

Research Article:

Contemporary Practices in Teaching 21st Century Skills at Malaysian Primary Schools: Do Environmental Factors and Teacher's Attitudes Matter?

Tiew Chia Chun and Melissa Ng Lee Yen Abdullah*

School of Educational Studies, Universiti Sains Malaysia, 11800, USM Pulau Pinang, Malaysia

*Corresponding author: melissa@usm.my

ABSTRACT

The implementation of 21st century education is a key factor for successful education reform. Due to a lack of empirical research, practices to develop students' 21st century skills at the primary school level are still unclear. The purpose of this study was to identify teachers' contemporary practices and the influences of environmental factors as well as teachers' attitudes on these practices. A quantitative research design was used to achieve the objectives of the study. A total of 400 primary school teachers from the state of Penang, Malaysia was sampled. Three instruments were used to collect the required data; the Teachers' Practices in Teaching 21st Century Skills Questionnaire (37 items), Environmental Factors in Teaching 21st Century Skills Questionnaire (12 items) and the Teacher' Attitudes in Teaching 21st Century Skills Questionnaire (35 items). The data were analysed with descriptive analysis and structural equation modelling (SEM). The results showed that primary school teachers adopted five contemporary practices in teaching 21st century skills. The inquiry-based instructional approach was the most preferred practice, followed by the communicative language teaching approach, constructivist learning approach and problem-centred instructional approach. The technology-based instructional approach, however, was the least preferred practice. Results of the Partial Least Square Structural Equation Modelling (PLS-SEM) approach showed that supporting environmental factors had positive influence on both teachers' practices and attitudes. Additional results indicated positive mediation role of teachers' attitudes on their practices of teaching 21st century skills. Implications for the research findings were discussed in this study. As supported by the Stimulus-Organism-Response (SOR) Theory, this study found that environmental factors could drive teachers' adoption of contemporary practices. In addition, teachers' attitudes have positive effect on their applications of these instructional practices as emphasised by the Theory of Planned Behaviour. Educational implications and suggestions for future research are also discussed in this paper.

Keyword: Pedagogical practices, 21st century skills, primary school students, environmental factors, teachers' attitudes

Received: 1 June 2021; **Accepted:** 23 July 2021; **Published:** 29 July 2022

To cite this article: Tiew, C. C., & Abdullah, M. N. L. Y. (2022). Contemporary practices in teaching 21st century skills at Malaysian primary schools: Do environmental factors and teacher's attitudes matter? *Asia Pacific Journal of Educators and Education*, 37(1), 61–85. <https://doi.org/10.21315/apjee2022.37.1.4>

INTRODUCTION

Numerous education reforms have been initiated in the Asia Pacific region including Malaysia since the beginning of the 21st century to enhance the nations' future competitiveness and development of talents (Yin, 2019; UNESCO, 2016). The main emphasis of the education reform was to nurture students' 21st century skills and prepare students for the demand of the fourth Industrial Revolution (Indah & Rohmah, 2020; Pana & Escarlos, 2017). In Singapore, Japan, the Republic of Korea and Hong Kong (China), for an example, the 21st century curricular reforms are about doing education differently. Recognizing the fast-changing and increasingly knowledge-based global economy, these countries are placing more curricular emphasis on "learning to learn" so that students are equipped with skills needed to meet the job demands in the 21st century (Bentaouet & Bend, 2018). Communication skills (Liao, 2004), creativity (Vong, 2008; Leong, 2010), digital and ICT skills (Kong et al., 2014; Weninger, 2017) are among the important skills being emphasised in teaching and learning within the Asia Pacific region. The mastery of these skills is essential as it allows students to thrive and stay competitive in the future. The Ministry of Education (MoE) Malaysia has also taken measures to infuse the teaching and learning of 21st century skills in the country's national curriculum and assessment practices starting from elementary school level, as evident in the Primary School Standard Curriculum (Kurikulum Standard Sekolah Rendah, KSSR) and the School-based Assessments (Pentaksiran Bilik Darjah, PBS). These education transformations aim to provide students with greater learning opportunities to learn and practice 21st century skills (Ministry of Education, 2013). The changes taken place in Malaysian education system are in line with the 21st century framework that emphasises mastery of transferable skills rather than rote learning for examination purposes (Raja & Daud, 2018). Teachers play significant roles to develop students' 21st century skills through the implementation of contemporary teaching pedagogies (Garba et al., 2015). These practices are student-centered in nature which encourage active learning. A substantial amount of literature suggests that teacher-centered learning greatly inhibits students' development of 21st century skills (Amin & Corebima, 2016; Gunawardena et al., 2017).

Through collaborative projects and activities that require the application of critical thinking skills, problem-solving skills, creativity and connection with others, students can develop 21st century skills (Aamirah et al., 2017). The promotion of critical thinking (McDonald, 2017; Pithers & Soden, 2000), creativity (Bekteshi, 2017; Kaplan, 2019), and communication skills (Littlewood, 2013) were reported in many countries. Effective teaching of 21st century thinking skills in second language learning, for instance, have been reported in Asia-Pacific region (Itmeizeh & Hassan, 2020; Zhao et al., 2016; Zuhri, 2020). However, findings concerning the specific type of pedagogical practices in teaching 21st century skills are still scarce.

Problem Statement

There is a growing emphasis in the Asia-Pacific region, including Malaysia, to teach 21st century skills in schools. Teachers are regarded as the key agent of change in this education reform. Their roles in the 21st century classroom is to create a constructive learning environment that stimulates critical thinking through hands-on and minds-on practices; promote collaborative learning; encourage ICT-aided creativity and connectivity (Hiong, 2017).

Among the main contemporary practices of 21st century education is problem-centered instructional approach, inquiry-based instructional approach, constructivist learning approach, technology-based instructional approach and communicative language teaching approach (Ghamrawi et al., 2017; Malini et al., 2017; Sukiman et al., 2013). However, teachers in many countries are still struggling with the implementation of 21st century teaching and learning (Care et al., 2018). Primary school teachers play important roles in laying the foundation for skills development among young students (Chin & Chin, 2012; Othman & Kassim, 2017). To achieve this goal, effective instructional practices have to be implemented. Research on teaching practices of these teachers and factors that influence it will help to enhance the quality of teaching and learning at the foundation level. Research on primary school teachers will offer new knowledge and understanding on the teaching of 21st century skills. Due to a lack of empirical studies on the implementation of 21st century teaching in Malaysian schools, it is unclear what types of practices are being implemented to teach 21st century skills (Care et al., 2018; Ranbir, 2018). Hence, there is a lack of knowledge on pedagogical practices that promote the development of 21st century skills. When there is a lack of studies on these instructional practices, effective practices could not be identified. In other words, the good practices that can be adopted by primary school teachers to teach 21st century skills are unknown. Generally, teachers find it challenging to adopt contemporary pedagogical practices (Nurfilzah, 2016; Shazaitul & Maisarah, 2015). Hiong's study (2017), however, offers more positive findings: teachers have moderate adoption of 21st century teaching practices. There were also studies that look into the implementation of 21st teaching according to school subject. Mazarul Hasan et al.'s (2020) study for instance, found that teachers' readiness to carry out 21st century teaching and learning in Islamic Education is high in terms of knowledge but their skills and attitudes are still at the moderate level. Overall, there are still limited studies on primary school teachers' practices in teaching 21st century skills and the findings are inconsistent. There are obvious needs to fill up this literature gap.

