

# **Exploring Learning Environment Practice and Higher Order Thinking Skills for Malaysian Education Industry**

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## **Abstract**

The education industry is an important industry which forms the backbone of the country's development. This study provides a framework for conducting an empirical study to enhance higher order thinking abilities in the Malaysian school sector. This study's objective is to review structural analysis of learning environment practise and higher order thinking abilities in Malaysia's education sector. This study aims to review learning environment practices (learning facilities, constructivist-oriented teaching, clear goals and appropriate curriculum, student autonomy, and collaboration between students). The four key higher order thinking skills examined in this study are applying, analysing, evaluating, and creating. A structural link model between learning environment practises and higher order thinking abilities in the Malaysian education sector was also put forth in this study. The research hypotheses are being established in accordance with the suggested research model. Future study projects are suggested as this paper comes to a close.

## **Keywords:**

Education industry, higher order thinking skills, learning environment, Malaysian, structural equation modelling

## **INTRODUCTION**

The education system forms the backbone for a nation's development (Suprpto et al., 2017) and it should move in line with the economic transformation. With the provision of an excellent and high-quality education system, the economic transformation could be moved towards more precise and sustainable development. This is because an excellent education system should consider the elements of providing knowledge (Short, 2019; Yahya & Sa'ari, 2015) and 21st century skills especially higher order thinking skills (HOTS) (Ramdiah et al., 2019) to members of the present and future society with the hope of propelling economic growth and national prosperity (Abdullah & Ishak, 2019; Short, 2019; Ramdiah et al., 2019).

In line with the age of industrial economic competition faced by Malaysia, the requirement to produce competitive thinking skills which are critical, innovative, and creative (Alkharusi, et al., 2019; Yusof, 2017; Wilkin, 2017) among the younger generation is an important aspect which should be emphasised for one to stay ahead of the age of information and technology boom (Ichsan et al., 2019). As such, a systematic and excellent learning environment practice (LEP) should be focused on by the relevant authorities to ensure that

the transformation of the students' mind transformation could be worked on in the best manner and in turn, ensure that the planned transformation of education goes through a phase of improvement and thus, contribute to the achievement of the aspirations targeted by the country (Curriculum Development Division, 2016).

In this paper, learning environment practice (LEP) has been chosen as one of the factors that lead students to excellence in HOTS. This is because the learning environment practice (LEP) during the learning and teaching process could be seen as contributors of the success in the students' application of HOTS skills via various external and internal factors which support students' learning (Jamaluddin et al., 2021; Short, 2019; Nold, 2017).

Excellent and high-quality thinking skills are important aspects in developing students with a high marketability value (Fitriani et al., 2020; Hashim et al., 2016). This marketability value is related to the education aspect as education is one of the platforms for triggering creativity and generating innovation (Husamah et al., 2018), equipping the younger generation with the skills needed to compete in the job market and to become enablers in the economic development on the whole (Pereira et al., 2016). As such, through the excellent integration of LEP and HOTS, the Malaysian education system will be able to expand through the education transformation and economic transformation targeted in the nation's vision as outlined in Malaysia Education Blueprint (MEB) 2013 – 2025.

Academic excellence which involves students' HOTS level can be improved via a learning environment which occurs as an effect of the involvement of environmental dimensions such as learning facilities (Richardson & Mishra, 2018; Chen et al., 2017; Mokhtar, 2012), constructivist-oriented teaching (Alao & Ukpong, 2020; Chen et al., 2017; Dorit & Barry, 2005), clear goals and appropriate curriculum (Chen et al., 2017), student autonomy (Gasser et al., 2018; Chen et al., 2017), collaboration between students (Richardson & Mishra, 2018; Chen et al., 2017; Nadzir, 2010) and peer identity (Chen et al., 2017) positively associated with life satisfaction (Shernoff et al., 2017; Chen et al., 2017; Wan et al., 2011). As such, a student will try his/her best to achieve something when there is an emphasis on life satisfaction (Chen et al., 2017).

