engaging and improve accessibility. 2) Use a variety of multimedia resources such as preparing interactive digital content infused with video, audio, reading, and interactive activities. 3) Have students individually and collaboratively contribute to creating content. 4) Promote students' reflection on their own understanding. 5) Explain the purpose of the learning, provide clear instructions, and make connections between different activities, so students can see how the activities fit together and how to complete the tasks. In addition, Martin and Budhrani *et al.* [18] interviewed eight teachers who were experienced in online teaching in the United States of America. The teachers' responses indicated that teachers in online learning perform five roles: facilitator, course designer, content manager, subject-matter expert, and mentor.

This study used the model for instructional strategies of meaningful online learning developed by Dabbagh and Marra *et al.* [15]. In this model, there are three types of instructional strategies: supportive strategies, exploratory strategies, and dialogic strategies. Supportive strategies refer to instructor performance support through learning processes such as coaching, mentoring, modeling, explaining, and scaffolding. Exploratory strategies promote discovery activities such as problem-solving, exploration, creation, hypothesis testing, and role-playing. Dialogic strategies refer to strategies that engage students in discussion activities such as collaboration, articulation, social negotiation, and reflection.

Regarding student motivation in distance learning, Hira and Anderson [19] sought to study stimulating students in online learning through project-based collaborative learning. The study examined the transition of schools from traditional education to online education in response to the pandemic, based on teachers' and parents' perspectives about engaging students in project-based collaborative learning during the

pandemic. Teachers and students continued to communicate from their homes using online technology tools. Eleven teachers from four schools in the United States of America were interviewed. The interviewees used project-based learning in traditional education and continued in the same pattern when moving to distance learning. The results of the study indicated that linking study projects to students' daily lives increased their interest in learning. It was found that there was an improvement in students' performance on projects as they did their work independently. Teachers linked this indicator to two aspects: the lack of distraction factors in distance learning, and the advantages of social and emotional communication. Overall, the study showed that adopting a project-based collaborative learning approach improved students' skills in organizing their time through the completion and delivery of the intended projects.

Minda [20] examined the relationship between online learning and students' motivation by administering a questionnaire to a sample of 100 students in an intensive language program at Padang Sidempuan State at the Institute of Islamic Studies in Malaysia. The results of the study indicated a weak correlation between online learning and student motivation: Internet-based learning had a negative experience on students' desire to learn and made students frustrated when they had to learn through the Internet. There were several reasons for the negative experience: the students lacked technology literacy skills; there were deficiencies in educational resources for the design of online learning; and the students did not have enough money to access the Internet service.

III. METHOD OF THIS STUDY

This study used a qualitative method: an exploratory case study of K-12 teachers. A focus-group discussion and an evaluation form were used in this study. The current study aimed to address the following research questions:

1) To what extent are K-12 teachers competent in implementing instructional strategies for distance-learning environments?
2) From the teachers' perspectives, what are the factors that stimulate students toward learning in distance learning environments?
3) To what extent are the principles of Universal Design for Learning (UDL) achieved in the lesson plans for distance learning that were produced by the teachers?

A. Participants

The participants of this study were thirty teachers (N=30) chosen from 395 teachers who participated in the First Virtual Educational Forum that was held for two days (1-2 June/2021) by the Ministry of Education, Oman. The participants for this study were teachers who had been selected as the top 30 teachers in the forum who pursued the best practices in online teaching that made their students motivated to learn and engage in distance-learning environments. The participating teachers were from a variety of subject areas, as shown in Table I. There were 25 females and 5 males.

TABLE I: NUMBER OF PARTICIPANTS BASED ON GENDER AND SPECIALTY

Number of Teachers	Specialization	Gender	
		Female	Male
4	First Domain Teacher	4	-
4	Second Domain Teachers	4	-
7	English Language	6	1
4	Arabic Language	3	1
3	Science	2	1
2	Islamic Studies	2	-
1	Information Technology	1	-
2	Art	2	-
1	Physical Education	1	-
2	Music	-	2
30		25	5

B. Instruments

Two instruments were used in the data collection for this study: a focus-group discussion, and a UDL evaluation form. Each instrument is described below.