Many local studies have examined the challenges faced by teachers in implementing 21st century education (e.g., Mohd et al., 2017; Fathizaki et al., 2019; Norazlin & Siti Rahimah, 2018). The main challenges identified were limited resources (Naeema & Abdo, 2017), large class size (Joseph, 2016; Celik et al., 2012) and time constraints (Abdul et al., 2017; Shazaitul & Maisarah, 2015). Nevertheless, supporting factors that promote the teaching of 21st century skills, such as the provision of resources, school facilities, supporting colleagues, classrooms settings, teachers' professional development, students' readiness and so on were seldom explore (Kenya Institute of Curriculum Development, 2017). The

influence of these factors on primary school teachers' practices is still unclear. In addition, the MoE has provided trainings and professional development to enhance teachers' knowledge and skills to teach 21st century skills, as cited in the Malaysia Education Blueprint (2013–2025) (Norazlin & Siti Rahimah, 2018). Research showed that teachers are aware of the importance of 21st century teaching (e.g., Lim et al., 2017). This indicates that issues concerning the implementation of 21st century teaching could have stemmed from teachers' attitudes as research in this area is still scarce and no conclusive findings could be drawn. Most local studies also tend to focus on secondary school level (e.g., Nor Asniza & Hazri, 2000; Naeema & Abdo, 2017; Tee et al., 2018) and higher education (e.g., Syahrul et al., 2019). Studies that have examined primary school teachers' practices in teaching 21st century skills are still limited. The lack of studies on primary school teachers' instructional practices led to issues on effective teacher training and development of students' 21st century skills. Without information on the current teachers' practices and the influencing factors, effective trainings and skill development programme could not be designed. There are needs to fill in the research gaps and determine whether environmental factors and teachers' attitudes matter in the teaching of 21st century skills at primary school level. This study is one of the very few that investigated the influence of environmental factors and teachers' attitudes on 21st century instructional practices in the local context. By closing the research gaps on factors that influence primary school teachers' contemporary practices, this study offers new insights and useful information to improve the quality of teaching and learning at primary schools. Based on the supporting environmental factor identified in this study, school administrators and relevant stakeholders will be able to provide more effective support for teachers to carry out contemporary practices to teach 21st century skills. If teachers' attitude is found to be a determining factor that influence the application of contemporary practices in teaching 21st century skills at primary schools. There are needs for teacher training to emphasise the development of positive attitudes among teachers to implement these practices.

Research Questions

1. What are the teaching practices adopted by primary school teachers in teaching 21st century skills?
2. Do environmental factors influence the practices of primary school teachers in teaching 21st century skills?
3. Do environmental factors influence the attitudes of primary school teachers in teaching 21st century skills?
4. Do attitudes of primary school teachers influence their practices in teaching 21st century skills?
5. Do attitudes of primary school teachers mediate the relationships between environmental factors and their practices in teaching 21st century skills?

LITERATURE REVIEWS

Contemporary Practices in Teaching 21st Century Skills

Previous studies proposed five main contemporary practices that are found to be effective in enhancing students' 21st century skills (e.g., Ghamrawi et al., 2017; Malini et al., 2017; Sukiman et al., 2013; Itmeizeh & Hassan, 2020; Wang & Kokotsaki, 2018) namely problem-centered instructional approach, inquiry-based instructional approach, constructivist learning approach, technology-based instructional approach and communicative language teaching approach.

Problem-centered instructional approach

The Pacific Policy Research Center (2010) suggests that one of the best practices for teaching 21st century skills is problem-centered instructional approach such as problem-based learning (Adwan Mohammad & Abdul Hakim, 2019). Husamah (2015) emphasised that project-based learning is also another key practice under problem-centered instructional approach that can develop independent thinkers and learners to meet the labour demand of the 21st century. In addition, open-ended problems can potentially be integrated into primary school lessons to promote students critical thinking and problem-solving skills (As'ari, 2014). When students are presented with a problem or an ill-structured situation, they are encouraged to think of solutions to resolve the problems. It gives students opportunities to analyse the problem, brainstorm for ideas, evaluate the solutions, and make the best decision.

Inquiry-based instructional approach

Wah Chu et al. (2017) emphasised that inquiry-based instructional approach is one of the most important contemporary practices that could promote 21st century skills in technology-rich learning environments. This is because it enhances students' thinking skills through questioning technique that stimulates curiosity and drives inquiry (Hassan et al., 2016). Through inquiry-based instructional approach students are encouraged to think outside the box. Hence, this pedagogical practice is recommended in past studies (e.g., Kogut & Silver, 2009; Naeema & Abdo, 2017) as effective practices to develop students' 21st century skills, particularly creative and critical thinking. Vaish (2013) also found that inquiry-based instructional approach promotes communication between students as they attempt to find answers together.

Constructivist learning approach

Constructivist learning approach encourages students to actively construct their own understanding and knowledge during the teaching and learning processes. Through this approach, students will interpret and make sense of the information they read and learn. The teaching and learning processes are more student-centered in nature and the teacher's role is to facilitate the development of 21st century skills (Peters & Stout, 2006). Creating effective learning environment is not an easy task. The teaching and learning processes, activities and assessment need to be carefully designed to support constructivist activities and promote

students' accountability in learning (Anagün, 2018). Group discussions and pair learning activities with open-ended questions can promote students' knowledge construction and mastery of 21st century skills (Setyarini et al., 2018). Through discussions with peers and feedbacks received from teachers, students can construct deeper understanding on what they learned. Besides, Wang and Seepho (2017) and Karami et al. (2012) found out that discussion enhances students' critical thinking and creativity as it allows them to share their voices, examine, and argue their opinions with peers. Similarly, Florea and Hurjui (2015) found that collaborative learning engages students in discussion, which encourage them to think critically and communicate own perspectives convincingly while respecting others' opinion.

Technology-based instructional approach

The application of technology-based teaching approach in Malaysia and Asia Pacific context is on the rise (Garba et al., 2015). According to the World Economic Forum (Haron, 2018), 65% of the primary school students today will ultimately end up working in completely new job types that does not exist yet. To prepare students for the challenges future, the implementation of technology-based instructional approach is crucial. Through technology integration, students will acquire 21st century skills that will benefit them in the future, in particular digital skills (Corales, 2019). To implement technology-based teaching approach, the teaching and learning process involve the use of technology tools. The most common tools are software applications (e.g., words processing software, spreadsheet software, presentation graphics software), Internet, mobile technology, Augmented Reality, virtual field trips, search engines, email and WebQuests. With such tools, teachers can design instructional activities that require students to use technology as a tool, not just a mere mechanism for the delivery of the content (Corales, 2019; Bistaman et al., 2018). According to Pana and Escarlos (2017), technology-based instructional approach is effective in enhancing 21st century skills such as critical thinking, creative thinking, communication, collaboration, and digital skills.

Communicative language teaching approach

Communicative language teaching approach (CLT) is recognized as a contemporary practice of the 21st century (Murrizda et al., 2019). To handle information and communicate effectively, communication skills is needed in 21st century teaching and learning. In fact, it is a success factor for personal growth and professional career development in the future. This approach places emphasis on communication in person or through online mode (Littlewood, 2013). Studies (e.g., Murrizda et al., 2019) found that CLT approach is crucial in developing students' ability to interact and communicate effectively in different settings. For example, students learn how to deliver their views in face-to-face and online discussions with their peers, teachers as well as the community of learners at learners. To do so, instructional practices must include learning activities or assignments that provide platforms for students to interact with others. Gunawardena et al. (2017) suggests that activities like role-plays, debates, discussion, and stories can be carried out to promote students' thinking and communication skills in schools.