The findings of previous studies show that there is a relationship between positive learning environment with students' HOTS application success (Dumford et al., 2016a; Yee et al., 2015; Che Ahmad et al., 2013; Fraser, 1998). As such, the present study considers the LEP components which are the learning facilities, constructivist-oriented teaching, clear goals and appropriate curriculum, student autonomy, and collaboration between students in looking at the relationship between the two components towards the success of students' HOTS application. There is a lot of prior research on learning environment practice (LEP) and higher order thinking skills (HOTS), but there hasn't been much work done to examine how LEP and HOTS are related. Consequently, this paper's purpose is to present and evaluate information on:

- HOTS and learning environment practice (LEP) for Malaysia's education sector
- to look into how LEP may affect HOTS
- to create a LEP and HOTS research model

## **LITERATURE REVIEW**

### **Learning Environment Practices**

The learning environment refers to the social, psychological, and pedagogical aspects (Fraser, 1998) which provide a space and opportunity to promote learning (Joyce & Weil, 1996). It is also described as the surrounding environment or situation which provides a direct effect on students' success through the learning implemented (Chen et al., 2017; Tessmer & Harris, 1992). Richardson and Mishra (2018) in their study related to learning environment factors which support the development of students' creativity defined the learning environment as the quality of students' learning, involvement, and experience in the physical, social, psychological, and pedagogical contexts where the teaching and learning occurs.

Based on the definition of learning environment put forward by previous researchers, Candra and Retnawati (2020) and Chen et al., (2017) in their studies explained that a learning environment which involves students' knowledge development process actively is in line with the constructivist concept. This is because from the perspective of constructivists in the learning environment, this concept explains the importance of the process of knowledge building which encourages high quality thinking among the students.

Additionally, the emphasis on helping students to understand the structure and process for developing the identity of individuals responsible for their own learning makes the use of the concept of constructivist learning environment as an important predictor factor of HOTS. This is proven via studies conducted by Candra and Retnawati (2020) which explained that an effective constructivist learning environment would be able to stimulate students' responsible attitude towards their learning (Vermunt, 2003) as well as interactional involvement among peers, support and cooperation among the teachers, students and peers in encouraging initiative and proactive behaviour in the learning process for building high quality thinking skills (Candra & Retnawati, 2020). Peer involvement and support and cooperation between teachers, students and peers in the constructivist concept illustrate the social interaction which exists in learning (Candra & Retnawati, 2020; Chen et al., 2017).

### **Learning Environment Construct**

Moos (1979) divided the social environment into three dimensions. The three dimensions include the individual development towards assessing the direction of self-development and improvement occurring in a particular environment, assessing the relationship of individuals involved in his/her environment and retention systems and change systems that measure whether the environment is orderly and clear in anticipation of maintaining control and responding to change. In a study by Kock et al., (2004), the three main dimensions of learning environment used involved the roles of teacher and students, the learning aims, and learning tools. Meanwhile, Puteh et al., (2014) divided the learning environment into five dimensions which are climate change awareness, the physical condition of the class, the comfort of the class, the comfort of teaching and learning and the effects of the environment on health.

Razak (2015) in his study classified the learning environment into 5 main dimensions which included the cooperation between students, the freedom to generate ideas, integration, the clarity of rules, and resources. The cooperation between students can be seen from the extent of students' willingness to help and support one another during the learning session

conducted. As for the freedom to generate ideas, this could be seen from how the practical activities enable the generation of ideas among the students. The integration dimension is assessed from the extent of the combination of the practical activities with the theory. The clarity of rules dimension explains the extent of workshop behaviour being guided by formal rules while the resources dimension is based on the extent to which the equipment and materials in the workshop are adequate for the purpose of the implementation of the teaching and learning session.

A study by Chen et al., (2017) and Mokhtar (2012) adapted the learning environment dimension based on the definition of learning environment put forward by Fraser (1998). However, the dimension stated by Chen et al., (2017) and Mokhtar (2012) is too general without considering the classification of learning environment based on the social, pedagogical, and psychological components. The learning environment described by Chen et al., (2017) could be divided into eight dimensions which are constructivist-oriented teaching, clear goals and appropriate curriculum, student autonomy, assessment and assignment, teacher and student interaction, cooperation between students, peer identity and spirit and learning facilities. On the other hand, six dimensions of learning environment were utilized in Mokhtar’s study (2012) which are a good teaching approach, clear objectives, assessment, assignment workload, learning source and learning community. Table 1 summarizes the construct focus scope applied in earlier studies.

