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Learning Style, Environment and Its Influenceon Student Interest for Higher Order Thinking Skills in Science Subject

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ABSTRACT:

Thinking skills are important elements that need to be considered to produce highly competitive students. The rapidly changing and challenging world requires students to go beyond building their knowledge capacity and develop higher order thinking skills, such as critical thinking, decision making and problem solving. Masteryof high -level thinking skills (HLTS) needs to be applied from the beginning to familiarize students with situations that require them to use those skills in their lives. An important goal of early childhood education is to promote effective thinking in young children. In this regard, the mastery of HOTS must be applied as early as possible with the help of parents in their own family environment. The mastery of HOTS also needs to continue to grow with a more appropriate environment and supported by a deep interest in a subject. This study was conducted to examine the factors of learning style and environment in influencing students' mastery of HOTS for Science subjects. It is hoped that the findings of this study can be used as a guide for future researchers.

KEYWORDS:

Learning style, environment, higher order thinking skills, HOTS, science

Introduction

Malaysia's aspiration to achieve the status of a high -income country requires various plans that need to be realized. The need for a workforce with sufficient knowledge and skills to support and drive economic growth must be met. To achieve this, science, mathematics, engineering and mathematics (STEM) education has been introduced. STEM is an agenda that is given attention and emphasis due to the importance of its value for a country. The direction of STEM education in the Malaysia Education Development Plan 2013-2025 outlines several steps in strengthening STEM education such as increasing student interest through new learning approaches and strengthening the curriculum, incorporating mastery of HOTS, increasing the use of practical teaching facilities and making content relevant to life. daily to increase interest. The mastery of HOTS is an important element and needs to be nurtured and strengthened to obtain quality human resources in the future. According to a World Economic Forum (WEF) report (2016), by 2020 some of the relatively key skills required by most jobs and industries are cognitive abilities (such as creativity and mathematical thinking) and process skills (such as active listening and critical thinking). In addition, other skills that are also required are complex problem -solving skills (Aminah etal., 2021; Azlisham et al., 2021; Saadiah et al., 2021; Firkhan et al., 2021; Ishak et al., 2021).

LiteratureReview

Noor Ashikin (2017) listed three issues related to the mastery of HOTS among students. The issues are student engagement, student communication and lack of knowledge. These issues are seen as problems that need to be resolved if the mastery of HOTS is to be improved. Student involvement requires students to be active in teaching and learning activities, but the opposite situation occurs where most students are passive and less responsive. A conducive learning environment will encourage students to be more active in the classroom. In fact, the high -level thinking agenda is a relative construct that requires a force to act on each student to develop a readiness in the minds of practitioners to absorb and digest the learning environment and acquire what is introduced to it (Azreen & Mohamed, 2017).

In addition, students 'learning styles can also influence students' involvement in the classroom. By identifying learning styles in the context of education and behavior in student learning, teachers can use different teaching strategies related to the type of learning (Norazmi, 2020Each student has their own learning style where the learning style may feel effective or comfortable for themselves such students but may not for other students. One of the most important learning factors that may influence higher order thinking can be seen in studies of learning approaches and learning style research (Leite, 2013).

Learning style factors are important in determining a student’s success because each student has different characteristics in terms of their respective abilities and the way a student’s understanding leads to different learning styles between students (Anisah & Ruslin 2016). Therefore, students 'learning style will indirectly be able to impact on students' mastery of HOTS. In addition, some students like to be given guidance, study in groups and do things better if they can engage in learning activities. Some students are also actively involved, being observers and listening to music while learning (Roszi et al., 2021).

The combination of all this is related to the way students learn that need to be identified by teachers to ensure that the teaching and learning process can be carried out effectively andcan achieve objectives. Students do not have the same learning style and they are willing to learn through different means

(Rosnee et al., 2021). Teaching strategies that follow the learning style of students can provide satisfaction and make learning easier and better for students. Unaware of this learning style, students tend to miss out on what they are learning. Therefore, students' learning styles need to be observed in order to ensure the effective implementation of PdP activities.

Next, students need to have certain education, experience, practice, resources and support before they can demonstrate mastery of HOTS. Zaid et al. (2020) argues that students 'progress from low -level thinking to higher -level thinking is in line with age. It is important for students to have the motivation and resources to do so. This is because student attitude factors indicate that many students display an easy -going attitude and /or lack motivation to think even for good students (Zaidetal., 2021).Alltheseelementsarefactorsthatneedtobe

Given attention if we want to produce students who meet the criteria for mastery of HOTS as outlined by the MOE.

