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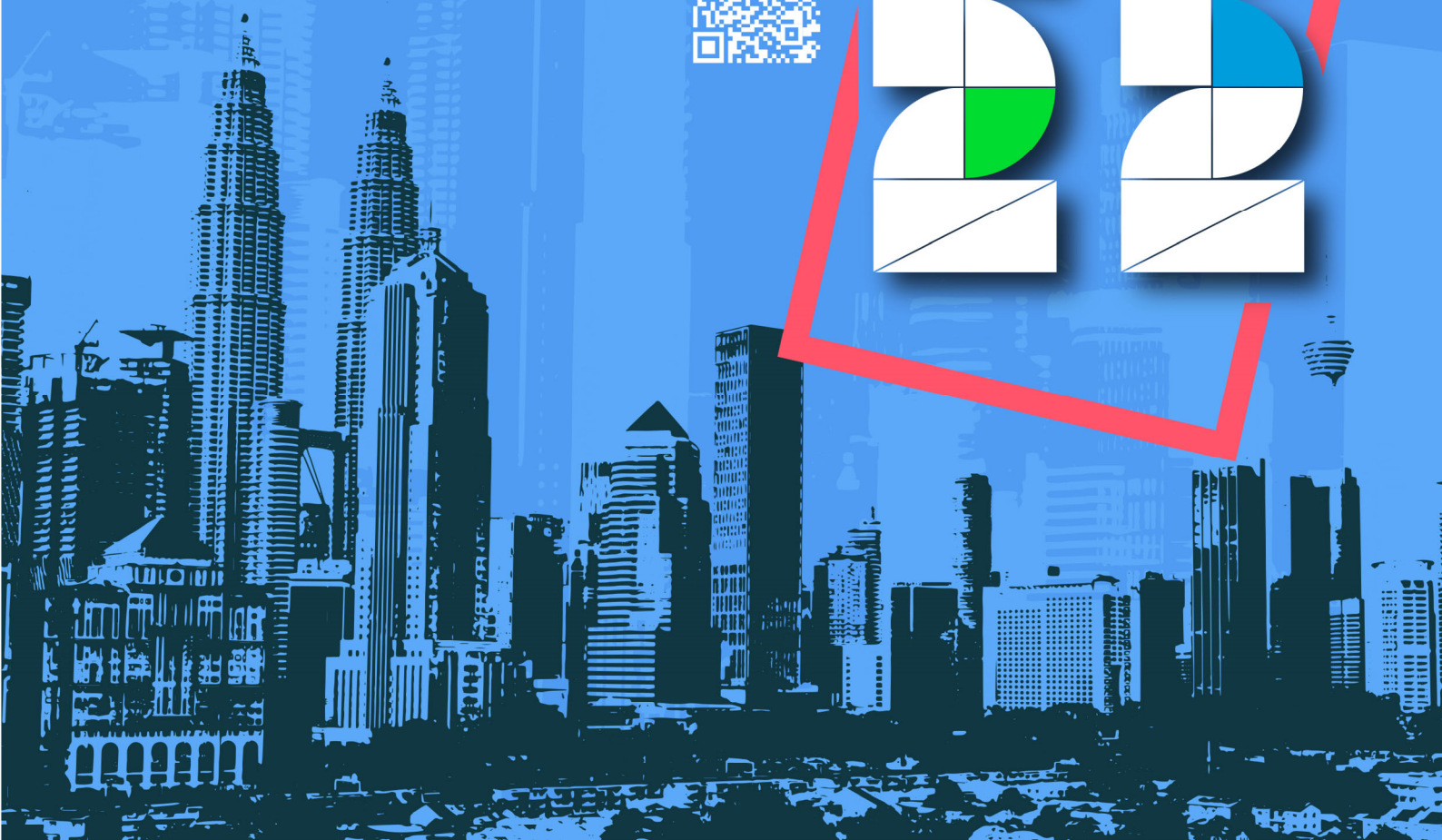

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TeSSHI 2022

Reengineering Knowledge and Creativity for Global Excellence

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Foreword

The papers compiled in these e-proceedings are papers presented online at Technology, Science, Social Sciences and Humanities International Conference 2022 (TeSSHI 2022) held on 30 June 2022 at Universiti Teknologi MARA (UiTM) Cawangan Kedah, Kedah, Malaysia. With the theme, ***Reengineering Knowledge and Creativity for Global Excellence****,* the conference has brought together presenters of diverse background who shared their conceptual and empirical papers in broad areas that are subsumed under the fields of Technology, Science, Social Sciences and Humanities. These e-proceedings comprise current researches that were undertaken with the rigorous endeavour of knowledge enhancement to ensure that the world of academia will continue to flourish. It is thus hoped that readers will significantly benefit from knowledge contained in these proceedings.