**Table 1: The Summary of Research Construct on Learning Environment Practice Study**

<b>Author (Year)</b>	<b>Focus Construct and Description</b>
Moos (1979)	- Classified the social environment into three dimensions: a) Individual development assessing the direction of development and self-improvement occurring in a particular range b) Assessing the relationship of individuals involved in the environment c) retention systems and change systems that measure whether the environment is orderly and clear in anticipation of maintaining control and responding to change.
Kock et al., (2004)	- Utilised three main dimensions of learning environment: a) the role of teacher and student b) learning objective c) resource materials
Mokhtar (2012)	- Classified the learning environment into six dimensions a) good teaching approach b) clear objectives c) assessment d) assignment workload e) learning source f) learning community
Puteh et al., (2014)	- Classified the learning environment into five dimensions: a) climate change awareness, b) the physical condition of the class, c) the comfort of the class, d) the comfort of teaching and learning e) the effects of the environment on health.
Razak (2015)	- Classified the learning environment into 5 dimensions a) Cooperation between students b) Freedom to generate ideas

	<ul style="list-style-type: none"> <li>c) The integration of practice and theory</li> <li>d) Clarity of rules</li> <li>e) Workshop materials</li> </ul>
Chen et al., (2017)	<ul style="list-style-type: none"> <li>- Divided the learning environment into 8 dimensions:               <ul style="list-style-type: none"> <li>a) Constructivist oriented teaching</li> <li>b) Clear objectives and curriculum relevance</li> <li>c) Student autonomy</li> <li>d) Assessment and assignment</li> <li>e) Teacher and student interaction.</li> <li>f) Cooperation between students.</li> <li>g) Peer identity and spirit</li> <li>h) Learning facilities</li> </ul> </li> </ul>

Generally, based on the synthesis conducted by the researcher based on the literature review, there is limited number of studies related to a learning environment which supports HOTS mastery at secondary school level. Existing studies provide general findings without explaining the real learning experience which should be applied to improve students' mastery of HOTS. As such, the researcher decided to focus on studies on learning environment component as represented by the learning facilities, constructivist-oriented teaching, clear goals and appropriate curriculum, student autonomy, and collaboration between students. Detailed description about the classification of learning environment studies by the researcher in this study and the operational definitions for each learning environment dimensions are shown in Table 2.

**Table 2: The Operational Definition Research Construct on Learning Environment Practice Study**

<b>Dimension</b>	<b>Operational Definitions</b>
Learning facilities	Chen et al., (2017) described that learning facilities are a learning environment component which supports students' constructivist learning. The quality learning provision and maintenance and management are the main factors which contribute to the success of students' constructivist learning (Candra & Retnawati, 2020; Che Ahmad et al., 2013). In the learning environment situation at school, the learning facilities are referred to as the multiple facilities available in the school which support students' teaching and learning.
Constructivist-oriented teaching	Chen et al., (2017) described that constructivist-based learning is a knowledge building process which involves the learning element more than the knowledge transfer process. The knowledge building process becomes more meaningful when students' active involvement becomes the focus during the teaching and learning session and provides meaningful experiment in relating their knowledge and experience to face multiple situations in real-life (Lawrence & James, 2016).
Clear goals and appropriate curriculum	Chen et al., (2017) stated that clear objectives and curriculum relevance seen from the aspect of goal setting in every subject should be understood by the students as much as they could, and these should be aligned with the curriculum planning so that they are in line with the activities planned. The clear objectives understood by the students would contribute to excellent achievement in studies
Student autonomy	Chen et al., (2017) explained that students' autonomy should be seen as the freedom given to the students in choosing what and how they want to study. Giving freedom to the students in choosing the way they study

		should be the way as the students know more about what and how they should learn after they go through various phases of experience in learning (Thorndike, 1898).
Collaboration between students		Chen et al., (2017) described the cooperation between students as seen from the opportunity given by the teacher who controls the teaching and learning session in the students' communication and work session. The opportunity to communicate and work with other students during the teaching and learning session contributes to the students' mind transformation in their active involvement in learning.

