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IDENTIFICATION OF THE PHYSICAL FACTORS AND PRACTICES FOR IMPLEMENTING LOWER PRIMARY SCIENCE CURRICULUM

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ABSTRACT

The study identifies the physical factors and practices for the implementation of level one lower primary science curriculum. The purposes of this study were to assess the existing physical factors and practices for the implementation of primary science curriculum, to determine whether the schools have accommodated physical factors as in accordance to the Ministry of Education guidelines and to identify the relationship between the classroom physical factors and the teaching and learning (T&L) science practices. A survey design was adopted for this study. The study involved 146 primary science teachers from District of Larut, Matang and Selama, Perak. The research instruments employed were questionnaires, observation check list and interview protocol. Data were analyzed using descriptive statistics, which were frequency distribution and percentage, while correlation tested the hypothesis at 0.05 significant level. Data from the interviews were analyzed using Atlas.ti while the classroom observations were analyzed through the checklist. The key finding of the research identifies that the majority surveyed schools are adhered to the ministerial guidelines. However, the accommodation facilities in the classrooms are at moderate satisfaction level. The result reveals a low rating (mean = 2.47) for overall analysis of existing physical factors and a moderate level (mean = 2.74) for existing practices in the primary schools for implementing science curriculum. Furthermore, the result also indicates that the classroom physical factors have a significant relationship with the science T&L practices (r = 0.876, p < 0.05). In conclusion, by enhancing the accommodation of physical factors in the classroom, the quality of T&L could be improved. Its implication is that the integration of physical facilities in science curriculum could reduce frustration, improve positive behavioral, and could help in developing students' personality and self-confidence.

Keywords: Physical factors, lower primary, interconnected relationship in teaching and learning practices, good academic and quality behavior performance

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PENGENALPASTIAN FAKTOR-FAKTOR FIZIKAL DAN AMALAN DALAM PELAKSANAAN KURIKULUM SAINS TAHAP SATU SEKOLAH RENDAH

ABSTRAK

Kajian ini mengenalpasti kemudahan fizikal dan penggunaannya dalam pelaksanaan kurikulum sains tahap satu di sekolah rendah. Matlamat kajian ini adalah untuk menilai kemudahan fizikal serta amalan sedia ada dalam pelaksanaan kurikulum sains, menentukan sama ada sekolah-sekolah menyediakan kemudahan prasarana mengikut garis panduan Kementerian Pendidikan serta mengenalpasti hubungan antara kemudahan fizikal dalam bilik darjah dengan amalan pengajaran dan pembelajaran (PdP) sains. Kajian ini adalah berlandaskan reka bentuk tinjauan. Sampel kajian ini merangkumi seramai 146 orang guru sains sekolah rendah di sekitar Daerah Larut, Matang dan Selama, Perak. Instrumen yang digunakan termasuk soal selidik, senarai semak pemerhatian dan protokol temu bual. Data penyelidikan ini dianalisis berdasarkan statistik diskriptif iaitu kekerapan dan peratus, serta korelasi dan diuji hipotesisnya pada tahap signifikan 0.05. Data temubual dianalisis menggunakan Atlas.ti manakala kaedah pemerhatian telah dianalisis melalui penggunaan senarai semak. Hasil kajian mendapati bahawa majoriti sekolah yang dikaji mematuhi garis panduan KPM. Namun, penyediaan kemudahan fizikal dalam bilik darjah adalah pada tahap sederhana memuaskan. Hasil kajian menunjukkan penyediaan kemudahan fizikal sedia ada berada di tahap rendah (min = 2.47), manakala amalan penggunaan kemudahan fizikal di tahap sederhana (min = 2.74) dalam pelaksanaan kurikulum sains. Hasil kajian juga menunjukkan bahawa kelengkapan kemudahan fizikal dalam bilik darjah mempunyai hubungan yang signifikan dengan amalan PdP sains (r = 0.876, p < 0.05). Kesimpulannya, peningkatan kelengkapan kemudahan dalam bilik darjah menambah baik kualiti PdP. Implikasinya, integrasi kemudahan fizikal dalam kurikulum sains dapat mengurangkan kekecewaan, meningkatkan tingkah laku yang positif, serta membantu perkembangan personaliti dan keyakinan diri pelajar.