1) Focus-group discussion

The group discussion was split into six groups; the discussions were held online through Microsoft Teams. These meetings were audio-video recorded and then analyzed. The focus-group discussion included questions related to two main aspects: 1) the instructional strategies teachers used in distance learning (e.g., What are effective strategies you used to increase students' participation in classes and the completion of tasks and duties? What are the methods you used to make connections between synchronous and asynchronous classes? What type of support did you give your students to achieve their learning objectives?); 2) the factors that led to change in designing lesson plans to fit online teaching, to make classes more effective and engaging, to ensure students access to digital content, and to help increase the students' motivation to learn. To verify the validity of this instrument, it was judged and reviewed by four specialists in the field of learning technologies. The formulation of each question was verified to be understandable by the target group of the study. It was also checked whether the questions were appropriate to answer the main research questions of this study.

2) The UDL evaluation form for a teacher's lesson plan

The evaluation form was adopted from previous research (Al Sheik, 2017) [10]. It was developed based on the principles of the UDL. It is known that teachers are interested in overcoming individual differences among their students to achieve lesson goals equally. For this reason, educators and experts use the principles of UDL in making lesson goals, instructional materials, instructions, and assessments [21], [22]. Thus, any educational product made in the style of UDL can be used with different users, despite their diversity and differences, and thus achieve the learning goals of all students [23]. The UDL provides guidance from an early stage of lesson planning; this enables teachers to build flexible pathways from the beginning of lesson preparation that takes into account the abilities and needs of students, to ensure students' understanding and interaction with the content [10]. The UDL promotes the use of a variety of teaching approaches and instructional strategies such as

collaborative learning, project-based learning, and other student-centered learning strategies [21]. In the current study, the evaluation form was used to assess lesson plans that were developed and implemented by the participating teachers with their students; these lesson plans were submitted by the teachers in the First Virtual Educational Forum. These lessons were evaluated in the form of recorded videos and digital content. The scoring of items in this evaluation form used a 5-point Likert scale, from 1 (very low) to 5 (very high). A measurement scale was built to explain the interpretation of data collected from the analysis of the intended form, as shown in Table II.

TABLE II: MEASUREMENT SCALE FOR INTERPRETATION OF THE RESULTS OF THE STUDY

Scale	Mean Range
Very High	4.20-5.00
High	3.40-4.19
Medium	2.60-3.39
Low	1.80-2.59
Very Low	1.00-1.79

To ensure the validity of this scale, it was adopted from previous research (Al Sheik, 2017) [10]. In addition, for this study, the researchers distributed the form to a random sample of teachers (N=14, including male teachers and female teachers), to measure the validity of the content. Cronbach-Alpha reliability was checked for the construct validity of this scale, as the coefficient was extracted for the entire form. Using the Statistical Package for Social Sciences (SPSS) program, the value of the reliability coefficient was approximately 0.941, which is high and acceptable for the purpose of analyzing the data of this study.

C. Procedures and Analysis

Prior to the study, the consent of participating teachers was obtained, and the purpose of the study was explained. In addition, it was highlighted that their participation was entirely voluntary and that they had the right to opt-out of the study at any time. Thirty teachers participated in the focus-group discussion. The participating teachers were divided into six groups, with 5 participants (males and females) in each group, for a period of three days. Two groups met each day. The discussion took place virtually through Microsoft Teams, and it was audio-video recorded. The duration of the discussion per group lasted between an hour and an hour and a half (1-1.5 hours). The responses of the participants were transcribed and analyzed in a written narrative.

A qualitative interpretation of the participants' responses was analyzed. The transcripts and video-audio recordings were revisited several times to understand the participants' thoughts. Thematic analysis was used to analyze the data of the focus-group discussion. Open coding was initiated, then it was revised to form the organizational themes. Grouping these themes took place in Trello software, to group data under the main themes. After that, the results were compared with previous studies and discussed, resulting in recommendations and suggestions.

Next, the UDL evaluation form for teachers' lesson plans was used to evaluate the recorded videos and digital content produced by the participating teachers. The researchers filled in their evaluation forms independently; then they discussed their evaluations and compared the results. Finally, the data were analyzed using SPSS software. Descriptive statistical analysis of the mean and standard deviation of scores was performed; then it was interpreted based on the measurement scale and UDL guidelines.