TeSSHI 2022 and these e-proceedings would not have been possible without the great efforts from the presenters, and the generous support from the TeSSHI 2022 committee members and the Rector of UiTM Cawangan Kedah, Prof. Dr. Mohamad Abdullah Hemdi. A heartfelt gratitude is extended to all involved. It is hoped that these e-proceedings will be an impetus to stimulate futher studies and research that benefit the society at large.

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Inhibiting Factors to Successful Virtual Teaching and Learning in Engineering Science Topic from the Perspectives of Polytechnic Lecturers

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ABSTRACT

The present study aims to explore the perceptions of polytechnic lecturers on inhibiting factors to successful virtual teaching and learning in engineering science topics. Three purposefully selected lecturers who had more than 10 years of experience teaching engineering science-related topics from Politeknik Tuanku Sultanah Bahiyah, Kulim Kedah were interviewed. The in-depth interviews were transcribed and analysed using qualitative thematic analysis. The findings present the point of view of the lecturers with regard to the inhibiting factors standing in their way of being effective and successful in virtual teaching classes. Their perspective had generated four themes of the inhibiting factors, which were as follows: (1) the readiness and satisfaction of the lecturer; (2) the level of focus and attitude of the student; (3) the facility and environment; and (4) the lecturer–student devalue relationship. The lecturers outlined a few numbers of possible suggestions to overcome these inhibiting factors. They have articulated their apprehension about the polytechnic's students' lack of motivation and self-directed learning for continuing their education in the field of engineering science. The anticipated suggestions could be done for further investigations and improvements in the virtual teaching of the topic of Engineering Science.

Key Words: virtual teaching, polytechnic lecturer, engineering science, readiness, satisfaction

INTRODUCTION

The digital era transformation especially during the endemic of Covid-19, the utilization of Information Technology (IT) in the education sector is encouraging (Junus et al., 2021). It facilitates online classes as a manifestation of the e-learning concept and allows lecturers and students to engage in a virtual environment, although physically separated (Junus et al., 2021). Without exception, with increasingly advanced technologies impacting the learning system, the Curriculum Development and Evaluation Division, Department of Polytechnic Studies had developed the Curriculum Information Document Online System (CIDOS) for the e-learning project (Mahsum et al., 2021).

CIDOS was introduced as a document management system that acts as a platform to facilitate the publication of curriculum and other related information digitally for lecturers and polytechnic students (Mahsum et al., 2021). The automated CIDOS intercedes the virtual classes processes by

allowing students to download learning notes, answer and submit quizzes online, execute and submit assignments online, interact with lecturers online through the forum and chat, and review lessons online (Mahsum et al., 2021).

Meanwhile, Husin et al. (2021) describe the LMS-based CIDOS as a management system that employs MOODLE open-source software. The CIDOS Learning Management System (LMS) is used to create interactive e-learning materials that include student resources and activities. The most important resource is to provide notes (Resource and Lesson) in HTML, Microsoft PowerPoint, or Microsoft Word format. Quizzes and assignments are activities that test each student's comprehension and are due at a specific time. Chat and Forum is a two-way interaction activity between students and lecturers. Using journal activities, students can do self-reflection on what they have learned. The LMS platform has a database where students and lecturers can track their activities thoroughly and effortlessly (Husin et al., 2021).

Despite the countless virtual learning benefits, there are drawbacks to this digital transformation (Moreno-Guerrero et al., 2020; Almiah et al., 2020). Similarly, the fully virtual teaching in the subject of DBS10012 Engineering Science in polytechnic had given ups and down challenges for the lecturers in delivery and practice of effective teaching virtually. Even though the concept of blended learning had been implemented previously in polytechnic (Mahsum et al., 2021), little literature was found regarding the perceived inhibiting factors in full virtual teaching among polytechnic lecturers specifically teaching Engineering Science subject, that requires critical theoretical, calculation and laboratory activities.

Thus, this research aims to explore the perceptions of polytechnic lecturers on inhibiting factors to successful virtual teaching and learning in engineering science topics. This study also has the purpose to obtain suggestions for further investigation and improvement. As a practical implication, this finding may enhance the knowledge of the stakeholders and administration towards better management of virtual teaching especially the involvement of laboratory and practical assessment.