Theoretical Perspectives

According to the Stimulus-Organism-Response (SOR) Theory (Skinner, 1957), human behaviour is influenced by stimulus (S) from the environment, which impact the organism's internal state (O) and subsequently drives their behaviour (R) (Zhai & Usman, 2019). In the context of this study (Figure 1), the SOR model explicates how stimulus in the environment such as the supporting factors (e.g., resources, facilities, support, classroom setting, student factors) can fortify the inner state of the teachers and drives them to adopt contemporary practices in teaching 21st century skills (Barbaba et al., 2001). This implies that stimulus in the environment include physical and social factors that support the implementation of 21st century teaching. These factors could impact the teachers' attitudes such as their thinking/knowledge (cognitive), feelings (affective) and actions (behaviour) towards the teaching of 21st century skills. In this study, the three dimensions of teachers' attitudes toward the teaching of 21st century skills were gauged. First and foremost, cognitive dimension of attitude refers to an individual's knowledge and beliefs on a discussed object. It refers to teachers' knowledge about the concepts and teaching of 21st century skills. Second, affective dimension explains how an individual's feeling (positive or negative) changes according to the thing, people, topic, and incident. So, it discusses teachers' feelings towards the teaching of 21st century skills. Third, behavioural dimension describes the influences of attitude which change the ways an individual behaves (Cherry, 2018). It refers to the actions taken by teachers in order to teach 21st century skills in their lessons. Teachers' attitudes subsequently influence their adoption of pedagogical practices (e.g., problem-centred instructional approach, inquiry-based instructional approach, constructivist learning approach, technology-based instructional approach and communicative language teaching approach). The influences of teachers' attitudes and perceived environmental support on practices are also rooted in the Theory of Planned Behaviour (TPB) (Ajzen, 1993). TPB explains individual's intention which results in the conduct of a behaviour. Teachers' attitude towards the teaching of 21st century skills and their perceived behavioural control influence their behaviour and action in teaching 21st century skills in classrooms. The current study included the concept of perceived behavioural control by linking the supporting environmental factors as the ease that could possibly promote the teachers' practices of 21st century skills at primary schools. It is believed that the environmental factors and teachers' attitudes towards the teaching of 21st century skills can possibly influence their practices of teaching 21st century skills within primary education (Ajzen, 1993).

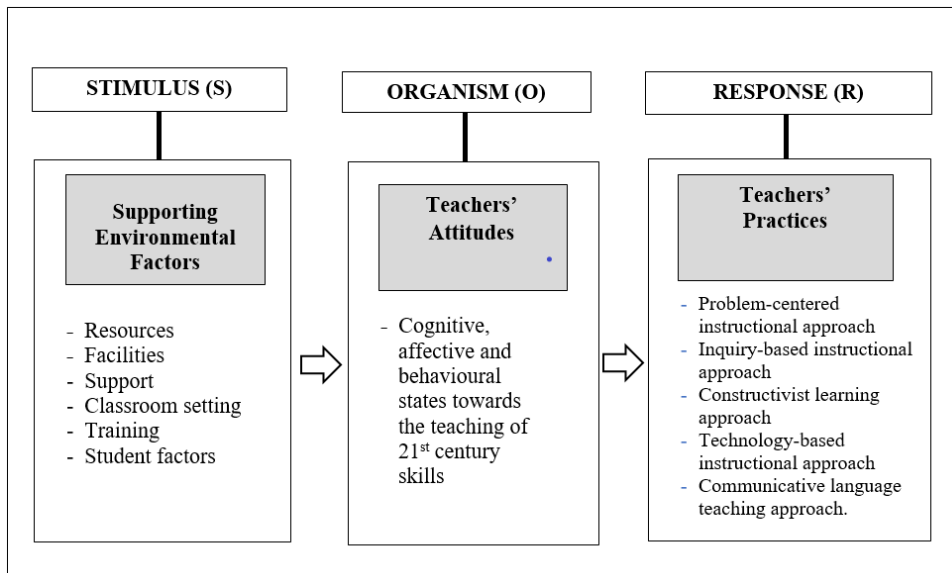


Figure 1. The influence of supporting environmental factors and teachers' attitudes on practices in teaching 21st century skills.

METHODOLOGY

This study employed a quantitative design to answer the research questions. The researchers randomly selected primary schools from a northern state in Peninsular Malaysia, through stratified sampling to fulfill the desired number of respondents. The samples consisted of 400 primary school teachers. The respondents' demographic profiles namely gender, age group, highest education level, and years of teaching is showed in Table 1. Data were collected through questionnaire survey technique. The pedagogical practices used by primary school teachers were measured by the Teachers' Practices in Teaching 21st Century Skills Questionnaire (Ghamrawi et al., 2017).

The instrument contains 37 closed-ended items that measures five contemporary practices:

1. Problem-centred instructional approach (6 items).
2. Inquiry-based instructional approach (6 items).
3. Communicative language teaching approach (8 items).
4. Constructivist learning approach (9 items).
5. Technological-based instructional approach (8 items).

The Environmental Factors in Teaching 21st Century Skills Questionnaire (12 items), on the other hand, was used to gauge environmental factors that support the teaching of 21st century skills. This instrument was adapted from Sukiman et al.'s (2013) questionnaire.

Lastly, teacher’ attitudes was measured by the Teacher’ Attitudes in Teaching 21st Century Skills Questionnaire which has 35 items (Nooraini & Abdul, 2017). All the instruments have been validated by experts in the field of educational psychology to check if the questions looked like they really measured what they were supposed to measure. They were also invited to make professional judgements on the relevance and coverage of the present questionnaire to evaluate whether the questionnaire had satisfactory validity in answering the research questions of the study. Pilot tests were also carried out to establish the reliability and validity of the instruments prior to the actual study. Respondents who were involved in the pilot study were excluded from the actual data collection. After the pilot test, the reliability score for the scale of teachers’ attitudes recorded Cronbach alpha value of 0.97. Next, the reliability score for the scale of teachers’ practices in was determined as Cronbach alpha value at 0.98 and lastly the reliability score for the scale of environmental factors was determined as Cronbach alpha value at 0.94. In this case, the instrument was relevant and reliable to be used.

The study has obtained ethical clearance from the Human Research Ethics Committee (JEPeM), Universiti Sains Malaysia. Approval for data collected were also obtained from the Educational Planning and Research Division (EPRD), Ministry of Education and the Penang State Education Department. The collected data were entered into the Statistical Package for the Social Science (SPSS) version 26 for descriptive statistical analysis. This was followed by the Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis that was carried out via SmartPLS 3 to evaluate the measurement and structural models.

Table 1. Demographic profile of respondents

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	47	11.8
	Female	353	88.3
Age group	21–30 years old	49	12.3
	31–40 years old	163	40.8
	41–50 years old	100	25.0
	51–60 years old	88	22.0
Highest education level	Bachelor’s Degree	304	76.0
	Master’s Degree	19	4.8
	PhD	1	0.3
	Others	76	19.0
Teaching experience	< 5 years	39	9.8
	6–10 years	91	22.8
	11–15 years	110	27.5
	16–20 years	41	10.3
	> 20 years	119	29.8

RESULTS

Descriptive Analysis

The results of descriptive analysis showed that the respondents have high extent of application on all the five pedagogical practices that teach 21st century skills (Table 2). Most notably, the inquiry-based instructional approach has recorded the highest mean value ($M = 4.55$; $SD = 0.58$) among the five pedagogical practices. This implies that primary school teachers were more prone to use inquiry-based instructional approach to teach students' 21st century skills. This was followed by communicative language teaching approach ($M = 4.50$; $SD = 0.59$), constructivist learning approach ($M = 4.48$; $SD = 0.61$) and problem-centered instructional approach ($M = 4.45$; $SD = 0.58$). Technological-based instructional approach has the lowest mean value at $M = 4.32$ ($SD = 0.59$), suggesting that it was the least used approach in teaching 21st century skills at elementary school level.

Table 2. Overall mean value and standard deviation of teachers' practice

Variables (Teachers' practices)	Mean (M)	Standard Deviation (SD.)
Problem-centered instructional approach	4.45	0.58
Inquiry-based instructional approach	4.55	0.59
Communicative language teaching approach	4.50	0.59
Constructivist learning approach	4.48	0.61
Technological-based instructional approach	4.32	0.59

Note. Low ($M = 1.00$ – 2.00); Moderate ($M = 2.01$ – 4.00); High ($M = 4.01$ – 6.00)

Assessment of Measurement Model

In PLS-SEM model assessment, the internal consistency reliability and validity of the reflective measurement model were first evaluated (Hair et al., 2017). Table 3 displays the constructs (environmental factors, teachers' practices and teachers' attitudes) and their respective indicators. The results showed that the indicators fulfilled the recommended factor loadings, Cronbach's alpha, composite reliability, and average variance extracted (AVE). The indicator loadings reported between 0.753 to 0.857 which fulfilled the standard of .7 (Hair et al., 2017). The value of Cronbach's alpha of the latent variables fell between 0.92 and 0.94 which meant that the latent variables fulfilled the minimum value of 0.60 for exploratory purposes and 0.70 for confirmatory purposes. The values of AVE of constructs ranged between 0.62 to 0.67, which were greater than the acceptable threshold of 0.5 (Garson, 2016). Therefore, the measurement model achieved convergent validity.