IV. RESULTS

A. Participants' Awareness of Instructional Strategies for Distance Learning

The first research question concerned the awareness of participants about instructional strategies for distance learning. The most surprising aspect of the data is that the teachers lacked awareness of instructional strategies for distance learning. Since the teachers had teaching qualifications, it was assumed that they had knowledge of the techniques and instructional strategies that can be used in engaging students in meaningful learning in any delivery mode, face-to-face, blended, and online learning. The data showed that 96% of the participants in the study focused on the use of different educational applications and programs in teaching (e.g., Padlet, Liveworksheets, Mentimeter, Jamboard) in addition to technical devices such as screens and tablets. It was reported, "Some of the strategies that we use are interactive applications so that the student does not feel bored." Other participants commented, "We found too many programs. As for the students, they have mastered above the ten programs." The most striking result to emerge from the data is that only a minority of participating teachers have the basic knowledge of these strategies; this was noticed through the learning activities and tasks they used in synchronous and asynchronous lessons. These are examples of what the participating teachers reported: assigning students to scientific inquiry in carrying out science experiments; stimulating discussions and dialogue among students; using problem-solving; and using role-playing by assigning students to play the little-teacher role. Together, these results provide important insight that the majority of teachers did not have the basics of using instructional strategies for distance learning to engage students effectively in the learning activities of their lessons.

B. The Factors that Stimulate Students to Learn in A Distance-Learning Environment

Turning now to the factors that contribute to motivating students toward learning, the results are discussed in three aspects: intrinsic motivation for teachers, the availability of digital content in distance-learning environments, and challenges in applying instructional strategies for distance learning.

1) Intrinsic motivation for teachers

One of the factors involved in stimulating students toward learning is the teacher's intrinsic desire for change. It is apparent from the data that teachers were motivated to research and diversify the educational applications and programs to engage students in their lessons. A common

view among the participating teachers was that the use of educational applications, websites, and software has increased students' stimulus to attend asynchronous lessons through LMS and made those lessons close to reality. The participating teachers pointed out that there are many available and useful applications in a specialty such as learning languages (e.g., Arabic and English), science, art, mathematics, and musical skills. Despite the advantages of using a variety of educational applications in learning, the participant teachers reported that "the employment of these programs in distance learning requires effort, brainstorming, and prior preparation for the lessons" to support students' learning. One of the participants reported using a pool of programs and applications to solve the problem of the lack of Internet access for some students, by transferring asynchronous activities in programs such as Wordwall to activities that can be implemented without requiring Internet access.

In addition, the results of the study showed that the participants devoted considerable effort to provide a variety of educational digital resources for students, to stimulate their learning in distance-learning environments. The teachers created interactive e-books that embedded a variety of digital content (e.g., presentations, videos, audio clips, educational games, and links to websites) linked to lessons' learning outcomes, for both synchronous and asynchronous classes. It was reported by the participating teachers that the different digital content produced by the teachers was more trusted by students than other available content; the teachers felt that their familiarity with the different levels and circumstances of their individual students made the students more trusting of the content produced by their teachers.

Teachers' practices in providing students the opportunity to participate in the production of digital content are a significant factor that has an impact on stimulating students to learn. Teachers gave students space to contribute to producing parts of lessons and projects and to present their work to their colleagues, promoting ownership and agency of the learning process among students. This finding indicated that the teachers' role in distance learning differs from direct instruction in the classroom. In distance learning, the teacher becomes a facilitator of the learning process by supporting autonomy in students' learning. For instance, the science teacher of the second cycle had the students that were assigned to scientific investigation document on video their preparation of tools for the scientific experiments and present the video in front of their colleagues. In addition, students prepared a presentation on a specific topic, then presented it to their colleagues. This kind of learning experience builds a reciprocal relationship between teachers and their students based on dialogue and discussion, instead of the teacher being the main source of knowledge.

Teachers giving immediate feedback and granting badges to students contributed greatly to motivating students to learn. For instance, teachers granted badges through Class Dojo and posted them as pictures on the LMS. Other teachers continued communication with students and their parents about the students' achievements. The participating teachers pointed out that parents play a vital role in supporting students in distance education in the way the parents follow up with their children in assignments and tasks, motivating their children to attend classes and to become active participants. Students receiving feedback from teachers about the students' work is considered a factor that leads to enhancing the quality of lesson plans [11].