METHODOLOGY

This is a qualitative study design using semi-structured and in-depth interviews. The interview instrument was developed based on self-directed learning theory which is one of the core concepts in adult learning education by Knowles's andragogy (Loeng, 2020). From Knowles's andragogical perception, the learner moves toward increasing self-directedness, and the lecturer's role is to encourage this increasing self-directedness. Thus, it is important to assess the learner's experiences as it will become an increasing source of learning (Knowles, 1975; Loeng, 2020).

The method of interview sessions was conducted when both the interviewer and the respondent were physically presented together for the data collection process that is relevant for this study. The interview is very effective method of exploring a person's perceptions, including respondent's attitudes, interests, thoughts, values, and opinions. The interview is a method that allows a researcher to obtain depth research information because it involves direct face-to-face contact with the targeted respondents (McNiff, 2002).

The respondents interviewed were three polytechnic lecturers (ID01, ID02 and ID03) from Politeknik Sultanah Bahiyah, Kulim, Kedah who were nominated via two eligibility criteria: (i) Have more than 10 years of experience and qualification in teaching subject DBS10012 Engineering Science and (ii) Have experience in virtual teaching of subject DBS10012 Engineering Science. The interview protocol was developed as followed in Kallio et al. (2016). The main research question was about the respondents' perceptions regarding inhibiting factors to conducting virtual teaching of DBS10012 Engineering Science to the polytechnic students. Then a thematic analysis was used to analyze the interview transcripts (Braun and Clarke, 2006).

RESULTS AND DISCUSSIONS

Throughout the interviews were conducted, various perceptions of the polytechnic lecturers on inhibiting factors to virtual teaching were expressed. Following are four main inhibiting factors that have been recognized:

1. Lecturer's readiness and satisfaction

According to Tajuddin et al. (2021), Malaysian lecturers have numerous problems when it comes to online teaching. This is including aspects of technological developments, pedagogical changes, government guidelines, and students' particular demands (Tajuddin et al., 2021). Nevertheless, this study found that there is a clear elucidation of lecturers regarding their readiness to fully utilize virtual learning in the subject.

> *"One thing that truly needs to be considered is the readiness of the lecturer. Are they willing to make significant changes such as the application of augmented reality in virtual learning? Not all lecturers are ready to make 360 degrees changes like this. Too time consuming and costly. So, not practical" (ID02)*

> *"To become a technology savvy, creative and innovative need many investments, and of course, we cannot simply implement it. It needs to be in line with others' requirement and expectation too" (ID01).*

The readiness of lecturers in virtual teaching is important to be considered because of the transition they must make from face-to-face engagement to an online and advanced virtual lecture setting (Cutri & Mena, 2020). This is even more important towards lecturers who had lower IT literacy and lower experience and knowledge in managing technical issues during virtual learning (Mallillin, 2020). Besides, previous studies had shown many negative implications of technical problems towards students' motivation and learning process (Tajuddin et al., 2021; Cutri & Mena, 2020; Mallillin, 2020).

As being recommended by the respondents, the Unit of Informative and Multimedia (UIDM) in polytechnic for an instance, needs to prepare additional computer-related to virtual teaching courses and training to the lecturers. The aim is to increase the teaching quality and competency of the lecturers when using technology, which at the same time may increase the student's motivation and engagement to the virtual classes.

Despite the barriers and challenges in using technology for effective virtual teaching, most of the lecturers expressed their worries, frustration and dissatisfaction with their student's progress, especially during the online practical classes. The feelings were overwhelmed particularly due to their longing that practical, or laboratory classes should be taught face-to-face so that the learning objectives are more achievable.

> *"We also don't know what the students know. We can't examine their understanding and activity during class, unless face-to-face, we can observe and monitor them comprehensively "(ID02)*

> *"Demonstrating laboratory assessment virtually was super challenging and insufficient. The objective could not be achieved well. Because we can only demonstrate. Students understanding are uncertainties" (ID01)*

The lecturers believed that students should have hands-on experience with their laboratory sessions. Most lecturers also felt that their capacity for teaching online courses was not optimal because they did not believe the learning objectives could be fully realised virtually (Junus et al., 2021).

2. Student's level of focus and attitude

Most of the lecturers were agreed that their students felt more fun, alert and enjoy during face-to-face class than in virtual class.

"Students are more focus, responsive and enjoy during face-to-face class than online class" (ID01)

"When they (student) just listening in class, their focus was appalling. They even don't show much interest on the interactive quiz we provide" (ID02)

Indeed, it is true that during online-based learning, students' performance and motivation may get flawed (Balan & Montemayor, 2020). Despite advancements that technology had to provide us, the students were still besieged to maintain their focus on the lectures given virtually (Balan & Montemayor, 2020). The disengagement towards class activity and decline of class response were among the indicators of low motivation levels of the students (Balan & Montemayor, 2020). Previous studies found that lower attention span and concentration were usually hitting harder for the students who have difficulties understanding the teachers' instructions (Deng & Wu, 2018; Hartnett & Hartnett, 2016). These students have also had a higher chance to lose interest and thus, leave the learning activities.

