Global Business and Management Research: An International Journal
Vol. 13, No. 4s (2021)

Teaching Challenges and Strategies of Malaysian Educators in Online Teaching during COVID-19 Pandemic

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Abstract
Purpose: This research aimed to design a model and test confirmatory factor analysis to better explain the effects of teachers' challenges on teaching strategies during online teaching and learning.
Design/methodology/approach: This study employs a quantitative research design by means of survey. An online questionnaire consisting of 36 items was distributed to educators to gain the intended data. Data were analysed using Structural Equation Model (SEM).
Findings: The results found significant relationship between technological challenges and content challenges and teaching strategies. However, no significant relationship was found between pedagogical challenges and strategies. Finally, this study reported that there is a significant effect of teaching challenges on teaching strategies.
Originality/ value: When this study was conceived, there is little evidence of the interaction between teachers' challenges and teaching strategies particularly in Malaysian online education context. Thus, there is a need to provide empirical evidence on the challenges encountered and strategies employed by instructors at various education levels in Malaysia.
Paper type: Research paper

Keywords: Technological challenges, Content challenges, Pedagogical challenges, Teaching strategies

Introduction

Online education is form of education whereby technological devices such as computers and tablets are used for teaching and learning purpose. In recent time, particularly during COVID-19 pandemic, online teaching and learning has become the basic essence in education as face-to-face teaching and learning condition is not possible. Due to the drastic shift from traditional approach to online medium in education sector, instructors may experience enormous challenges to accommodate the new transformation and fulfil learning outcomes simultaneously. Education sectors at all levels, from kindergarten to tertiary level are trying to minimise the gap between what is expected and what is performed. Nevertheless, the outcomes

of online education may not be as desired due to several challenges encountered among educators in ensuring the sustainability of education. Furthermore, educators may also have applied strategies in overcoming the challenges in their teaching. As such, this study aims to explore the strategies and challenges faced by Malaysian educators in online teaching and learning during COVID-19 pandemic. This study provides deeper understanding of the challenges educators faced and their coping mechanism by educators in online education particularly during the pandemic. Moreover, this study also provides a model based on empirical evidence that could be used by educators in minimising the hurdles during the online instructional process. This paper is organised into several parts namely literature review and hypotheses, methods, findings, discussion and finally conclusion, limitations and recommendations.

Literature Review and Hypotheses

Since COVID-19 pandemic begins, online learning has become ubiquitous at higher education institutions and schools around the world. Therefore, it is necessary to have an understanding on what makes online education a triumph as well as an insight on what are the challenges and strategies employed by instructors during online teaching and learning.

Bao (2020, p.113) highlighted the five principles for online education namely:

(a) high relevance between online instructional design and student learning
(b) effective delivery on online instructional information,
(c) adequate support provided by faculty and teaching assistants to students
(d) high-quality participation to improve the breadth and depth of student's learning
(e) contingency plan to deal with unexpected incidents of online education platforms

According to Tartavulea et al. (2020), support from institutions, the confidence in the online system and learner perception on formative assessments were positively related to the effectiveness of online education. On the other hand, research have also explored the significant role of student satisfaction in online learning environment. For example, Nambiar (2020) reported that a quality of learner-teacher interaction, availability of technical support and organisation of online class modules are the determinants of teacher and student satisfaction. In the same vein, Masrom and Mohd Alwi (2022, in press) surveyed student satisfaction determinants in online learning setting and found that learner-content interaction and online learning self-efficacy were the predictors of student satisfaction.

The sudden transformation from face-to-face to online teaching and learning have brought wide-ranging challenges. For instance, online learning activities could lead to more distraction of online content and hinder learner engagement in the online lesson (Melor et al., 2019). Moreover, research has shown that technical issues that happen during the online lessons may also disturb the learning process (Halim & Hashim, 2019; Joshi et al., 2020) and limit learner engagement and participation (Gillet-Swan, 2017). Likewise, instructors also struggled to create instructional materials and monitor learners behavior during online lessons (Chang & Fang, 2020). Creating interactive instructional materials could be a challenge because instructors need to properly plan on how to maintain and manage learners' attention, deliver lesson activities, and create interaction with students. Meanwhile, Joshi et al. (2020) highlighted that the impediments encountered by teachers in India during online teaching were mostly technical hurdles such as lack of infrastructure, technical support and knowledge on online teaching platforms. In addition, external distraction and family interruption were pointed as rather serious challenges when conducting online classes from home.