2) The availability of digital content in distance-learning environments

Another significant aspect of increasing students' interest is the availability of digital materials to students in distance-learning environments. Digital content is considered one of the main components of distance learning that helps teachers achieve learning outcomes; digital content facilitates access to information for students, and students can refer to it or interact with it more than once and at any time. Therefore, the participating teachers in the study looked for ways to make these educational resources appropriate and accessible. The teachers reported that they posted the digital content and other educational resources to the LMS that was affiliated with the Ministry of Education, as well as uploaded the content to an external repository and posting the links on social media such as YouTube and WhatsApp. The teachers did this to ensure the availability and accessibility of the content in a variety of ways. In addition, the participating teachers described other methods used with their students, such as creating a digital wall in Padlet to organize the content of the subject and share it with students. The participating teachers reported that they and their students collaborated in posting different educational resources and other activities that supported the topics of their lessons, which made it easier for students to subsequently return to it. The participating teachers also recorded asynchronous classes and shared them with their students as integrated interactive lessons from the introduction to the final assessment, including the implementation of multiple in-class activities.

3) Challenges in applying instructional strategies for distance learning

The results of the study showed that 93% of participating teachers encountered challenges during the implementation of distance learning. An example of the challenges was the lack of specialized applications for communication between teachers and their students, among students themselves, and between teachers and parents. It was directed by the Ministry of Education to stop the use of any external applications for communication other than those available on the LMS. However, the LMS was not supported with communication tools such as emails, messages, or discussion forums. Besides, having a high enrollment of students in classes increased the teacher's effort, whether in the implementation of synchronous lessons or in the implementation of activities and exercises for asynchronous classes; this could require more time than the teacher had available.

Another challenge that the participants faced was the lack of awareness of the difference between instructional strategies for face-to-face learning and instructional strategies for online learning, because of deficiencies in training and a lack of ongoing professional development. An additional aspect of this challenge was the participants' insufficient readiness to move from face-to-face learning to

fully distance learning in a very short time.

Another significant challenge was that the participants were committed to using the features available in the LMS that are affiliated with the Ministry of Education. However, participants could not add applications within the LMS. A participant reported, "In the Google Classroom there are many add-ons that can be used in education by adding them to the platform, but we were not allowed to add them, so I wish to consider the part of allowing the teacher to add some specialized applications to each subject to help teachers achieve learning outcomes of their lessons." Moreover, the participants noted that students had shortcomings in research skills, as reflected in their demonstrated level of capability and efficiency in self-paced learning. The participants believed that there was a shortcoming in training students on scientific research methods via the Internet. The participants stressed the need for specialized courses for teachers in the area of producing digital content, which would contribute to raising the teachers' ability to produce appropriate digital content for their lessons and meet their students' needs.

C. The Extent to Which the Lesson Plans in Distance Learning Align with the Principles of UDL

The mean and standard deviations for each item were calculated. As shown in Table III, the score of each of the three main principles of the UDL was in the range labeled "high", according to the measurement scale shown earlier in Table II. The principle "Provide multiple means for representation" has the highest mean score (M = 3.696; SD = 0.720). The principle "Provide multiple means of engagement" has the lowest mean score (M = 3.400; SD = 0.737).

TABLE III: THE MEAN AND STANDARD DEVIATION OF THE SCORE FOR EACH OF THE THREE MAIN PRINCIPLES OF UDL

Principles	Mean	SD	ionInterpretat
Provide multiple means of engagement	3.400	0.737	High
Provide multiple means of representation	3.696	0.720	High
Provide multiple means of action and expression	3.405	0.813	High

1) Item-factor correlation analysis

Table IV shows the mean and standard deviation of scores for each sub-dimension of each principle of the UDL. For the first principle ("Provide multiple means of engagement"), "Provide options to spark excitement and curiosity for learning" was the highest-scoring sub-dimension applied to the participants' lesson plans in distance learning at (Mean= 3.691, SD= 0.891), which is "high" according to the measurement scale. The sub-dimension "Provide options for self-regulation" was the lowest-scoring sub-dimension applied to the participants' lesson plans at (Mean= 2.976, SD= 0.789), which is "medium" according to the measurement scale. For the second principle ("Provide multiple means of representation"), all sub-dimensions received scores at a "high" level according to the measurement scale. There were slight differences among the three sub-dimensions of this principle. "Provide options for perception" was the highest-scoring sub-dimension applied

to the participants' lesson plans in providing content and information in different ways at (Mean= 3.821, SD= 0.689). "Provide options for comprehension" was the lowest-scoring sub-dimension of this principle at (Mean= 3.595, SD= 0.807). For the third principle ("Provide multiple means of action and expression"), "Provide options for performance" was the highest-scoring sub-dimension applied to the participants' lesson plans at (Mean= 3.678, SD= 0.668), which is "high" according to the measurement scale. "Provide options for expression and communication" was the lowest-scoring sub-dimension applied to the participants' lesson plans at (Mean= 3.214, SD= 0.769), which is "medium" according to the measurement scale.

