COVID-19's Rapid Digitalization of Construction Education: Built Environment Instructor Experience in Kwazulu-Natal, South Africa.

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Abstract: The novel coronavirus pandemic has had a significant impact on society and everyday life. The pandemic imposed a global shutdown leading to many challenges such as the suspension of academic programs at universities. The result of this suspension contributed to the rapid overnight migration of educational activities from traditional face-to-face learning to a virtual environment which until then was unfamiliar to both instructors and students. This study identified the experiences faced by built environment higher education instructors in KwaZulu-Natal, South Africa during this sudden switch to online teaching and learning. This pilot study employed a quantitative research approach to survey instructor experiences on online teaching and learning during a global pandemic. The data was computed and analyzed using IBM Statistical Package for Social Sciences (SPSS) version 27. Descriptive statistics were used to analyze the data collected. The study sample comprised of 20 higher education instructors in the region of the KwaZulu Natal province in South Africa. Findings from the study revealed that instructors faced adaptive challenges with rapidly having to redesign and remodel the mode of academic course delivery and assessments to suit an online platform. Additionally, instructors observed that students faced technological challenges such as connectivity and navigating the online learning management system platforms. The challenges identified by instructors and students can be effectively transformed to opportunities for future learning under the 'new normal'.

Key words: Challenges, COVID-19 pandemic, higher education institutes, online learning.

1. INTRODUCTION

For centuries crises have always negatively impacted the education sector and potentially disrupted the right of students to quality education during disasters such as war, riots, earthquakes, weather related disasters and pandemics [1]. Globally the academic realm capitulated to the changes as a result of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, commonly referred to as Coronavirus (COVID-19)[2, 3]. One of the significant changes emanated from the closure of higher education institutes (HEI's) due to the COVID-19 virus is transforming from the traditional face-to-face academic delivery mode to the virtual environment in order to minimize transmission and curb the spread of COVID-19 virus [4, 5]. UNESCO reported that more than 1.5 billion members of the student population were forced to substitute alternate forms of teaching and

learning. Therefore, as an outcome of the pandemic, HEI's globally were tasked with employing digital approaches such as Emergency Remote Teaching (ERT) as a mode of academic delivery [7-9].

1.2.   Significance and challenges of online learning

The global pandemic that seized the world has posed extraordinary challenges requiring instructors to transform their academic delivery mode to online learning to limit the spread of the virus. Additionally, ERT is the result of a precipitous and momentary solution from traditional face-to-face teaching to online delivery due to the global pandemic [10]. Therefore, ERT serves as a replacement to all techniques of traditional face-to-face teaching with online knowledge transmitted via various digital platforms. However, the digitalization of knowledge to suit an online platform designed by instructors should not compromise the quality of instruction [11]. Employing ERT is of great significance to facilitate students' flexibility in their online learning experiences, instructor delivery mode, and dissolve the façade of uncertainty, despondency, and anxiety. Unpredictably, the transition from traditional face-to-face lectures to online platforms by students and instructors as a result of COVID-19 occurred at an extraordinary rapid pace [11]. However, the increased demand for technical assistance required by students and instructors conflicted with the availability of existing underdeveloped support teams [12, 13]. Although many HEI's lacked the support systems required by instructors and students to ensure the smooth delivery of online teaching and learning [14, 15]. For instance, a study in Western USA reported that instructors were rushed into ERT as a result of the pandemic, and lacked the preparatory training required to facilitate online learning [16]. Additionally, since online learning is dependent on the internet, many students lacked data and did not possess a device that could smoothly and seamlessly connect to the online learning platforms [17-19].