### **Higher Order Thinking Skills**

Higher Order Thinking Skills or HOTS are the dependent variables in this study as HOTS are the main learning outcome emphasised among the students at schools. In fact, HOTS are also the main issue being discussed as the thinking skills element is one of the six aspiration of students which are the focus in the nation's education transformation (Kementerian Pendidikan Malaysia, 2015). Besides HOTS, the nation's education transformation also focuses on the preparation of students with 21<sup>st</sup> century skills to enable them to compete globally with 21<sup>st</sup> century skills as evidence of their high and wide marketability (Owenbiugie & Ojeaga, 2022; Husamah et al., 2018).

As such, the drafting of *Kurikulum Standard Sekolah Menengah (KSSM)* is one of the platforms for ensuring that the nation has achieved its education transformation. The significance of HOTS' mastery by the students is shown in its definition as a metacognitive process (Yee et al., 2015) which connects the usage of the mind's potential (Onosko & Newmann, 1994) via observation and information-processing learning for interpreting, analysing, and manipulating information for solving problems (Suardana et al., 2018). The HOTS concept is also classified as a thinking process which involves concept formation, understanding, making decisions, and solving problems (Yurniwati & Soleh, 2020; Marzano, 1988). Success in combining and organising the information acquired (Fitriani et al., 2020) shows that high-quality thinking and learning application has been successfully developed. This is supported by previous literature which explains that a person's ability in combining and organising the existing information with new information for the purpose of solving problems, analysing opinions, and making predictions is the accurate and relevant concept with higher order thinking skills (Underbakke et al., 1993; Newmann, 1990). *Dokumen Standard Kurikulum dan Pentaksiran (DSKP)* utilises the Bloom's Taxonomy of Critical Thinking as reviewed by Anderson (Anderson & Krathwohl, 2001) which includes the application, analysing, evaluating, and creating skills.

As such, the development of HOTS questions should be prepared based on the thinking skills stated in the DSKP and the questions should also fulfil the general statements related to mastery as shown in Table 3.

**Table 3: General Statements Related to Mastery Level in Higher Order Thinking Skills**

<b>Higher Order Thinking Skills (HOTS)</b>	<b>Description</b>
Applying	Using knowledge, skills, and values in different situations for solving a problem.
Analyzing	Breaking information into smaller pieces to understand in detail and to analyse the association between the small parts.

Evaluating	Making considerations and decisions using knowledge, experience, skills, and values as well as giving justifications.
Creating	Creating a creative or innovative idea, product, or method

(Source: Curriculum Development Division, 2016)

### **Relationship between LEP and HOTS**

The previous findings show that the learning environment is able affect students' learning outcome (Wicaksana, et al., 2020; Chen *et al.*, 2017; Vinales, 2015; Puteh *et al.*, 2014). The relationships between student and teacher and student achievement show a positive and significant association which proves that teachers can become catalyst of students' success (Chen *et al.*, 2017; Mokhtar, 2012; Nadzir, 2010). The good relationship between teachers and students is based on the communication that exists between the two parties which encourages teachers to help students deal with problems in the learning process (Mohd Nor, 2005).

In the school context, an effective teacher who is well-liked and much praised by the student's teacher (Hassan & Mohd, 1999) should have good and unique communication skills. This is because communication is a process which exists due to the experience shared by the teacher with students and vice versa, and this process contributes to the relationship between humans. A study on secondary school students found that the teacher-student relationship is significant due to the approach used by the teacher in teaching. This is due to the interaction level between teacher and students which contributes towards the students' excellence, motivation, and success through the teacher's role as catalyst for the latter via the teaching and learning process (Ishak & Mohammad, 2001; Okula, 1999).