In addition, a conducive learning environment will also help in developing students' HOTS. The learning environment has an impact on thinking skills (Ishak et al., 2021). The study conducted by Budsankom et al. (2015) showed that classroom climate, teaching and learning methods influence students 'HOTS. In addition, researchers suggest that psychologicalfactors should also be considered and applied to the classroom environment. For example, with the management of positive learning activities, the classroom climate should support positivethinkinginlearning,teachingbehaviorsorteachers'personalitiestosupportattitudes toward learning. A positive learning environment will help teachers and students achieve the best in the learning process (Firkhan et al., 2021). Therefore, the factors of the learning environment must be given attention to ensure that the achievement of students' HOTS continues to increase.

There are several factors that contribute to the well-being of students in school namely psychological, physical, cognitive and social. Threats to the well-being of students in schools can be addressed in a number of ways namely teacher support, positive peer relationships, a disciplined learning environment and caring parents. Parents who care about their children and always communicate with their children will contribute to more prosperous students in school (OECD 2017). A parental environment that can stimulate students' HOB is an environment that needs to be created in the family institution as a conducive environmentwill cause students to be able to show better achievement in school.

However, the parenting factor has also been studied for decades as one of the most important environments of its influence on a child's well-being. Democratic parenting style and family support will help students improve their attitudes towards learning, achievement motivation, and self - confidence will also affect the mastery of HOTS (Mohd Norazmi et al., 2021). Among the parenting variables are parenting style, differences in parental treatment and co - parenting consistency (Fauziyana et al., 2020). Therefore, parents should take care of their children carefully and fairly and give children opportunities to share ideas, make decisions, and solve problems. Parents should also encourage their children to participate in activities inside and outside the classroom to stimulate the application of HOTS in them.

Students,on the other hand,oftenfeelthatKBAT questionsarenotimportantintheirstudies. The LPM study showed almost 30% of students did not answer non -routine questions. Community culture often emphasizes excellence and A number as one of the aspects of student success. The culture of the society formed is closely related to the familyenvironment and the socioeconomic status (SSE) of the student's own family. Saadiah et al. (2021) conducted research to provide comprehensive validation of children's differences in thinking, beliefs, doing or choosing not to do, feelings and so on that can be attributed to different parentingstyles. Parent's areveryinfluential on thepersonal formation ofchildren in theenvironmentinwhichtheyareshaped.Fornearlyacenturyresearchhasbeenconducted

on the relationship between parents 'SSE and theirchildren's cognitive abilities (Rindermann & Baumeister 2018).

Methodology

This quantitative survey study uses data obtained through a spread of survey questionnaires. The data were analyzed with CFA test with the records recorded on several aspects, namely Internal consistency, convergent validity and discriminant validity.

Findings

Internalconsistencyreliability

Internal consistency is important for testing item reliability. Internal consistency can indicate the degree of measurement of items that measure the same or interdependent constructs. To test the internal consistency in PLS-SEM, it is necessary to refer to a value known as composite reliability (CR) which has a value between 0 to 1. Higher CR values indicate higher reliability. CR values below 0.60 indicate a lack of internal consistency reliability. If the scores produced are nearly the same and stable each time the instrument is used (Jackson 2006), then scores from consistent instruments can indicate the reliability (Creswell 2012) of a study. Table 1 shows the CR values for the pilot study. It was found that the CR values for allconstructs werebetween0.799 and0.945. AccordingtoNunallyand Bernstein(1994), CR values between 0.6 and 0.7 areacceptable. Thus, thelevel ofinternal consistencyforthepilot study was high and reliable.

Convergentvalidity

Apositiverelationshipbetweenitemsthatmeasurethesameconstructisknownas convergentvalidity.Todetermineconvergentvalidity,areliabilityindicatorthataimsto assess the extent to which an indicator or a set of indicators is consistentwith what is to bemeasuredisused.Reliabilityindicatorsoralsocalledouterloadingandaveragevariance extracted(AVE)aretakenintoaccountforthisvalidityassessment.Outerloadingvalues above 0.4 are acceptable if contributing to the AVE score is greater than 0.5 (Hulland 1999). Inaddition,itemswithanouterloadingvaluebetween0.4to0.7shouldbeconsideredfor removal.ItemremovalcanbedoneifitcanincreasetheAVEvalue.Byrne(2016)argues that the value of outer loading must be above 0.5 and the value of AVE must be equal to orhigher than 0.5. Analysis of the measurement model to obtain the values of outer loading and AVEwasperformed.Thesevalueswereusedinthepilotstudy.Figure3.3showsthemeasurement model for obtaining the results of the pilot study analysis.