On the other hand, Ferri et al. (2020) categorised the challenges in online teaching into social, pedagogical and technological challenges. Lack of learner-teacher interaction, and parents' support (because parents are working) were among the social challenges while pedagogical

challenges include lacks social and cognitive presence among teachers and lacks digital skills. Besides, technological challenges highlighted by the participants were lacks technological devices and poor Internet connection. In a qualitative study in Pakistan, Noor et al. (2020) pointed out that the issues faced by teachers during online teaching are poor Internet connection, limited availability of educational resources, poor learners' attendance and lack of technological knowledge.

In a recent study, Hoang and Le (2021) investigated teachers attitudes during online teaching in Vietnam by means of survey. The results indicated the challenges faced by learners are technological competency, learner motivation, learner technical support while instructors' challenges are in terms of experience, willingness, and technological competency. Various issues and challenges have been highlighted in previous literature, and mostly are related to learners, instructors and institutions. Hence, it is valuable to understand the challenges confronted during online teaching and learning in Malaysian context so that practical suggestions on how these challenges could be dealt with can be offered.

Many studies have described the strategies applied by instructors in improving their pedagogical and knowledge skills during online teaching. For instance, Sutarto et al. (2020) conducted an interview to understand the strategies used by teachers to promote learners' interest in learning. The findings showed that teachers explain the importance of learning, use simple but interesting learning materials, and conduct continuous evaluation to encourage learners. Meanwhile, McQuirter (2020) pointed out that teachers' focused on choosing suitable platforms and applications that are used to deliver the program in strategising their teaching approach. Mahmood (2020) examined instructional strategies that could be applied during online teaching. The study proposed teachers to keep their pace slow and share resources with students before class. Furthermore, the study also suggested the ministry to have a collaboration with telecommunication industries so that Internet-related issues can be overcome. In a meta-analysis study, Doo et al. (2020) stressed on the importance of scaffolding as it was found to have significant effect on learning outcomes. The study also highlighted the importance of computers as a scaffolding source in online learning environment. Based on studies reviewed, instructors have applied various strategies including pedagogical and instructional strategies in facing the online teaching challenges. This study is among the few that explores the interaction between teachers' challenges and teaching strategies.

We thus hypothesise:

H1: Teachers' challenges in technology significantly affect their teaching strategies

H2: Teachers' challenges in content significantly affect their teaching strategies

H3: Teachers' challenges in pedagogy significantly affect their teaching strategies

The following is the conceptual framework of this study:

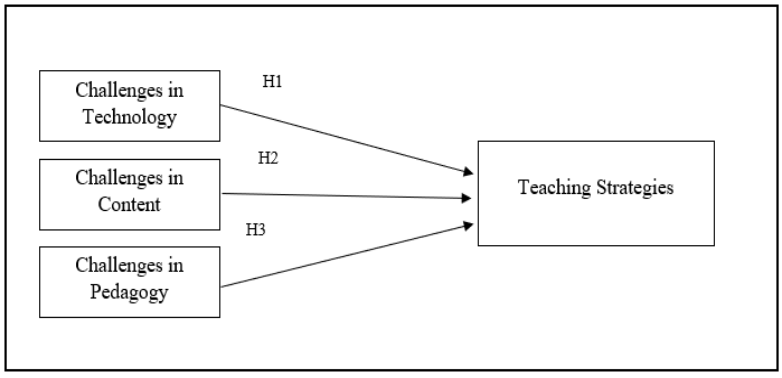

Figure 1: The Conceptual Framework of Teaching Challenges and Strategies

Methods

A survey was used in this study to explore the effects of teachers' challenges on their teaching strategies. The online survey was administered during an online programme particularly organised for educators. 190 educators from various public and private education institutions (i.e. schools, tertiary education institutions) completed the survey. Table 1 presents the demographic information of the participants.