Table 3. Results of measurement model

Constructs and indicators	Factor loading	CA	CR	AVE
Environmental Factors – EF				
EF14: Colleagues work together to design appropriate course content that promote 21st century skills.	0.777	0.92	0.93	0.64
EF15: The access of resource is good enough for teaching students 21st century skills.	0.817			
EF16: The facilities at school are enough to support the use of technology for the development of 21st century skills.	0.771			
EF17: In-service training has taught me adequate skills of promoting 21st century learning.	0.841			
EF18: Students show interest in learning 21st century skills in my classrooms.	0.756			
EF19: Students are motivated to express their opinions during the lessons.	0.834			
EF20: The classroom setting allows students to sit in group formations during lessons.	0.781			
EF21: The classroom learning is interactive which enables students to engage in meaningful communication during lessons.	0.857			
Teachers' Attitudes – TATT				
TA6: I understand the importance of teaching 21st century skills.	0.772	0.94	0.94	0.67
TA8: I have knowledge on the pedagogical approaches that can be used to teach 21st century skills.	0.829			
TA11: I understand the content of curriculum to create effective 21st century leaning in classrooms.	0.815			
TA16: I am confident in teaching creativity skills in my lessons.	0.816			
TA17: I am confident in teaching communication skills in my lessons.	0.827			
TA24: I feel that teaching 21st century skills facilitate students' learning in classrooms.	0.820			
TA26: In my lesson plans, I always include the components of 21st century skills.	0.856			
TA34: I am concerned about the development of 21st century skills among students.	0.823			
TA35: I have provided support for students to learn 21st century skills in my classrooms.	0.841			

(continue on next page)

Table 3 (continued)

Teachers' Practices – TPRAC					
TP4:	I ask students to invent solutions to a complex problem in my lessons.	0.801	0.93	0.94	0.62
TP6:	I encourage students to find information independently for the tasks assigned during my lessons.	0.790			
TP9:	I encourage students to ask questions during my lessons to stimulate their 21st century skills.	0.795			
TP10:	I encourage students to provide responses to questions during my lessons for the development of 21st century skills.	0.753			
TP13:	I engage students in oral presentations during my lesson (at the end of individual or group work).	0.816			
TP14:	I conduct meaningful interaction with students to promote their 21st century skills in my lessons.	0.795			
TP22:	I allocate time for students to engage in group activities to promote 21 st century skills during my lessons.	0.806			
TP23:	I selectively assign students in group formation to make sure a balance ability during my lessons.	0.794			
TP36:	I allocate time for students to work on the online platform for the discussion of the task given in my lessons.	0.765			
TP37:	I provide guidance when students encounter problem in finding information using ICT tools during my lessons.	0.799			

Note. CA = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted

Next, the Fornell-Larcker criterion and heterotrait-monotrait (HTMT) ratio of correlations was used to examine the discriminant validity (Hair et al., 2017; Henseler et al., 2015). The values of square root of AVE (ranged from 0.79 to 0.82) were greater than its correlation with any other latent variables (Table 4), so the standard discriminant validity was achieved. In addition, the value of discriminant validity was also tested via the Heterotrait-Monotrait Ratio (HTMT). Henseler et al. (2015) opine that discriminant validity is established between a pair of reflective constructs if the value of HTMT is below 0.90. The discriminant validity of the model was established as the values of HTMT criterion were 0.84 (Table 4).

Table 4. Fornell-Larcker Criterion, HTMT and VIF

Latent variable	Environmental factors	Teachers' attitudes	Teachers' practice
Fornell-Larcker Criterion			
• Environmental factors	0.805	-	-
• Teachers' attitudes	0.539	0.822	-
• Teachers' practice	0.577	0.795	0.791
Heterotrait-Monotrait Ratio (HTMT)			
• Environmental factors	-	-	-
• Teachers' attitudes	0.563	-	-
• Teachers' practice	0.608	0.846	-
Inner VIF values for collinearity assessment			
• Environmental factors	-	1.000	1.409
• Teachers' attitudes	-	-	1.409
• Teachers' practice	-	-	-

Assessment of Structural Model

The structural model for collinearity was examined to make sure that the predictor constructs are below the critical levels of collinearity (Hair et al., 2017). The values of Variance inflation factors (VIF) in the constructs were assessed to check for the collinearity issue (Sarstedt et al., 2017). The present study reported to have VIF values below 5 (Table 4), which concluded that the structural model had no collinearity problems.

The next step was to assess the structural path coefficient for the relationship between the latent variables. In the present study, structural equation modelling analysis was conducted to examine the path coefficient (Figure 2). Table 5 displays the direct relationship between 1) environmental factors and teachers' practices, 2) environmental factors and teachers' attitudes, and 3) teachers' attitudes and teachers' practices. Bootstrapping was applied to determine the confidence intervals of the path coefficients and statistical inference. All the constructs recorded t-value of 1.96 and above. First, environmental factors ($\beta = 0.211, p < 0.001$) had a significant but relatively small effect on teachers' practices, which supported H1, "Environmental factors influence the practices of primary school teachers in teaching 21st century skills". The finding predicts that when the environmental factors become more positive, the adoption of contemporary practices will enhance but in a small manner. Second, environmental factors ($\beta = 0.539, p < 0.001$) had a significant effect on teachers' attitudes and H2 is supported. It implies that "Environmental factors influence the attitudes of primary school teachers in teaching 21st century skills". Third, teachers' attitudes ($\beta = 0.681, p < 0.001$) had a significant effect on teachers' practices. H3 "Attitudes of primary school teachers influence their practices in teaching 21st century skills". 'was supported. It implies that when teachers' attitudes become positive, their adoption of practices to teach 21st century skills increase as well.

Table 5. Path coefficient

No	Relationship	Beta	t-value	p-value	Result
H1	Environmental Factors → Teachers' Practices	0.211	4.969	0.000	Supported
H2	Environmental Factors → Teachers' Attitudes	0.539	10.799	0.000	Supported
H3	Teachers' Attitudes → Teachers' Practices	0.681	18.578		Supported