Findings from a study by Candra dan Retnawati (2020) described that the application of constructivist-based teaching in the teaching and learning session helped to develop a good relationship towards the learning outcome. These can be proven from the findings which stated that the summary effect with a fixed-effect model of 0.44 was greater than the effect magnitude of 0.20 and z value of 12.678 while r had a value of 0.43. The explanation put forward by Tasker (1992) was in line with the findings from Candra dan Retnawati (2020) which informed that the constructivist-based learning application which propelled the students' active involvement in the teaching and learning session contributed towards meaningful knowledge building, developing ideas from the knowledge received and then combining those ideas with the new information received. Through the processes in the constructivist-based learning application, the students' mind transformation could be shaped to prepare them with high marketability value through the nation's economic and education transformation.

A study by Abu and Eu (2014) on Form 4 students' achievement in Additional Maths found that teachers' teaching during the teaching and learning session provided an impact on students' achievement. The teachers' interesting way of teaching encouraged the students' active involvement during the lesson. This made the students excited to follow the lesson to the end and simultaneously contributed towards successful achievement in their learning. Besides focusing on the psycho-social learning environment, the Social Constructivist Theory also emphasised the importance of a conducive learning environment in line with the needs of students and teachers, which include furniture, equipment, room layout and other aspects such as lighting, learning area, technology support and air quality (Sanip & Che Ahmad, 2014; Che Ahmad *et al.*, 2013).

Vygotsky (1978) opined that all aspects of physical learning environment should be prepared and designed in line with the learning activity requirements while assisting to create a learning environment which encourages the students’ active participation as an effect of their satisfaction of the learning environment. As such, students’ active participation in teaching and learning improves and enhances their HOTS mastery. Windschitl (2002) emphasised the classroom features which included the preparation of challenging tasks, providing students with problem solving tasks and requirement for collaborative work involvement to enable them to build knowledge and skills using their own experience. This proved that the Vygotskian theory focuses on the social environment as the environment acts as a catalyst for the student’s learning and development.

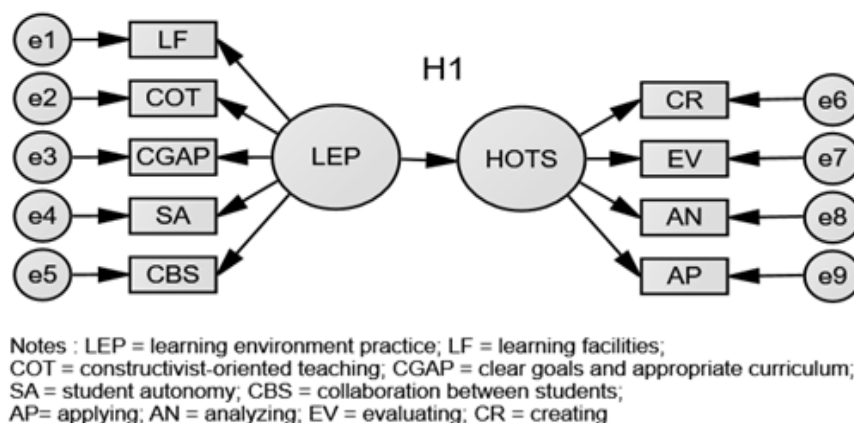
**Research Model**

To sum up, the learning environment which involves the social interaction principle plays a role in the students’ HOTS development. This has been proven by Candra and Retnawati (2020) and Chen et al., (2017) in their studies which found that each student responds in a unique way to his/her environment whereby a comfortable environment can encourage and stimulate positive attitude and become an agent to excellence in mastering HOTS. If the findings prove that there is a direct effect between the learning environment with HOTS, then the learning environment factor can increase the predictive validity in the Social Constructivist Theory as a predictive factor which has a direct relationship with HOTS.

The extensive literature evaluation indicates that HOTS have an impact on LEP. It would be suitable for this study and the educational sector. Therefore, the following hypotheses are set up to be evaluated in order to understand the relationship between LEP and HOTS in the Malaysian education industry:

HA1: In the Malaysian education sector, there is a strong correlation between HOTS (applying, analyzing, evaluating, and producing) and LEP (learning facilities, constructivist-oriented teaching, clear goals and appropriate curriculum, student autonomy, and collaboration amongst students).