The importance of student motivation in online learning cannot be overstated. Students need to be motivated as learning is a process of remembering, understanding, recalling, applying, analysing and synthesizing knowledge (Balan & Montemayor, 2020). That is why, Balan and Montemayor (2020), stated that motivation is the engine of learning, and thus, one of the major factors for successful online learning courses. Yet, to have an effective and successful virtual class, both lecturers and students need to play their parts (Ramli et. al., 2021). Respondents of this study agreed that the lack of readiness of the students in the class may influence their online attitudes and focus.

"Few students are working part-time (e.g., food riders) and they always went missing or not ready in online class" (ID01)

"Only 30% of the students participate in the class and the rest we don't know if they even listen or not" (ID02)

Chung et al. summarized the focus and readiness of the students are seldomly affected by their demographic background such as condition at their home (Tajuddin et al., 2020; Chung, Subramaniam and Christ Dass, 2020). Misunderstanding between lecturer and student may also cause poor online learning interaction, experiences, and dissatisfaction (Tajuddin et al., 2020). By understanding the student's situation and readiness factors, the lecturer may improve their self-satisfaction and work efficiency too. Together with the improvement in the online teaching application and approach, the students are believed to be more lenient to participate in the course (Ramli et. al., 2021). Another issue regarding the student's attitude expressed by the lecturers was the honesty and transparency during assignment submission and examination.

"Major problem was during assignment submission and discussion. Some were not bothered to submit and answer. Some were just copied and paste others works" (ID03)

"During the online exam, the issue of honesty of the students does exist. Even the evaluation score may have an issue of transparency that is difficult for the lecturer to measure " (ID01)

To identify the level of understanding of the students, formative and summative assessments will be conducted virtually. Yet, many lecturers have queried the reliability of the results since they are unable to observe the students thoroughly via online as compared to traditional face-to-face assessment, where body language and facial expressions could be signage of their understanding (Ramli et. al., 2021).

By asking questions, the level of understanding could be improved. Besides, asking questions is a part of the learning process, and often students are encouraged to ask questions to get a better understanding of the subject (Chung, Subramaniam and Christ Dass, 2020). Similarly, in an online platform, the students may post their questions in the group to achieve the same outcome. In this study, there were exposures regarding asking question culture among the polytechnic students, as follows.

"Students have to be told. They won't do or ask unless you (lecturer) told them" (ID03)

"Some students too shy or too afraid to ask anything in front of his/her friends. Or maybe their environment does not allow them to do so. I don't know" (ID01)

"Students who actively participate in the class by asking questions, we can see the difference in their marks" (ID03)

Online communication self-efficacy is another aspect that should be improved. According to Chung et al., even though Malaysian students specifically, do not grasp the lecture's topic, they will try to avoid asking questions during face-to-face sessions. This is due to the social stigma, and lack of self-efficacy in online communication. (Chung, Subramaniam and Christ Dass, 2020). If this culture prolongs, there will probably cause a direct effect on the student's preparation and performance for online learning (Chung, Subramaniam and Christ Dass, 2020).

3. Facility and environment

Most of the lecturers were agreed that their students felt more fun, alert and enjoy during face-to-face class than in virtual class. Another major inhibiting factor voiced by the respondents were issues related to facility, infrastructure, internet connectivity and working station. Some of the comments of the lecturers were below.

"Not all students have a good notebook and stable internet connectivity. Some of them struggle to connect due to slow coverage at their "kampung" (ID01)

"Early time of teaching online, a lot of times have been wasted. I was busy calling the lost students" (ID01)

"Quite a several times, class is interrupted with my hang laptop" (ID03)

"Most of the students off their camera. Their reason was that it consumed bigger internet data. So, I'm not sure whether they are there listening or not" (ID02)

Most of the respondents were satisfied with the internet connectivity provided by the polytechnic. The only matter the most was the non-conducive working environment and limited digital tools during synchronous online classes. Among the arguments were as follows.

"If in polytechnic, the best place to start online class is a place that is noiseless and away from other lecturers" (ID01)

"Non-conducive workstation in the office is bothering me. Sometimes I need to lower down my volume during teaching as not to bother other lecturers who also has an online class" (ID03)

"I was so in haste to set up all the teaching tools for my lab. But end up, I frustrated when the student could not see my whole demonstration. The screen was too narrow (sigh)" (ID02)

Facilities and infrastructures in higher education institutions are among the critical challenges to producing successful online learning (Tajuddin et al., 2020; Ismail, Abu Bakar and Syed, 2020).