1.3.   Platforms adopted online during the global pandemic

Around the world governments implemented precautionary measures to curb the spread of the COVID-19 virus. These measures included suspending educational activities and promoting the use of digital tools to supplement teaching and learning [20]. Consequently, countries around the world have introduced several learning solutions during the pandemic to ensure the continuation of education [21]. It has been identified that education had drastically revolutionized and digitalized educational tools such as TV Broadcasts, online libraries and video lectures [22]. Major digital organizations such as ZOOM, MICROSOFT and GOOGLE are offering free features for their products that support online lectures. Additionally MICROSOFT TEAMS offered their premium version for 6 months at no cost [23] . Similarly, GOOGLE's function can accommodate up to 250 people with its enterprise video conferencing with an additional recording function for online lectures [24]. Additionally the popular Learning Management System (MOODLE) used by HEI's serves as a significant platform to post announcements, share course content with students, host quizzes and assignments [25]. In a case study on the use of MOODLE on first-year medical physiology course in Malaysia, Seluakumaran, Jusof [26] reported that MOODLE may improve grades and student knowledge as opposed to face-to- face-courses. To understand the productivity of online platforms this study sought to identity the experiences faced by instructors while teaching online.

2. METHODOLOGY

A questionnaire was developed based on the review of relevant literature and a pilot study was conducted with a sample of built environment HEI instructors in the Kwazulu-Natal Province of South Africa with close-ended questions in a questionnaire survey instrument to establish their views on their experience with teaching online during a pandemic. The target population for the research were built environment instructors from construction management, quantity surveying, civil engineering and project management discipline. The questionnaire administered on MICROSOFT FORMS and a link emailed to participants. This study adopted a quantitative research approach and purposively sampled 20 HEI instructors. A data set of descriptive statistics was captured and computed with the use of SPSS version 27. Internal validity tests were conducted of the items using a set of scaled responses reporting the Cronbach's alpha co-efficient for validity. Table 1 below reflects Cronbach's alpha exceeding the widely recommended threshold of 0.70 [27].

Table 1. Cronbach alpha's reliability statistics for online learning

Description	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of items
Challenges instructors faced during online teaching	.832	.721	5
Instructors' observation of students' online learning experience	.778	.774	9

3. DATA ANALYSIS

3.1. Respondents' profile

A total of 20 built environment instructors successfully completed the questionnaire survey (male = 55%, female = 45%). The study sampled instructors across different built environment disciplines HEI's in Kwazulu-Natal, South Africa. The questionnaire survey hosted online on MICROSOFT FORMS and a link was emailed to instructors.

3.2. Respondents' demographics

Table 2 presents the demographic information of built environment instructors who participated in the study. A total of 45% (9) of the participants were aged at 40 and below and 55% (11) were above the age of 41. Primarily, participants comprised of 30% (6) senior lecturers, 60% (12) lecturers, 5% (1) junior lecturer and 5% (1) postdoctoral fellow respectively. All participants taught remotely since the commencement of the pandemic with teaching experience up to 5 years 40% (8), 6 to 10 years 15% (3), 11 to 15 years 20% (2) and 16 years and above 25% (4).

Table 2. Demographics

Characteristics	Discipline	No. of participants	%
Age group	40 and below	9	45%
	41 and above	11	55%

Level of appointment	Senior Lecturer	6	30%
	Lecturer	12	60%
	Junior Lecturer	1	5%
	Postdoctoral Fellow	1	5%
Teaching experience	Up to 5 years	8	40%
	6 to 10 years	3	15%
	11 to 15 years	2	20%
	16 and above	4	25%

3.3. Challenges instructors faced during online teaching

This section sought to assess the challenges instructors faced during online learning. Participants rated their experience using a 5-point Likert scale, where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree. Table 3 indicated that instructors were uncertain on the method of assessment online assessments (mean score = 2.30), instructors faced challenges on the development of quality online assessments (mean score = 2.30), instructors felt isolated and alone (mean score = 2.05), adapting the transformation from face-to-face delivery to online learning (mean score = 1.85), and Lack of student participation during online lessons (mean score = 1.5), were ranked respectively.