Table 1: Demographic Information of The Respondents

	Frequency	**Percentage**
Gender		
Male	68	35.8
Female	122	64.2
Age		
29 and below	8	4.2
30-34	28	14.8
35-39	54	28.4
40-44	52	27.4
45-49	32	16.8
50 and above	16	8.4
Type of Institution		
Primary schools	20	10.5
Secondary schools	28	14.7
Colleges	44	23.2
Universities	98	51.6

The instrument used in this study was self-developed based on the findings of previous studies. The questionnaire consists of two parts. Part A elicits participants' demographic information while Part B consists of 36 items measuring teachers challenges, and strategies using a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). The items can be found in Appendix A. The data was analysed using Structural Equation Model (SEM) to test the hypotheses. Table 2 describes the variables measured in the questionnaire and their corresponding item number.

Table 2: The Number of Items in the Survey

Variables	Number of items
Challenges (Technology Domain)	7
Challenges (Content Domain)	7
Challenges (Pedagogy Domain)	5
Teaching Strategies	17

Findings

This study aims to investigate the effects of teaching challenges on teaching strategies among educators. The data were investigated for its reliability, confirmatory factor analysis and structural model.

Reliability Checking

Table 3: Cronbach Alpha Coefficient

Item	Number of items	Cronbach's Alpha (α)
Overall	36	0.911
Challenges (Technology Domain)	7	0.830
Challenges (Content Domain)	7	0.735
Challenges (Pedagogy Domain)	5	0.867
Strategies (Technology Domain)	7	0.820
Strategies (Content Domain)	4	0.837
Strategies (Pedagogy Domain)	6	0.820

Table 3 above summarises the results of Cronbach's alpha coefficient for all variables. Results show the overall Cronbach's alpha for all variables ($\alpha = 0.911$) which consists of challenges-technology domain ($\alpha = 0.830$), challenges-content domain ($\alpha = 0.735$), challenges-pedagogy domain ($\alpha = 0.867$), strategies-technology domain ($\alpha = 0.820$), strategies-content domain ($\alpha = 0.837$) and strategies-pedagogy domain ($\alpha = 0.820$). Thus, the result of the reliability analysis for this study was acceptable since Cronbach's alpha values were greater than 0.7 (Pallant, 2013) which indicates that the instrument has good internal consistency.

Confirmatory Factor Analysis (CFA)

The results of confirmatory factor analysis are presented in Table 4.

Table 4: Factor Loading Coefficient for Item Reliability during CFA

Construct	Sub Construct	Factor Loading	CR (above 0.6)	AVE (above 0.5)
Challenges (Technology Domain)	CTD_1	0.823	0.8698	0.6261
	CTD_2	0.834		
	CTD_3	0.737		
	CTD_5	0.767		
Challenges (Content Domain)	CCD_3	0.921	0.8302	0.6251
	CCD_4	0.631		
	CCD_6	0.793		
Challenges (Pedagogy Domain)	CPD_1	0.712	0.8684	0.5694
	CPD_2	0.808		
	CPD_3	0.780		
	CPD_4	0.733		
	CPD_5	0.736		
Strategies (Technology Domain)	STD_6	0.680	0.8354	0.5612
	STD_3	0.683		
	STD_2	0.798		
	STD_1	0.824		
Strategies (Content Domain)	SCD_4	0.662	0.8946	0.5954
	SCD_3	0.857		
	SCD_2	0.848		

	SCD_1	0.700		
Strategies (Pedagogy Domain)	SPD_5	0.885	0.8470	0.6501
	SPD_4	0.799		
	SPD_2	0.727		
	SCD_3	0.857		
	SCD_2	0.848		
	SCD_1	0.700		

Table 4 summarises the results of the reliability and validity of composite reliability (CR) and average variance extracted (AVE). According to Awang et al. (2015), the minimum value of CR is 0.6 and AVE is 0.5. The CRs for the constructs in the final model ranged from 0.8302 to 0.8946, and the estimated values for the AVE ranged from 0.5612 to 0.6501. Thus, the challenges on teaching strategies have exceeded the convergent validity check. The fitness indexed were performed and the results are shown in Table 5. All indicators of fitness indexes are achieved.