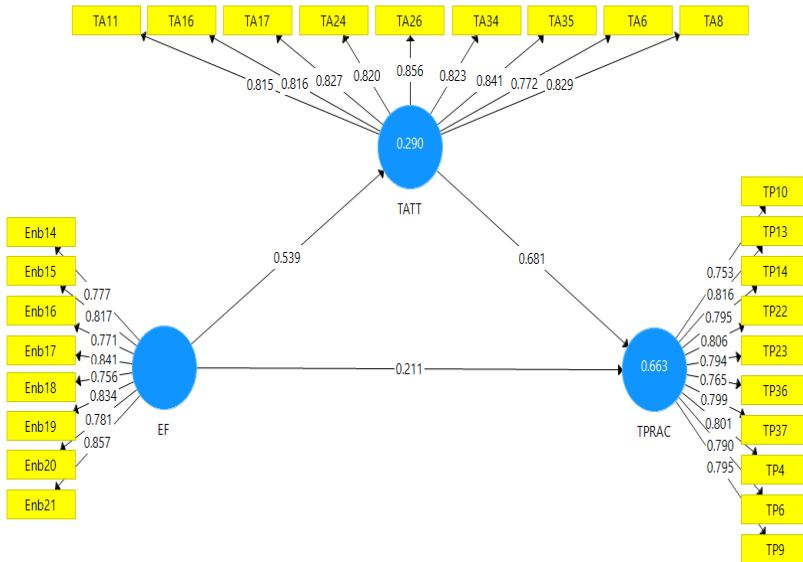


Figure 2. Results of structural model

Mediating Effect

After determining that the path coefficients were significant, mediation analysis was carried out (Table 6). It is only suggested to calculate VAF when absolute value of the standardised total effect, $p1 \times p2 + p3$ is 0.20 and above (Hair et al., 2017). The direct effect of environmental factors on teachers' practices has a value of 0.211, while the indirect effect via teachers' attitudes has a value of $0.539 \times 0.681 = 0.367$. In this case, the indirect effect was significant at t -value of 10.699 and p -value < 0.001 . So, the total effect has a value of $0.211 + 0.367 = 0.578$. The VAF equals the direct effect divided by the total effect and has a value of $0.367/0.578 = 0.634$. Hence, VAF is calculated as $(0.539 \times 0.681) / (0.539 \times 0.681) + 0.211 = 0.634$. The data concluded that teachers' attitudes had a moderate mediating effect on teachers' practices, resulting to 63.4% of the variance. On magnitude of mediation, the analysis confirmed teachers' attitudes as a mediator which partially mediated

the relationship between environmental factors and teachers’ practices. The influence of the mediator (teachers’ attitudes) is stronger than the direct influence of independent variable (environmental factors) on teachers’ practices.

Table 6. Mediation analysis

No	Relationship	Beta	t-value	p-value	Confidence interval (BC)		Result
					LL	UL	
H4	Environmental Factors → Teachers’ Attitudes Teachers’ Attitudes → Teachers’ Practices	0.367	10.699	0.000	0.295	0.438	Supported

The values of the coefficient of determination, R² were calculated. Teachers’ attitudes (TATT) had a moderate R² value of 0.29 whereas teachers’ practices (TPRAC) obtained an R² value of 0.66, which was considered as a substantial value. This implies that the two latent variables (TATT and EF) substantially explained 66% of the variance in TPRAC. The effect size indicates the magnitude of the relationship between the latent variables (Wong, 2013). Based on Cohen’s (1988) guidelines, 0.02 represents a “small” *f*² effect size, 0.15 represents a “medium” effect, and 0.35 represents a “high” effect size. The effect size *f*² for the structural model relationship was calculated. Teachers’ attitudes (TA) had large effect of 0.976 on teachers’ practices (TP). Environmental factors (EF) had large effect of 0.409 on teachers’ attitudes and small effect of 0.093 on teachers’ practices (TP).

In summary, the results showed that environmental factors directly affect teachers’ attitudes and practices in teaching students’ 21st century skills at primary schools. Teachers’ attitudes exerted direct effect on teachers’ practices in developing students’ 21st century skills. Next, environmental factors indirectly affected teachers’ practices in developing students’ 21st century skills through teacher’s attitudes. Lastly, teachers’ attitudes mediate the relationship between environmental factors and teachers’ practices. The findings of this study supported the five hypotheses formulated (Table 7).

Table 7. Decision on hypotheses

No.	Hypothesis	Result
H1	Environmental factors positively influence teachers’ practices.	Supported
H2	Environmental factors positively influence teachers’ attitudes.	Supported
H3	Teachers’ attitudes positively influence teachers’ practices.	Supported
H4	Environmental factors indirectly influence teachers’ practices through teachers’ attitudes.	Supported
H5	Teachers’ attitudes mediate the influence of environmental factors on teachers’ practices.	Supported

DISCUSSIONS

The results of the analysis revealed that inquiry-based instructional approach was the most preferred approach used by teachers to teach students 21st century skills at primary schools. The findings corroborated with a study by Yusoff and Seman (2018) as most teachers always applied questioning approach to stimulate students' 21st century thinking skills at primary schools (Zhao et al., 2016). Such approach provides an exposure for them to take part in questions, problems, and activities related to real-life contexts (Häkkinen et al., 2017). Next, the second most preferred approach by teachers was communicative language teaching (CLT) approach. The use of CLT in primary education is well support by Littlewood (2013), explaining that the use of CLT has been widely accepted and integrated into national policies and syllabi within the East Asian education context. The findings continued with constructivist learning approach, the third highest pedagogical practice preferred by teachers. The result was supported by Abrami et al. (2015) who found that the use of cooperative learning among teachers was prevalently high. The use of discussion to enhance students' 21st century skills was supported by Joseph (2016). Evidently, collaboration facilitates the development of creativity and critical thinking effectively (Karami et al., 2012). Through scaffolding, students' critical thinking can be enhanced (Gunawardena, 2019) as the process facilities own meaning. The second least preferred pedagogical practice was problem-centered instructional approach. By providing authentic problem, students are engaged in thinking critically (As'ari, 2014). The result was supported by Ersoy and Başer's (2014) study, which found that problem-based learning has positive effects on creative thinking abilities. The findings revealed that technology-based instructional approach was least practiced by teachers to teach 21st century skills in their classrooms. It was the least used approach to teach 21st century skills at elementary school level. As supporting environmental factors was found to have significant influences on teachers' practices; the adoption technology-based practices can be enhanced if more technological supports (e.g., hardware, software, ICT resources) are provided. Nevertheless, the overall adoption of contemporary practices by primary school teachers to teach 21st century skills is still at a fairly good level. In fact, Malaysia and Singapore are at a more developed pace in embracing ICT-aided approach for education purposes compared to other Southeast Asian countries (Garba et al., 2015).

Based on a theoretical perspective, mediation is commonly used to explain the reason for the existence of a relationship between an exogenous and endogenous construct and mediator variable aims to reveal the true relationship between an independent and a dependent construct (Hair et al., 2017). The analysis confirmed the positive relationship between environmental factors and teachers' practices. This study found out that environmental factors have positive impact towards teachers' attitudes ($\beta = 0.681, p < 0.001$) and teachers' practices ($\beta = 0.211, p < 0.001$) in teaching 21st century skills at primary schools. The result corroborated with Zimmerman's (2010) study which revealed that environment significantly affected teachers' classroom practice. This is because environmental factors such as support from school, colleagues, resources, facilities, and training programmes can promote positive attitudes among teachers. According to Stimulus-Organism-Response (SOR) Theory, supporting environment can stimulus teachers' internal state such as their

knowledge, feelings, and behaviour towards the teaching of 21st century skills, which subsequently affect their adoption of contemporary practices. In fact, one of the major findings of this study was that teachers' attitudes had greater influence on their teaching of 21st century skills. As emphasised by Mazarul Hasan et al., (2020), teachers' attitudes are important in the implementation of 21st century teaching and learning. This study found that attitudes play a mediating role in the relationship between environmental factors and teachers' practices in developing 21st century skills at the primary school level. According to Chaiklin (2011), attitudes hold the potential utility for the prediction of behaviours under a normal circumstance. Teachers with positive attitudes will be more willing to teach students' 21st century skills in their lessons. Similarly, teachers' attitudes were regarded as the driving force in determining the successful implementation of 21st century learning among students (Razak et al., 2018; Jansen & Merwe, 2015). This could be well supported to claim that attitudes exert greater impact on behaviours as evident in Theory of Planned Behaviour (Ajzen, 1993) which emphasises on the effect of teachers' perceived resources on their behaviours to teach 21st century skills.