Table 3. Challenges instructors faced during online teaching

Description.	Mean score	Std. deviation	Variance	Rank
Uncertainty on the method of assessment in an online environment	2.3	1.22	1.48	1
Development of quality online assessments	2.3	.979	.958	2
Feeling isolated and alone	2.05	1.19	1.42	3
Adapting the transformation from face-to-face delivery to online learning	1.85	.813	.661	4
Lack of participation during online lessons	1.5	.827	.684	5

3.4. Instructors' observation of students' online learning experience

This section sought to assess instructor's observations of students' online learning experience. Table 4 shows that students faced challenges navigating the learning management systems (BLACKBOARD, MOODLE, MSTEAMS) (Mean score = 2.50), Lack of student engagement during online learning (Mean score = 2.30), Students do not have access to technological devices (Mean score = 2.10), students struggled with Grasping the module content online (Mean score = 2.05), Negative impact on instructor performance rating (Mean score = 1.90) were ranked as the most frequent responses.

Table 4. Observation of students' online learning experience

Description.	Mean score	Std. deviation	Variance	Rank
Navigating the learning management systems (BLACKBOARD, MOODLE, MSTEAMS)	2.50	1.318	1.737	1
Lack of student engagement during online learning	2.30	0.979	0.985	2
Students do not have access to technological devices	2.10	0.911	0.832	3
Grasping the module content online	2.05	1.100	1.208	4
Negative impact on instructor performance rating	1.90	0.788	0.621	5
Poor student attendance	1.70	0.865	0.747	6
Dishonesty in online assessments	1.65	1.141	1.290	7
Communicating with classmates (not related to connectivity)	1.65	0.812	0.661	8
Connectivity problems (Network/data)	1.50	0.827	0.684	9

3.5. Factor analysis on instructor challenges and observations

Inspection of the correlation matrix revealed the presence of a coefficient of 0.7 and above, which is suitable for factor analysis [27]. Table 5 presents the results of the KMO with the data returning value-sampling adequacy of 0.718. Any value above the cut-off point of 0.6 is suitable for factor analysis [28].

Table 5: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.718
Bartlett's Test of Sphericity	Approx. Chi-Square	115.609
	Df	45
	Sig.	0.00

4. DISCUSSION

The results of this study indicate that instructors and students faced challenges in adapting from traditional face-to-face teaching and learning to the virtual environment. Although online learning is convenient in terms of saving time and accessibility, respondents agreed that a blended learning approach is much preferred. It has been identified that instructors were uncertain on the method of online assessments and course delivery. Mainly because online assessments requires more problem solving, critical thinking and application questions [29]. A recent study in Russia noted that digital learning technologies can be used effectively as additional tools to develop crucial skills within the online learning environment [30]. Additionally, due to the rapid transition to online platforms, instructors observed the challenges students faced. Students had difficulties with navigating the online platform and some students did not have a suitable device that is compatible with the software required for online learning. In a study on the possibilities and challenges of online education in India during the Pandemic, it was identified that most students relied on a mobile

device for online learning. Subsequently online platforms must have an app for mac, android and the web [31] .The results of this survey has its limitations as the pilot study may not be a complete representation of the majority of instructors teaching online in South Africa.

5. CONCLUSION

In South Africa, the COVID-19 pandemic has uncovered several social inequalities and disruptions however, at the same time the pandemic catalyzed education in the transformation to the virtual environment. Results of the study indicated that built environment instructors faced challenges with the development of quality online assessments as well as the assessment approach. Additionally, instructors observed that students faced difficulties with LMS and students from underprivileged backgrounds lacked a suitable digital device. Post the pandemic it is unlikely that HEI's will resume traditional teaching, therefore the experiences gained during ERT will be laid as a foundation to pave the future for online teaching under the 'new normal'. The experiences gained during ERT will enable instructors to have a better understanding of the circumstance a student maybe in and the solutions employed to remedy the situation. Instructors will be more experienced in creating and designing course content and assessments that is more suited for online platforms. It is recommended that HEI's develop a learning program for first year students to reinforce technological knowledge and LMS training to ensure readiness for online learning.

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