A minimum AVE value of 0.5 is obtained by removing items with an outer loading value of less than 0.5. The items were discarded one by one sequentially by performing the PLS algorithm process

repeatedly. shows the AVE values obtained from the analysis of the PLS-SEMmeasurementmodel.TheAVEvaluesforallconstructsexceededtheprescribed

Minimum requirement of 0.5 as reported in the table. Therefore, it can be concluded that the level of convergent validity for the pilot study is satisfactory.

Table 1: CR values for the internal consistency assessment of the construct (first level) of the pilot study

Construct	CompositeReliability(CR)
free	0.806
depends	0.820
equity	0.896
cognitiveinteraction	0.871
parentalpersonality	0.897
cooperation	0.888
student cohesive	0.844
ksma	0.904
makingdecisions	0.839
dodge	0.837
interestinthesituation	0.895
task orientation	0.886
parentsoccupation	0.915
creativethinking	0.902
criticalthinking	0.901
parentalincome	0.830
parentaleducation	0.826
involvement	0.827
problem solving	0.862
investigation	0.896
competition	0.848
environmental stimuli	0.799
concrete	0.914
parentalattitudestowards children's intelligence	0.890
teacher support	0.853

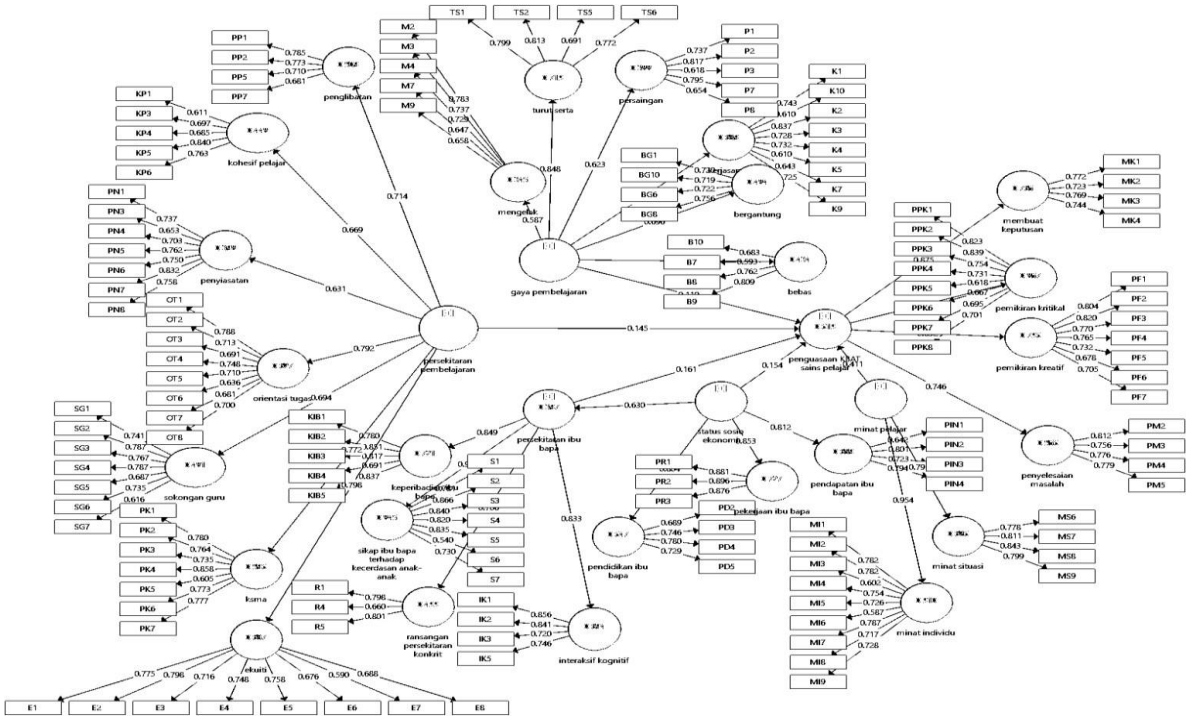

Figure1: PLS-SEMMeasurement Modelforthepilot study

Table2: AVE for internal consistency assessment of the construct (firstlevel) of the pilot study