As the results highlighted that environmental factor positively influenced teachers' practices of 21st century skills, it was consistent with the Theory of Planned Behaviour in the sense that teachers' perceived ease of supporting environment influenced their behaviours in teaching 21st century skills in primary classrooms. The present study found that teachers' positive attitudes on the teaching of 21st century skills exerted positive effect on their behaviours as in applying instructional practices that developed students' 21st century skills in their classrooms. Hence, the findings of the current study showed consistency with the Theory of Planned Behaviour proposed by Ajzen (1993). According to the theory, attitudes exert direct effect on social behaviours, stating that the relationship between attitudes and behaviours are indisputable. In the current study, teachers' attitudes on the teaching of 21st century skills exercised a significant effect towards their instructional practices of teaching 21st century skills in their primary classrooms. When it achieved the accuracy of predicting behaviours upon attitudes, it signified the confirmatory relationship between attitudes and behaviours proposed in Theory of Planned Behaviour (Ajzen, 1993). This present study provided relevant authorities with understanding on the roles of supporting environmental factors and teachers' attitudes in promoting the teaching of 21st century skills in primary education. With sufficient understanding on the supporting environmental factors, the schools and relevant stakeholders can provide supports to teachers and facilitate the process of developing students' 21st century skills in primary classrooms. The findings of the study served as a reference to teacher-trainers and curriculum designers to produce a more feasible curriculum and syllabus which can promote students' development of 21st century skills. This study contributed to Malaysian literature on primary education by describing teachers' attitudes and environmental factors towards the teaching of 21st century skills in classrooms.

CONCLUSION

Generally, this study has shed lights on the contemporary practices adopted by Malaysian primary school teachers in teaching 21st century skills. Five main contemporary practices have been applied in the local school context. As studies on teacher's practices are still scarce, the findings have contributed new understanding on the pedagogical practices used in teaching 21st century skills at the primary school level. The findings reaffirm that teachers have awareness towards the importance of 21st century teaching (e.g., Lim et al., 2017) and have adopted contemporary practices to promote the development of such skills in schools (Hiong, 2017).

This study also found that teachers' attitudes and supporting environment factors explain 66% of teachers' practices. In fact, teachers' attitudes mediate the relationship between environmental factors and teachers' practices. As such, teachers training institutes (IPG) and universities that offer teacher training programs should place more emphasis on nurturing positive attitudes among pre-service teachers. Teachers with positive attitudes are more likely to adopt contemporary practices in teaching 21st century skills. In other words, improving environmental factors alone may not be adequate to enhance teachers use of contemporary practices in teaching; teachers' attitude is a more pertinent factor. Founded on this basis, steps should be taken by the Ministry of Education to improve primary school teachers' attitudes in applying contemporary practices in teaching 21st century skills. Professional development programme and in-service trainings can be carried out to help teachers translate theoretical knowledge into actual practice, with more emphasis on nurturing their positive attitudes. The Teacher Training Division, Ministry of Education can also conduct workshops to improve teachers' perception, feelings and behaviours towards 21st century teaching. Supporting environmental factors particularly ICT support can further facilitate the adoption of contemporary teaching practices. In short, both environmental factors and teachers' attitudes are important factors that can influence primary school teachers' practices in teaching 21st century skills.

The findings and conclusions of this study were confined to the context of primary school. The transferability of the research findings and insights to other schools such as secondary schools or higher education contexts were limited. Additionally, as this research placed great emphasis on studying the teaching of 21st century skills among teachers at government primary schools in Malaysia, the findings may not be generalised across international and private primary schools. Future studies can compare teachers' practices according to different school types. The influence of environmental factors and teachers' attitudes on the teaching of 21st century skills have been identified in this research. Future studies can expand the scope of research by investigating other influencing factors to further understand the practices in teaching 21st century skills. Large-scale research can also be carried out to investigate teachers' state of practices of inquiry-based instructional approach, communicative language teaching approach, constructivist learning approach, problem-centered instructional approach and technology-based instructional approach. Teachers' attitudes towards these contemporary practices can be compared. In addition, there are also needs to understand how different environmental factors influence the teaching of 21st

century skills among primary school teachers in urban and rural schools. Such findings will provide to a more comprehensive understanding on the teaching of 21st century skills within the primary education context in Malaysia.

REFERENCES

- Aamirah, A. Z., Lee, Y. D., & Melor, M. Y. (2017). *21st century education in teaching English as a second language (ESL) in Malaysia*. Paper presented at the Seminar Pendidikan Serantau ke-VIII, Universiti Kebangsaan Malaysia, Malaysia, September.
- Abdul, H. A., Mahani, M., Noor, D. Abd H., Dayana, F. A., Lokman, Mohd., T., & Umar, H. A. K. (2017). Mathematics teachers' level of knowledge and practice on the implementation of higher-order thinking skills (HOTS). *EURASIA Journal of Mathematics Science and Technology Education*, 13(1), 3–17. <https://doi.org/10.12973/erasia.2017.00601a>
- Abrami, P. C., Bernard, R. M., Borokhovski, E., Waddington, D. I., Wade, C. A., & Persson, T. (2015). Strategies for teaching students to think critically: A meta-analysis. *Review of Educational Research*, 85(2), 275–314. <https://doi.org/10.3102/0034654314551063>
- Adwan Mohammad, & Abdul Hakim. (2019). The effect of project-based learning to improve the 21st century skills among emirati secondary students. *International Journal of Academic Research in Business and Social Sciences*, 9(12), 546–559.
- Ajzen, I. (1993). Attitude theory and the attitude-behavior relation. In D. Krebs, & P. Schmidt (Eds), *New directions in attitude measurement*. W. de Gruyter. Retrieved from https://www.researchgate.net/publication/264655146_Attitude_theory_and_the_attitude-behavior_relation
- Amin, A. M., & Corebima, A. D. (2016). Analisis persepsi dosen terhadap strategi pembelajaran reading, questioning, and answering (RQA) dan argument-driven inquiry (ADI) pada programme studi pendidikan biologi di kota Makassar. In *Seminar Nasional II 2016 Biologi, Pembelajaran, dan Lingkungan Hidup Perspektif Interdisipliner*. Malang: Prodi Pendidikan Biologi dan PSLK Universitas Muhammadiyah Malang.
- Anagün, Ş. S. (2018). Teachers' perceptions about the relationship between 21st century skills and managing constructivist learning environments. *International Journal of Instruction*, 11(4), 825–840. <https://doi.org/10.12973/iji.2018.11452a>
- As'ari, A. R. (2014). *Ideas for developing critical thinking at primary school level*. Paper presented at an International Seminar on Addressing Higher Order Thinking: Critical Thinking Issues in Primary Education, Islamic University of Muhammadiyah Makasar, April. <https://doi.org/10.13140/2.1.4534.9921>
- Barbaba, T., Bowma, M. & Suzanne, D. (2001). *Eager to learn: Educating our preschoolers*. Washington, DC: National Academy Press.
- Bekteshi, E. (2017). The perception of collaboration and creativity in language teaching and learning. *KNOWLEDGE – International Journal*, 19(3), 1131–1135.