Table 5: The Fitness Indexes for Teaching Challenges and Strategies Measurement Model

Fit Index	X^2	df	X^2/df	RMSEA	CFI	TLI
Index value	382.746	223	1.716	0.088	0.867	0.850

The Structural Model

Figure 2 shows the structural equation model for teaching challenges and strategies while Table 6 presents the regression weight for the model.

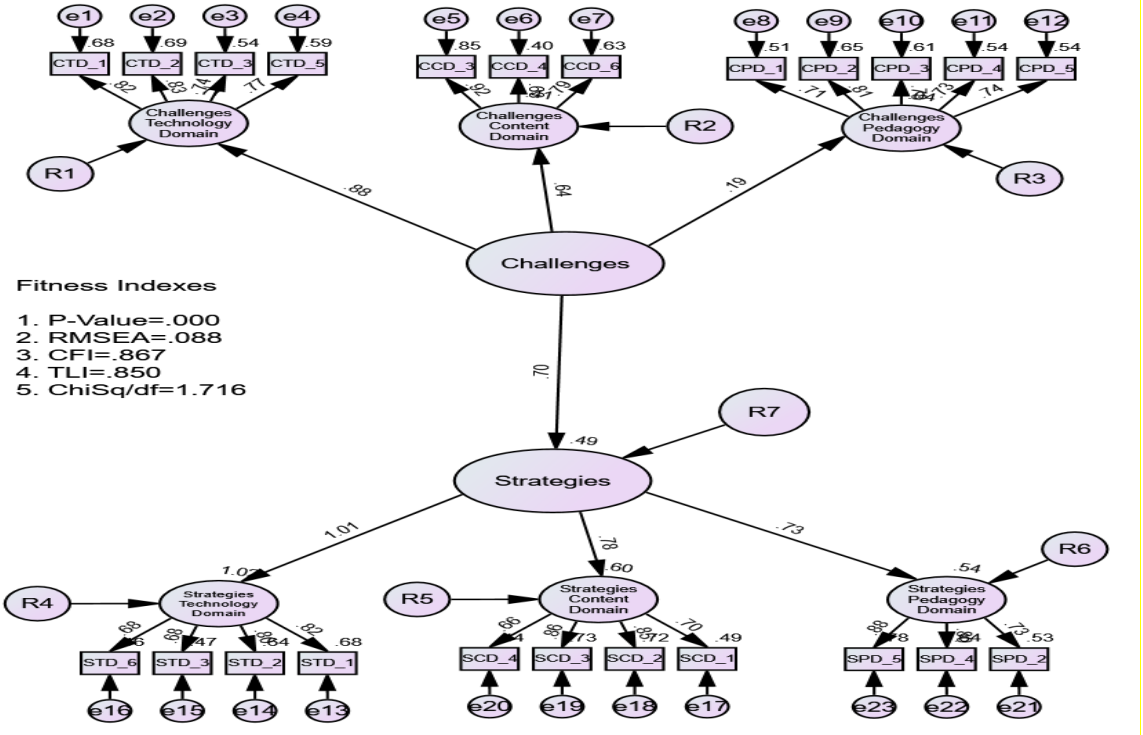

Figure 2: The Regression Path Coefficient among Constructs

Table 6: The Regression Weight for Teaching Challenges and Strategies

			Estimate	*p*-value	Conclusion
Challenges	→	Strategies	0.847	0.05	Significant
Challenges in Pedagogy Domain	→	Strategies	0.280	0.05	Not significant
Challenges in Technology Domain	→	Strategies	1.00	0.05	Significant
Challenges in Content Domain	→	Strategies	1.107	0.05	Significant

The final structural model (Figure 2) shows the relationship between challenges and strategies. Based on the regression weight for teaching challenges and strategies (as shown in Table 6), it was found that the relationship between the challenges in pedagogy domain and strategies (in second order of measurement) is not significant ($\beta=0.280$; $p<0.05$). However, the challenges in technology domain and challenges in content domain are significant toward strategies ($\beta=1.00$; p-value <0.05 and $\beta=1.107$; p-value <0.05 respectively). On the other hand, for strategies, all the variables are significant since p-value is less than 0.05. Based on the structural model, there is a significant effect of challenges on teaching strategies at p-value <0.05.