In light of the conceptual model that has been suggested, several hypotheses have been created. Figure 1 shows this model.



**Figure 1: A Proposed Research Model**



## **RESEARCH METHODOLOGY**

The research technique is intended to create the basis for LEP in HOTS to be successfully implemented. Although the LEP and HOTS are primarily applicable to the education sector, we now believe that they are also pertinent to other sectors, including the mining and mineral (Moheballi et al., 2020) and construction (Zuhairi et al., 2018) industries because they have demonstrated a significant influence on the environment's impact on outcomes. This is supported by Moheballi et al. (2020) who explained that environmental factors in the mining and mineral industry play an important role to the results of industries through the ability to make future plans. This is because, with the positive environment that exists in this industry, the future success of this industry can be planned in the best way and at the same time will contribute to the economic transformation of a country.

Additionally, the focus on LEP is an important element and is a priority in advanced nations such as Australia, the United States and Japan, but there is a lack of detailed studies in developing nations. As such, we have focused on the education industry in Malaysia as the study population. This study aims to provide an insight into the significance of the learning environment practice in the education industry as one of the main contributors in the nations' economic transformation through high marketability value.

Through the implementation of this research, the production of questionnaires will be done for the purpose of data collection. In order to cover most of the LEP and HOTS-related topics, a series of survey questions was carefully created. The final text of the questionnaire was sent to specialists, including academicians from international universities, experts in the field of education, and outstanding teachers from Malaysia, to ensure the accuracy and relevance of all the items. Then, the questionnaire which has been developed will be distributed to the students in secondary school in Malaysia. The Statistical Package for the Social Sciences (SPSS) version 22 is used for the analysis of the descriptive statistics and the preliminary data, which includes the frequencies, means, and standard deviations. Also, the necessary statistical analysis of the survey data was carried out using the structural equation modelling (SEM) method. Andre and Mijke (2021) justified that in addition to being able to detect target effects based on sample size, SEM is also seen to be capable of investigating the simultaneous relationship and the relative strength of integration between the variables. Confirmation factor analysis, reliability analysis and validation factor analysis to test construct validity, reliability, and measurement loading were performed. AMOS 20 computer software was used for SEM analysis to study the relationship between the dependent variable (DV) and the independent variable (IV) simultaneously.

## **CONCLUSION AND FUTURE RESEARCH**

Numerous studies on LEP and HOTS have been undertaken, but they have each had a distinct focus on the two topics without considering how they are now related. In order to determine the connection between LEP and HOTS in Malaysian educational industries, this research conducted an empirical investigation. The researcher made a novel discovery about LEP that could have a good impact on HOTS achievement based on the observation and synthesis that was done. As such, the exploration of the LEP association such as the learning facilities, constructivist-oriented teaching, clear goals and appropriate curriculum, student autonomy, and collaboration between students, could assist in bringing excellence to HOTS.

Furthermore, for future research agenda, the researcher suggested that other researchers could utilise the model produced from this study in their own study by giving a focus on specific subjects or courses for measuring HOTS. By placing the subject or course in measuring HOTS, then more specific findings could be achieved and as such, this provides added value in ensuring that HOTS excellence in the subject or course could be achieved easily. Furthermore, the researcher is interested to locate the HOTS component as the dependent variables to ascertain the extent of the relationship which exist between learning strategies and its impact on HOTS.

The educators are enthusiastic in utilising HOTS as a variable for producing a comprehensive model which can be used by third parties such as teacher, lecturer, and prospective researchers in the effort to realise the nation's aspiration to achieve excellence in the HOTS aspect as outlined in the education transformation programme MEB 2013-2025. Additionally, the usage of HOTS as an important variable to be studied is a result of the significance of the mind transformation process involving students at school as well as university students to ensure that they are competitive in providing a high marketability value not only at the national level but also at the international level.

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