- Bentaouet, R. K., & Bend, M. (2018). *Educating for the future: The case of East Asia*. Retrieved from <https://blogs.worldbank.org/education/educating-future-case-east-asia>
- Bistaman, I. N. M., Idrus, S. Z. S., & Rashid, S. A. (2018). *The use of augmented reality technology for primary school education in Perlis, Malaysia*. Paper presented at The 1st International Conference on Green and Sustainable Computing, November. <https://doi.org/10.1088/1742-6596/1019/1/012064>
- Care, E., Kim, H., Vista, A., & Anderson, K. (2018). *Education system alignment for 21st century skills: Focus on assessment*. Retrieved from <https://www.brookings.edu/wp-content/uploads/2018/11/Education-system-alignment-for-21st-century-skills-012819.pdf>
- Celik, S., Aytin, K., & Bayram, E. (2012). *Implementing cooperative learning in the language classroom: Opinions of Turkish teachers of English*. Paper presented at Akdeniz Language Studies Conference 2012, Antalya, Turkey, May. <https://doi.org/10.1016/j.sbspro.2013.01.263>
- Chaiklin, H. (2011). Attitudes, behavior, and social practice. *The Journal of Sociology & Social Welfare*, 38(1), 31–54.
- Cherry, K. (2018). *Attitude and behavior in psychology*. Retrieved from <https://www.verywellmind.com/attitudes-how-they-form-change-shape-behavior-2795897>
- Chin, P. C., & Chin, P. Y. (2012). Primary teacher education in Malaysia. *Journal of International Education Research*, 8(4), 373–380. <https://doi.org/10.19030/jier.v8i4.7285>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Corales, N. C. T. (2019). iTe(a)ch: Integrating technology in the 21st century classrooms. *Proceeding International Seminar of Primary Education*, 2, 1–6.
- Ersoy, E., & Başer, N. (2014). The effects of problem-based learning method in higher education on creative thinking. *Procedia – Social and Behavioral Sciences*, 116, 3494–3498. <https://doi.org/10.1016/j.sbspro.2014.01.790>
- Fathizaki, R., Mohd Mahzan, A., Abdul Raza, A., & Shakila, C. D. (2019). Issues and challenges in 21st century learning of history education. *Social Sciences, Education and Humanities*, 2, 59–63.
- Florea, N. M., & Hurjui, E. (2015). Critical thinking in elementary school children. *Procedia – Social and Behavioral Sciences*, 180, 565–572. <https://doi.org/10.1016/j.sbspro.2015.02.161>
- Garba, S. A., Byabazaire, Y., & Busthami, A. H. (2015). Toward the use of 21st century teaching-learning approaches: The trend of development in Malaysian schools within the context of Asia Pacific. *International Journal of Emerging Technologies in Learning*, 10(4), 72–79. <https://doi.org/10.3991/ijet.v10i4.4717>
- Garson, G. D. (2016). *Partial least squares: Regression and structural equation models*. Asheboro, NC: Statistical Associates Publishing.
- Ghamrawi, N., Ghamrawi, N. A. R., & Shal, T. (2017). Lebanese public schools: 20th or 21st century schools? An investigation into teachers' instructional practices. *Open Journal of Leadership*, 6(1), 1–20. <https://doi.org/10.4236/ojl.2017.61001>

- Gunawardena, M. (2019). Pedagogies for scaffolding thinking in ESL: Integrating first principle of learning. In L. Li (Ed.), *Thinking skills and creativity in second language education: Case studies from international perspectives*. Routledge. <https://doi.org/10.4324/9781315098920-3>
- Gunawardena, M., Sooriyampola, M., & Walisundara, N. (2017). Scaffolding thinking in ESL lessons: Negotiating challenges. *Thinking Skills and Creativity*, 24, 279–285. <https://doi.org/10.1016/j.tsc.2017.04.004>
- Häkkinen, P., Järvelä, S., Mäkitalo-Siegl, K., Ahonen, A., Näykki, P., & Valtonen, T. (2017). Preparing teacher-students for twenty-first-century learning practices (PREP 21): A framework for enhancing collaborative problem-solving and strategic learning skills. *Teachers and Teaching*, 23(1), 25–41. <https://doi.org/10.1080/13540602.2016.1203772>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Thousand Oak: SAGE Publications.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43, 115 R135. <https://doi.org/10.1007/s11747-014-0403-8>
- Haron, H. (2018). Education in the era of IR4.0. Retrieved from <http://umpir.ump.edu.my/id/eprint/22486/1/Education%20in%20the%20Era%20of%204.0.pdf>
- Hassan, S. R., Rosli, R., & Zakaria, E. (2016). The use of i-Think map and questioning to promote higher-order thinking skills in Mathematics. *Creative Education*, 7, 1069–1078. <https://doi.org/10.4236/ce.201677111>
- Hiong, S. N. (2017). Adoption of 21st century skills in teaching and learning. *Jurnal Penyelidikan IPGKBL*, 14. Retrieved <http://www.ipbl.edu.my/portal/penyelidikan/jurnalpapers/jurnal2017/1%20Siaw%20.pdf>
- Husamah, H. (2015). Blended project based learning: thinking skills of new students of biology education department (Environmental sustainability perspective). *Journal Pendidikan IPA Indonesia*, 4(2), 110–119. <https://doi.org/10.11591/edulearn.v9i4.2121>
- Indah, R. N., & Rohmah, G. N. (2020). The communicativeness and critical thinking devices of language supplementary materials for primary school. *RETORIKA: Jurnal Ilmu Bahasa*, 6(2), 165–172. <https://doi.org/10.22225/jr.6.2.2300.165-172>
- Itmeizeh, M., & Hassan, A. (2020). New approaches to teaching critical thinking skills through a new EFL curriculum. *International Journal of Psychosocial Rehabilitation*, 24(7), 8865–8885.
- Jansen, C., & Merwe, P. V. D. (2015). Teaching practice in the 21st century: Emerging trends, challenges and opportunities. *Universal Journal of Educational Research*, 3(3), 190–199. <https://doi.org/10.13189/ujer.2015.030304>
- Joseph, S. (2016). Enhancing critical thinking in English classes: A study of preuniversity colleges across Bangalore city. *IUP Journal of English Studies*, 11, 100–114. Retrieved from <https://search.proquest.com/docview/1865708037?accountid=14645>
- Kaplan, D. (2019). Creativity in education: Teaching for creativity development. *Psychology*, 10(2), 140–147. <https://doi.org/10.4236/psych.2019.102012>

- Karami, M., Pakmehr, H., & Aghili, A. (2012). Another view to importance of teaching methods in curriculum: Collaborative learning and students' critical thinking disposition. *Procedia – Social and Behavioral Sciences*, 46, 3266–3270. <https://doi.org/10.1016/j.sbspro.2012.06.048>
- Kenya Institute of Curriculum Development. (2017). *Basic education curriculum framework*. Retrieved from <https://kicd.ac.ke/curriculum-reform/basic-education-curriculum-framework/>
- Kogut, G., & Silver, R. (2009). *Teacher talk, pedagogical talk and classroom activities*. Paper presented at the 3rd Redesigning Pedagogy International Conference, Singapore, June.
- Kong, S. C., Chan, T., Huang, R., & Cheah, H. M. (2014). A review of e-Learning policy in school education in Singapore, Hong Kong, Taiwan, and Beijing: Implications to future policy planning. *Journal of Computers in Education*, 1(2–3), 187–212. <https://doi.org/10.1007/s40692-014-0011-0>
- Leong, S. (2010). Creativity and assessment in Chinese arts education: Perspectives of Hong Kong students. *Research Studies in Music Education*, 32(1), 75–92. <https://doi.org/10.1177/1321103X10370086>
- Liao, X. (2004). The need for communicative language teaching in China. *ELT Journal*, 58(3), 270–273. <https://doi.org/10.1093/elt/58.3.270>
- Lim, C. E., Faizahan, A. R. & Lawal, A. F. (2017). Teachers' awareness towards 21st century teaching and Its implementation (Administrators' perspective). *Advances in Social Sciences, Education and Humanities Research (ASSEHR)*, Volume 125, 1st International Conference on Intellectuals' Global Responsibility, 156–158.
- Littlewood, W. (2013). Developing a context-sensitive pedagogy for communication-oriented language teaching, *English Teaching*, 68(3), 3–25. <https://doi.org/10.15858/engtea.68.3.201309.3>
- Malini, G., Manjit, M., Sarjit., & Liew, W. K. (2017). Promoting HOTS via teaching practices. *3L: The Southeast Asian Journal of English Language Studies*, 23(1), 75–85. <http://doi.org/10.17576/3L-2017-2301-06>
- Mazarul Hasan, M. H., Maizura Komari, & Norazimah, Z. (2020). Islamic education teachers' readiness in implementation of 21st century learning [Kesediaan guru pendidikan Islam dalam pelaksanaan pembelajaran abad ke-21]. *International Journal of Education and Pedagogy*, 2(2), 9–17.
- McDonald, S. D. (2017). Enhanced critical thinking skills through problem-solving games in secondary schools. *Interdisciplinary Journal of e-Skills and Lifelong Learning*, 13, 79–96. <https://doi.org/10.28945/3677>
- Ministry of Education. (2013). *Malaysia education blueprint 2013–2025 (preschool to post secondary education)*, Putrajaya: Ministry of Education.
- Mohd, H. M. H., Muhammad, S. S., & Yusri, K. (2017). Meta-analysis study of teacher issues on higher order thinking skills in Malaysia. *World Applied Sciences Journal*, 35(12), 2520–2523. <https://doi.org/10.5829/idosi.wasj.2017.2520.2523>
- Murridza, N. H. M., Prapagara, L. V., & Saidalvi, A. S. (2019). Observation of communicative language teaching (clt) in a year 3 primary school in Johor Bahru. *LSP International Journal*, 6(1), 69–77. <https://doi.org/10.11113/lspi.v6n1.85>