Discussion

The aim of this study was to examine the effects of three domains in teachers' challenges namely technology, content and pedagogy on teaching strategies during online teaching and learning environment. The results indicated that there is a significant effect of teaching challenges of technology and content domain on teaching strategies while no relationship was found between pedagogical challenges and teaching strategies. Finally, the findings from SEM also showed that there is a significant effect of teaching challenges on teaching strategies.

The findings indicate that instructors are confronted with all sorts of challenges namely technological, content and pedagogical in online teaching. The technological challenges are caused by lack of skills/ knowledge in using the latest software and appropriate applications, technical issues during online class and not having sufficient time to be familiar with latest technology. Meanwhile, the content challenges consist of instructors' knowledge in the subject matter and instructors' competencies in applying the content in online teaching. Finally, pedagogical challenges include learner engagement and class control.

Furthermore, the results also pointed that instructor applied various teaching strategies to overcome the challenges encountered in online teaching and learning context depending on the nature of the challenges. For example, when dealing with technological challenges, the instructors resorted to strategies such as using user-friendly applications and platforms, interactive sites, share cloud storage, and audio and visual elements in their teaching. They also seek assistance from peers who are more technology savvy.

Similarly, for content related challenges, among strategies adopted are providing extra learning materials for students' reference, using simple example to explain the content, simplifying the content and encouraging students to be more independent in understanding the content. The last strategy is pedagogical related. They include are picking students to answer the questions,

providing positive reinforcement, speaking at slower pace, using easy words, providing more examples to explain the content and preparing different interactive activities.

Conclusion, Limitations and Recommendations

This study provides empirical evidence on the challenges and strategies encountered by instructors in online teaching. This study comes with several limitations that require further research in this area. Firstly, the participants in this study are limited to educators in Malaysia, hence, the findings may not be generalised to other contexts or other education system setting. Secondly, the data in this study mainly was based on what the participants "perceived to be" the challenges and strategies encountered in online teaching and learning. The actual challenges and strategies may be different from the ones mentioned. Thus, future research could be conducted using different methodology such as interview and observation so that comparison can be made. In addition, future research should investigate other variables that might influence teachers' strategies in teaching such as focusing on learners input, learning outcomes, teachers, knowledge and so forth. Besides, due to time constraint, the study only focused on exploring the challenges in three domains. Further research can expand this study by investigating other potential challenges that teachers are facing in their online teaching process. In conclusion, this study provides more in-depth understanding of teachers' challenges and strategies during online teaching in Malaysia education system during COVID-19 pandemic. Likewise, the empirical evidence from this study would be valuable for educators and institutions to better prepare themselves for future crises.

Acknowledgement

We are immensely grateful to Yayasan Canselor UNITEN (UNITEN) for funding this research.

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Appendix A

	Challenges (Technology Domain)
No.	Items
1	I know how to use Information Technology (IT) to teach my students. / *Saya tahu menggunakan Teknologi Maklumat (TM) untuk mengajar pelajar saya.*
2	I use the latest software to teach my students./*Saya menggunakan perisian yang terkini untuk mengajar pelajar saya.*
3	I know how to solve technical issues when I am having my class online./*Saya tahu bagaimana untuk menyelesaikan isu teknikal ketika saya mengadakan kelas secara atas talian.*
4	I like to learn new technological skills to improve my teaching./*Saya suka belajar kemahiran teknologi untuk meningkatkan pengajaran saya.*
5	I know how to choose the appropriate applications for my students while teaching online/ *Saya tahu bagaimana untuk memilih aplikasi bersesuaian untuk pelajar saya ketika mengajar secara dalam talian*.
6	I have enough time to practise my technology skills. /*Saya mempunyai masa yang cukup untuk latihan kemahiran teknologi saya.*
7	I only use familiar sites and applications with my students when I am teaching online./ *Saya hanya menggunakan laman web dan aplikasi yang saya biasa guna bersama-sama pelajar saya ketika mengajar secara dalam talian.*