Construct	AverageVariance Extracted (AVE)
free	0.513
depends	0.532
equity	0.520
cognitiveinteraction	0.629
parentalpersonality	0.635
cooperation	0.500
student cohesive	0.523
ksma	0.576
makingdecisions	0.566
dodge	

	0.508
interestinthesituation	
	0.521
task orientation	
	0.631
parentsoccupation	
	0.528
creativethinking	
	0.782
criticalthinking	
	0.570
parentalincome	
	0.536
parentaleducation	
	0.552
involvement	
	0.543
problem solving	
	0.546
investigation	
	0.610
competition	
	0.554
environmental stimuli	
	0.530
concrete	
	0.571
parentalattitudestowardschildren's intelligence	0.608
teacher support	
	0.538
participate	
	0.593

Discriminant validity

Each construct should be different from the other constructs in a model. The extent to whicha construct is completely different from other constructs indicates discriminant validity in a model. Cross loading assessment is typically the first approach taken to determine discriminant validity. The outer loading indicator on the relevant construct must be largerthan anycross loading. This means that the indicator for each construct shows a greater value thanthecrossloadingfor theotherconstructs. Table2 shows thecrossloadingvalues forthis study.

The Fornell-Larcker criterion is also used in assessing discriminant validity. It compares the powersourceoftheAVEvaluewiththecorrelationofthelatentvariable.Specificallythe

Power source for the AVE of each construct must be greater than the highest correlationvalue of that construct compared to the other constructs of the Fornell-Larcker criterion evaluation results of the study. From the table, the AVE power source values for each construct are located at the top and rightmost in each row and column respectively. The values below represent the values of the correlation between the construct with other constructs.ThepowersourcevalueofAVEis foundtobehigherthanthecorrelationvaluein the rows and columns of the construct. This means that the constructs are different from each other. Thus the condition of discriminant validity has been reached

Discussion

The advancement of cognitive ability in many ways is following the same principles. According to Een et al. (2021), thinking is not a natural function like sleeping, walking and talking. Thinkingneeds to be developed and a person does not necessarilybecome smarter as they get older. Some children are lucky because they learn thinking skills from their parents or others. Serious parents will engage in meaningful conversations, inspire theirimaginations, ask questions that make them think and so on. Other underprivileged children do not have an environment that nurtures and encourages their cognitive development. As children become accustomed to systematic thinking skills and experience positive learning experiences, they will gradually learn to enjoy more challenging tasks. Eventually their self - confidence will grow (Norazmi et al., 2019; Fauziyana et al., 2020; Norazmi, 2020; Zaid et al., 2020;).

Thus, the needs of the contemporary workplace including the ability to think critically and creatively in solving problems and responding to changes in economic and social conditions can be met. High - level thinking has long been confirmed as a key predictor of success in academia and the workplace. Extensive efforts to foster high -level thinking have involvedthe implementation of instructional design interventions that involve students in complex cognitive activities (Zaid et al., 2021).

Moreover, the current, information -intensive and ever -evolving workplace environment desperatelyrequires employees to continuallyacquire and transfer skills and competencies to change economic conditions and demands (Zaid et al., 2021). In meeting the needs of the workplace that demands this diversity of skills and needs, then the human resources that will be produced must have good competencies in various aspects. It needs to start with a child and student who knows their life goals and then try their best to achieve them. A very conducive environment needs to be created to achieve that goal. Students are active interpreters of the environment, culture, values and challenges around them (Mohd Norazmi et al., 2021; Rosnee et al., 2021; Roszi et al., 2021; Een et al., 2021; Yusaini et al., 2021).The way students interpret task requirements greatly influences learning outcomes. Such interpretations in turn are influenced by how students view the larger environment in which they learn (Nik Nurhalida et al., 2021).

Conclusion

Students desperatelyneed thinking skills to keep abreast of developments and competition in the global education stream and will be able to prepare them for a better future job market. Mastery of HOTS in Science subjects is very important to be implemented because it will be able to be practiced by students in their daily lives. Students can ask, obtain or determine answers to questions drawn from everyday experience and are able to describe, explain and predict natural phenomena. The teaching and learning process that successfully applies the mastery of HOTS as much as possible is very beneficial to students. KSSM which was introduced in 2017 requires changes that need to be

implemented, namely the mastery of HOTS is applied in PdP while implementing in -depth learning. Students are expected to be able to solve problems and make decisions through inquiry approaches and applications of mastery of HOTS.

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