- Naeema, S. A., & Abdo, M. A. (2017). The practice and challenges of implementing critical thinking skills in Omani post-basic EFL classrooms. *English Language Teaching, 10*(2), 116–133. <https://doi.org/10.5539/elt.v10n12p116>
- Nor Asniza Ishak, & Hazri Jamil. (2020). Pedagogies towards enhancing students' intellectual capital in Malaysian secondary schools. *Asia Pacific Journal of Educators and Education, 35*(2), 57–76. <https://doi.org/10.21315/apjee2020.35.2.4>
- Norazlin, M. R., & Siti Rahimah, A. (2018). *Implementation of 21st century learning and the challenges*. Paper presented at the 3rd UUM International Qualitative Research Conference (AQC), Melaka, Malaysia, 10–12 July.
- Othman, M. S., & Kassim, A. Y. (2017). Teaching practice of Islamic education teachers based on higher order thinking skills (HOTS) in primary school in Malaysia: An overview of the beginning. *International Journal of Academic Research in Business and Social Sciences, 7*(3), 401–415. <https://doi.org/10.6007/IJARBS/v7-i3/2745>
- Pana, G. U., & Escarlos, G. S. (2017). Contemporary teaching strategies on students' attitudes, academic performance and acquisition of the 21st century skills. *International Journal of Scientific & Technology Research, 6*(8), 332–337.
- Peters, J. M. & Stout, D. L. (2006). *Methods for teaching elementary school science* (5th ed.). Columbus, OH: Pearson Publishing.
- Pithers, R. T., & Soden, R. (2000). Critical thinking in education: A review. *Educational Research, 42*(3), 237–249. <https://doi.org/10.1080/001318800440579>
- Raja, A. R. I., & Daud, I. (2018). Aplikasi 'konsep 4C' pembelajaran abad ke-21 dalam kalangan guru pelatih pengajian agama institut pendidikan guru kampus Dato' Razali Ismail. *Asian People Journal, 1*(1), 45–65.
- Ranbir, S. M. (2018). Educational challenges in 21st century and sustainable development. *Journal of Sustainable Development Education and Research, 2*(1), 9–20. <https://doi.org/10.17509/jsder.v2i1.12266>
- Razak, N. A., Habibah, A. J., Krauss, S. E., & Nor, A. A. (2018). Successful implementation of information and communication technology integration in Malaysian public schools: An activity systems analysis approach. *Studies in Educational Evaluation, 58*, 17–29. <https://doi.org/10.1016/j.stueduc.2018.05.003>
- Setyarini, S., Muslim, A. B., Rukmini, D., Yuliasri, I., & Mujiyanto, Y. (2018). Thinking critically while storytelling: Improving children's HOTS and English oral competence. *Indonesian Journal of Applied Linguistics, 8*(1), 189–197. <https://doi.org/10.17509/ijal.v8i1.11480>
- Shazaitul. A. R., & Maisarah, M. S. (2015). The perception of critical thinking and problem among Malaysian undergraduate students solving skill. *Procedia – Social and Behavioral Sciences, 172*, 725–732. <https://doi.org/10.1016/j.sbspro.2015.01.425>
- Skinner, B. F. (1957). *Century psychology series: Verbal behavior*. Appleton-Century-Crofts. <https://doi.org/10.1037/11256-000>
- Sukiman, S., Noor, S. S., & Mohd, U. D. (2013). Pengajaran kemahiran berfikir: Persepsi dan amalan guru matematik semasa pengajaran dan pembelajaran di bilik darjah. *Jurnal Pendidikan Sains & Matematik Malaysia, 2*(1), 18–36.

- Syahrul, A. A., Soo, K. Y., Rahimah, M. Y., & Juyati, M. A. (2019). *Exploring lecturer's readiness for 21st century education in Malaysian higher learning institutions*. Paper presented at The International Conference on New Approaches in Education, Amsterdam, Netherlands, 12–14 July.
- Tee, M. Y., Samuel, M., Norjoharuddeen, M. N., Renuka, V. S., & Hutkemri. (2018). Classroom practice and the quality of teaching: Where a nation is going? *Journal of International and Comparative Education*, 7(1), 17–33. <https://doi.org/10.14425/jice.2018.7.1.17>
- UNESCO (2016). *School and teaching practices for twenty-first century challenges: Lessons from the Asia-Pacific region*. France: UNESCO.
- Vaish, V. (2013). Questioning and oracy in a reading program. *Language and Education*, 27(6), 526–541. <https://doi.org/10.1080/09500782.2012.737334>
- Vong, K. I. (2008). *Evolving creativity: New pedagogies for young children in China*. Trentham Books.
- Wah Chu, S. K., Reynolds, R. B., Tavares, N. J., Notari, M., & Yi Lee, C. W. (2017). *21st century skills development through inquiry-based learning: From theory to practice*. Singapore: Springer Nature. <https://doi.org/10.1007/978-981-10-2481-8>
- Wang, L., & Kokotsaki, D. (2018). Primary school teachers' conceptions of creativity in teaching English as a foreign language (EFL) in China. *Thinking Skills and Creativity*, 29, 115–130. <https://doi.org/10.1016/j.tsc.2018.06.002>
- Wang, S., & Seepho, S. (2017). Facilitating Chinese EFL learners' critical thinking skills: The contributions of teaching strategies. *SAGE Open*, 7(3), 1–9. <https://doi.org/10.1177/2158244017734024>
- Weninger, C. (2017). The “vernacularization” of global education policy: Media and digital literacy as twenty-first century skills in Singapore. *Asia Pacific Journal of Education*, 37(4), 500–516. <https://doi.org/10.1080/02188791.2017.1336429>
- Yin, C. C. (2019). Teacher education reform in the Asia Pacific Region. In G. W. Noblit (Ed.), *Oxford research encyclopaedia of education*. Oxford University Press. <https://doi.org/10.1093/acrefore/9780190264093.013.256>
- Yusoff, W. M. W., & Seman, S. C. (2018). Teachers' knowledge of higher order thinking and questioning skills: A case study at a primary school in Terengganu, Malaysia. *International Journal of Academic Research in Progressive Education and Development*, 7(2), 45–63. <https://doi.org/10.6007/IJARPED/v7-i2/4120>
- Zhai, X. S., & Usman, G. (2019). The SOR (stimulus-organism-response) paradigm in online learning: empirical study of students' knowledge hiding perceptions. *Interactive Learning Environment*, 28(5), 586–601. <https://doi.org/10.1080/10494820.2019.1696841>
- Zhao, C., Pandian, A., & Singh, M. K. M. (2016). Instructional strategies for developing critical thinking in EFL classrooms. *English Language Teaching*, 9(10), 14–21. <https://doi.org/10.5539/elt.v9n10p14>
- Zimmerman, L. (2010). *The influence of schooling conditions and teaching practices on curriculum implementation for grade 4 reading literacy development* (Doctoral dissertation), University of Pretoria. Retrieved from <https://repository.up.ac.za/handle/2263/24982?show=full>

Zuhri, F. (2020). Critical thinking on developing creative instruction: The practice of teaching English in Indonesia. *Proceedings of the International Joint Conference on Arts and Humanities, Indonesia*, 491, 678–682.