From Table V, according to Pearson Correlation analysis, there were significant relationships among all sub-dimensions ($p < 0.01$). The results show that providing multiple means of "engagement, representation, and actions and expression" were positively correlated.

TABLE IV: MEAN AND STANDARD DEVIATION OF SCORES FOR EACH SUB-DIMENSION OF EACH PRINCIPLE OF THE UDL

	Mean	SD	Interpretation
Provide multiple means of engagement			
Provide options to spark excitement and curiosity for learning	3.691	0.891	High
Provide options to sustain effort and persistence	3.500	0.802	High
Provide options for self-regulation	2.976	0.789	Medium
Provide multiple means of representation			
Provide options for perception	3.821	0.689	High
Provide options for language and symbols	3.657	0.878	High
Provide options for comprehension	3.595	0.807	High
Provide multiple means of action and expression			
Provide options for performance	3.678	0.668	High
Provide options for executive tasks	3.410	1.137	High
Provide options for expression and communication	3.214	0.769	Medium

TABLE V: PEARSON CORRELATION ANALYSIS AMONG ALL PRINCIPLES

Items	Provide multiple means of engagement	Provide multiple means of representation	Provide multiple means of action and expression
Provide multiple means of engagement	1		
Provide multiple means of representation	P=0.828 Sig=0.001	1	
Provide multiple means of action and expression	P=0.785 Sig=0.01	P=0.881 Sig=0.00	1
Total Average	P=0.922 Sig=0.00	P=0.963 Sig=0.00	P=0.941 Sig=0.00

Statistical analysis to evaluate the recorded lessons based on the UDL guidelines showed that there is a discrepancy between the scores of the three main principles of the model and the scores of the sub-dimensions. The results of the study showed that the principle "Provide multiple means of representation" scored at the highest level. That is, the

participants of this study tried to present content to students using different ways. The principle "Provide multiple means of engagement" scored at the lowest level because of the participants' unawareness and/ or they couldn't use some of the instructional strategies with students. But two of the sub-dimensions of the principle "Provide multiple means of engagement" scored "high": "Provide options to spark students' excitement and curiosity for learning", and "Provide options to sustain effort and persistence". That was because the participants diversified educational resources and ways of teaching, to encourage their students to interact in the lessons. By doing so, they stimulated the spirit of competition, provided immediate feedback on students' learning, and minimized students' fears and external influences that would prevent students from actively participating in distance learning. In addition, the analysis of data showed that the objectives of the recorded lessons were clearly stated by the participants to students. However, the participants did not promote to students the opportunity for self-assessment and expressing their personal opinions because the participants were unfamiliar with instructional strategies for distance education such as reflection and articulation. So, the sub-dimension "Provide options for self-regulation" scored lower at the "medium" level. The study by Minda [20] found that a deficiency in these skills negatively impacted students' learning experience in distance education.

The results of the statistical analysis to assess the participants' practice of the UDL principle "Provide multiple means of representation" were "high" scores for sub-dimensions "Provide options for perception" and "Provide options for symbols and languages". That is because of the diversity in presenting information through alternative formats and ways (e.g., visual and touch) to engage students in the learning process. This result is in agreement with the literature, which supports emphasizing the use of a variety of educational resources to make lessons more attractive and to improve the accessibility of lessons [17]. In addition, the "high" score on the sub-dimension "Provide options for comprehension" came from the participants' explanation of complex vocabularies using illustrations and multimedia as well as appropriate programs and applications to display the instructional materials that were mentioned previously.

With regard to the UDL principle "Provide multiple means of action and expression", the results of the study were "high" scores for sub-dimensions "Provide options for performance" and "Provide options for executive tasks" in lesson plans. The high scores were because of the identification of appropriate objectives for the lessons, the availability of various ways to participate in answering questions and expressing what is learned from the explanation, and the participants' observation of students' learning progress. On the sub-dimension "Provide options for expression and communication", the participants' lesson plans received only a "medium" score. The participants' lesson plans did not build graded levels of presentation to support their students to improve the level of expression and communication smoothly. This shortcoming was due to the participants' lack of knowledge of instructional strategies for distance education. The participants lacked an understanding of the role of the teacher as a supporter of the learning process by assisting students at a level appropriate for that student whenever the situation requires it, until the student achieves the required objectives.