	Challenges (Pedagogy Domain)
No.	Items
1	I find it difficult to keep my students engaged in the discussion. / *Saya dapati sukar untuk memastikan pelajar saya terlibat dalam perbincangan.*
2	I find it difficult to control my class. / *Saya sukar mengawal pelajar saya.*
3	I find it difficult to check if my students understand what I teach in class. / *Saya sukar untuk memastikan sama ada pelajar saya memahami apa yang diajar di dalam kelas.*
4	I am not sure if my students are paying attention in the class. / *Saya tidak pasti sama ada pelajar saya memberi perhatian di dalam kelas.*
5	I find it difficult to get students to participate in the teaching and learning process. / *Saya dapati sukar untuk mendapat kerjasama dari pelajar semasa proses PnP.*
	Challenges (Content Domain)
No.	Items
1	I am knowledgeable in the subject I teach. / *Saya berpengetahuan dalam subjek yang saya ajar.*
2	I can teach my subject effectively online./*Saya boleh mengajar subjek saya dengan berkesan secara dalam talian.*
3	I can complete my subject/course syllabus with online teaching./*Saya boleh menghabiskan silibus subjek/kursus dengan mengajar secara dalam talian.*
4	I know how to assess my students online./*Saya tahu bagaimana untuk menilai pelajar saya secara dalam talian.*
5	I am confident that my students understand my online teaching./*Saya yakin yang pelajar saya memahami kandungan pengajaran saya secara dalam talian.*
6	I believe that students understand better when subject is taught face-to-face./*Saya percaya bahawa pelajar lebih senang memahami subjek saya apabila diajar secara bersemuka.*
7	It is easy for me to search my subject's materials online./*Mudah bagi saya untuk mencari bahan-bahan berkaitan subjek saya secara dalam talian.*

TEACHING STRATEGIES

No.	Statement
1	I use apps and platforms that are user friendly. /*Saya menggunakan aplikasi dan platform yang mesra pengguna.*
2	I include audio and visual elements in my teaching./*Saya menggunakan elemen audio dan visual dalam pengajaran saya.*
3	I use interactive sites and applications in my online teaching./*Saya menggunakan laman web dan applikasi yang interaktif ketika mengajar secara dalam talian.*
4	I share my cloud storage/drive with other teachers/lecturers./*Saya berkongsi media penyimpanan dalam talian/drive bersama guru/pensyarah lain.*
5	seek help from teacher/lecturers who are IT savvy./*Saya mendapatkan bantuan daripada guru/pensyarah yang mahir dalam bidang IT.*

6	I am motivated to learn the technical aspects of online teaching through self-exploration. /*Saya bermotivasi untuk belajar aspek teknikal dalam pengajaran secara dalam talian melalui penerokaan kendiri.*
7	I expect my employer to provide me with training or workshops to enhance my skills in educational technology./ *Saya menjangkakan majikan saya akan menyediakan latihan atau bengkel untuk meningkatkan kemahiran saya dalam teknologi pengajaran.*
8	I provide extra materials for students to refer to. / *Saya menyediakan bahan tambahan untuk dirujuk pelajar.*
9	I use simple examples to explain the content. / *Saya menggunakan contoh mudah untuk menjelaskan kandungan.*
10	I simplify the contents for ease of comprehension. / *Saya meringkaskan kandungan bagi membolehkan pelajar memahami dengan lebih mudah.*
11	I encourage students to be independent in understanding the content. / *Saya menggalakkan para pelajar supaya berdikari untuk memahami isi kandungan pelajaran.*
12	I pick students to answer my questions in class. / *Saya menyebut nama pelajar untuk menjawab soalan saya di kelas.*
13	I give positive reinforcement (compliments, extra marks etc) if my students are responsive in the class./ *Saya memberi peneguhan positif (pujian, markah tambahan dan lain-lain) sekiranya pelajar saya responsif di kelas*.
14	I speak at a slower pace when I teach online. / *Saya bercakap dengan kadar yang lebih perlahan (tidak laju) semasa saya mengajar dalam talian*.
15	I use easy words when I teach online. / *Saya guna perkataan yang mudah difahami ketika saya mengajar dalam talian.*
16	I give a lot of examples to illustrate my points. / *Saya memberikan banyak contoh untuk menerangkan sesuatu perkara.*
17	I prepare different interactive activities each time. / *Saya menyediakan aktiviti interaktif yang berbeza setiap kali.*