If the lecturers are well-prepared with good online learning facilities, they are perceived to be more motivated and prepared to achieve the cognitive, affective or psychomotor domain-based learning objective successfully (Ismail, Abu Bakar and Syed, 2020). The investment towards innovative online learning environments to the lecturers are supposed to be worthwhile as they always need to think outside of the box to deliver effective and meaningful online learning experiences to the students (Rapanta, Botturi and Goodyear, 2020).

Therefore, one of the suggestions was to provide a mini studio equipped with a green screen and other digital learning tools for virtual teaching and learning of the lecturers. This aspiration is expected to at least help lecturers who need to live to demonstrate their laboratory and practical works. To ensure effective virtual teaching, respondents also had suggested the provision of suitable and higher specification computer for the polytechnic lecturer, parallel with the availability of a good internet connection, especially to the underprivileged students. This more or less may improve the teaching quality of the lecturers during virtual class, which at the same time may help the students to develop the aspired 21st-century skills such as technology literacy and creativity that are beneficial for their career path preparation (Junus et al., 2021 & Tajuddin et al., 2020).

4. Lecturer – student devalue relationship

Last but not least was the minimal interaction and perceived devalued relationship between lecturer and student. As remarked by lecturers in this study,

> *"No immediacy and chemistry between lecturer and student. Especially among students who have never been met in real since semester one" (ID03)*

> *"Interaction through virtual is different than face-to-face interaction. We cannot observe their true character. The only character we can observe when he/she was coming late or unresponsive when we call her/him repeatedly" (ID01)*

Virtual teaching is considerably different from teaching in a traditional face-to-face classroom setting (Ramli et. al., 2021). As compared to virtual learning, the face-to-face classroom is widely regarded as superior (Song et al. 2016). Facing students in person provided a more dynamic learning environment that fostered deeper connections and stronger chemistry between lecturers and students (Balan & Montemayor, 2020).

The inability to directly see a face or hear a voice in the virtual class may be the most difficult inhibitor to building the relationships that are so important in students' success and satisfaction (Ramli et. al., 2021). Nevertheless, there were many benefits of developing a personal relationship with online students. Among the benefits where lecturers can improve their virtual teaching effectiveness, and increase their students' engagement, satisfaction, and motivation. Other than that, a study found the most effective strategy to build this bond was by allowing students to share about themselves and if as lecturer, showing their personal side to the online student (Lim et al., 2020). Additionally, respondents had also proclaimed about the frustration they had to endure when students seemed to devalue their presence as lecturers.

> *"It is normal for the student to come late. But online class is worse because many students only came for attendance before they left or stay unresponsive until the end of class. I was disappointed" (ID02)*

> *"Afterall, we (lecturers) could only advise and remind the students. We cannot control them" (ID01)*

According to Graham et al. (1992), "teaching is a process of relationship development and in order to attain satisfaction, there is a need of effective interpersonal communication skills". And it is somewhat normal for online environments to have to limit nonverbal cues (e.g., eye contact, smiling, physical distance, movement, and graphic information) and students might have minimal knowledge about their teacher. However, Song et al. (2016) contends, "In a technologically mediated learning

environment, students need to know that their instructor is a human being rather than a computer who simply processes and grades their work" (Martin, 2019).

Thus, the lecturers need to help their online students to give an experience of "personhood" and immediacy behaviour during virtual class. These include behaviours of using appropriate humour, the inclusion of student names in correspondence, and the usage of emoticons in chat (Martin, 2019). Like traditional face-to-face classroom settings, immediacy behaviour shown by the lecturers is believed to enhance students with positive online learning experiences by enhancing student engagement, communication satisfaction, and cognitive and affective learning (Song et al. 2016).

CONCLUSION

This research provides findings on the perceptions of lecturers on inhibiting factors to conduct virtual teaching of subject DBS10012 Engineering Science in polytechnic specifically. This research highlights four main inhibiting factors that polytechnic lecturers face: (1) lecturer's readiness and satisfaction; (2) student's level of focus and attitude; (3) facility and environment and (4) lecturer–student devalue relationship. To produce effective and meaningful virtual teaching and learning experiences for both lecturers and students in Engineering Science, these factors should be overcome. Several solutions have been provided and for future research purposes, this study may act as a reference to assess the level of lecturer's satisfaction and evaluation when using virtual learning applications in their teaching and learning of engineering science-related topics such as mathematics for the polytechnic lecturers.

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