V. DISCUSSION

The findings of this study align with Ojaleye and Awofala [24], who confirmed that instructional strategies for distance learning enhanced academic achievement. These are likely related to the importance of extra-curricular activities in achieving learning goals [25]. That confirms the role of teachers in encouraging students to participate in learning activities through distance learning [19]. However, the findings of the current study do not support the previous research [20, 25] that demonstrated a lack of students' acceptance of distance learning because of the lack of educational resources. The current study emphasized that teachers motivated their students for distance learning in several ways (e.g., by diversifying the educational applications, and providing a variety of digital materials and content such as video clips and interactive activities). In addition, Ng and Chu [25] highlighted the importance of collaborative learning after school, while the participants in the current study faced difficulty in dealing with collaborative learning because of the lack of time to do so.

The findings of this study also confirm the necessity of diversifying the digital content and making it available to students in ways that allow for the possibility of playing the digital content on a variety of electronic devices, using a different application for asynchronous communication, and uploading videos on YouTube [16, 17]. Moreover, Ralph [17] emphasized the importance of the appropriate selection of digital content, diversifying the digital content to achieve learning outcomes of the lessons, and encouraging students to participate in the production of digital content.

Regarding the shortcoming in the participants' knowledge of instructional strategies for distance education, the result of this study is in agreement with the results of Ojaleye and Awofala [24] on the effect of using instructional strategies for blended learning (e.g., problem-based learning) in enhancing students' level in mathematics. In addition, this finding confirms that meaningful online learning should be constructive, active, cooperative, authentic, and intentional [15]. Teachers' understanding of these characteristics will help the teachers select appropriate instructional strategies for their teaching practices, to support the process of students' learning.

VI. CONCLUSION

During distance education, K-12 teachers encountered unprecedented challenges. Despite these challenges, the teachers sought to design meaningful lesson plans to engage their students effectively in the learning process. This study set out to explore the awareness of teachers in K-12 about instructional strategies for distance learning, motivational factors in distance learning, and the application of UDL

principles to the lesson plans produced by teachers. This study was limited to teachers who participated in the First Virtual Forum organized by the Ministry of Education in the Sultanate of Oman. This study assumed that teachers were aware of instructional strategies used to engage students in meaningful learning in any delivery mode. However, based on the information in the literature review, teachers were aware of some strategies such as providing a variety of digital resources to engage students in learning, promoting accessibility among students, and involving students in the co-creation of content for lesson plans. Based on the meaningful online learning model, teachers in this study at least had awareness of some of the strategies (exploration, discussion, scaffolding, and role-playing), while collaboration, reflection, and articulation were strategies largely missing among teachers. It is recommended from this study to expand the survey of teachers to a larger sample of teachers. Also, this study was limited to the use of a focus group discussion and analysis of the recorded lessons; thus, it is suggested to use observational tools to assess the best practices in a real setting.

Regarding the motivational factors for distance learning, this study found several enablers that teachers felt contributed to motivating their students to learn in the environment of distance learning. Teachers were intrinsically motivated to go beyond simply assigning online resources, instead searching for different educational programs and crafting them into assignments and activities that promoted providing immediate feedback on students' learning and enabling students to have the agency of learning. In addition, teachers in this study encountered challenges in several areas such as a lack of communication tools among teachers, students, and parents; difficulty in providing continuous support for students learning through synchronous classes due to the high enrollment of students per class; deficiencies of the LMS used in distance education; and students' lack of skills in self-paced learning.

Taken together, the results of this study suggest that to support students' learning, it is necessary to prepare professional development programs for teachers about learning theories and related instructional strategies for distance learning and blended learning. Moreover, there is a need to share guidelines on the basics of producing digital content aligned with learning objectives. Overall, this study strengthens the idea of providing official channels for communications among teachers, students, and parents through the LMS platform and e-mails. Finally, this study has raised awareness of an important area that needs attention: equipping students with twenty-first-century skills and self-learning skills to become lifelong learners.

CONFLICT OF INTEREST

We declare that there are no known conflicts of interest associated with this paper. Furthermore, we confirm that we demonstrated a strong work ethic in all aspects of this work and obtained the required approvals of all relevant bodies.

AUTHOR CONTRIBUTIONS

Al Abri, M. conducted the research, analyzed the data, and wrote the paper; Ambusaidi A. provided comments on the work and approved the final version.

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