Kata Kunci: Faktor-faktor fizikal, tahap satu sekolah rendah, hubungan kait rapat di antara amalan pengajaran dan pembelajaran, prestasi pencapaian akademik dan tingkah laku berkualiti

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CONTENTS

		Page
DECLARATION OF ORIGINAL WORK		ii
DECLARATION OF THESIS		iii
ACKNOWLEDGEMENT		iv
ABSTRACT		v
ABSTRAK		vi
CONTENT		vii
LIST OF TABLES		xi
LIST OF FIGURES		xiii
LIST OF ABBREVIATIONS		xiv
CHAPTER 1	**INTRODUCTION**	
1.1	Introduction	1
1.2	Research Background	4
1.3	Problem Statement	9
1.4	Research Objectives	16
1.5	Research Questions	17
1.6	Research Hypothesis	17
1.7	Research Conceptual Framework	18
1.8	Significance of the Study	19
1.9	Limitation of the Study	21
1.10	Operational Definition	21
1.11	Summary	28

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi
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CHAPTER 2 LITERATURE REVIEW

2.1 Introduction 29

2.2 Malaysian Primary Science Curriculum 30

2.3 Classroom Physical Environment 32

2.4 Classroom Physical Factors 36

2.5 Theories Presentations on Physical Settings in Classroom 45

2.5.1 Constructivism Theory 46

2.5.2 Social Learning Theory 47

2.6 Summary 49

CHAPTER 3 RESEARCH METHODOLOGY

3.1 Introduction 51

3.2 Research Design 54

3.3 Population And Research Sampling 56

3.4 Instruments 57

3.4.1 Questionnaires 57

3.4.2 Teacher Interview Protocol 60

3.4.3 Observation 61

3.4.4 Checklist 61

3.4.5 Field Notes 63

3.5 Pilot Study 63

3.6 Validity and Reliability of Instrument 65

3.7 Review Procedures 67

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

3.8 Data Analysis 67

3.9 Summary 67

CHAPTER 4 RESULTS

4.1 Introduction 69

4.2 Demographic Data 70

4.2.1 Gender 70

4.2.2 Race 71

4.2.3 Age 72

4.2.4 Academic Level 73

4.2.5 Experience of Respondents in Teaching Science 74

4.3 The Existing Classroom Physical Environment Setting and Practice 75

4.3.1 The Existing Physical Factors in Classroom 76

4.3.2 Practices of the Existing Furniture in Classroom 78

4.3.3 The Existing Furniture in the Laboratory 80

4.3.4 The Practices of Existing Furniture in the Laboratory 81

4.3.5 Safety in the Laboratory 83

4.3.6 Safety Management in the Laboratory 84

4.3.7 Management of Classroom Space 85

4.3.8 Ventilation and Lighting in Classroom 87

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

	4.3.9	Implementation of Teaching Aids in The Classroom	88
	4.3.10	Existence of ICT Facilities in the Classroom	90
	4.3.11	Existence of Facilities Outside Classroom	91
	4.3.12	Observation Analysis	93
	4.3.13	Summary of RQ1	96
4.4	Provision of Physical Environment		99
	4.4.1	Survey Findings	99
	4.4.2	Observation Findings	102
	4.4.3	Summary of RQ2	105
4.5	Existence Relationship between Classroom Physical Factors and the Teaching and Learning Science Practices		105
	4.5.1	The Relationship between Classroom Physical Factors and The Teaching and Learning Science Practices	106
	4.5.2	Observation Findings	107
	4.5.3	Classroom Setting	109
	4.5.4	Document Analysis Findings	111
	4.5.5	Interview Findings	113
	4.5.6	Summary of RQ3	121
4.6	Summary		122

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

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LIST OF TABLES

Table No.		Page
1.1	Previous studies on physical infrastructures in the institutions in Malaysia	15
3.1(a)	Likert scale and interpretation value	52
3.1(b)	Likert scale and interpretation value	53
3.2	Interpretation level of score mean	59
3.3	Data collection procedures and analysis data collection method	68
4.1	Gender of respondents	70
4.2	Race of respondents	71
4.3	Age group of respondents	72
4.4	Academic level group of respondents	73
4.5	Experience of respondents in teaching science	74
4.6	The existing furniture in the classroom	77
4.7	The practices of existing furniture and resources in the classroom	79
4.8	The existing furniture in the laboratory	81
4.9	The practices of existing furniture in the laboratory	82
4.10	Safety in the laboratory	84
4.11	The practices of safety in the laboratory	85
4.12	Management of space in classroom	87

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi
05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

4.13	The ventilation and lighting in classroom and laboratory	88
4.14	The usage of teaching aids in classroom	89
4.15	The existence of ICT facilities in the classroom	91
4.16	The existence of facilities outside the classroom	92
4.17a	The overall analysis of existing physical factors (RQ1) in the primary schools for implementing science curriculum	97
4.17b	The overall analysis of existing practices (RQ1) in the primary schools for implementing science curriculum	98
4.18	The provision of schools' physical factors in accordance to the Ministry of Education Guideline	101
4.19	Classroom facilities based on Ministry Education Guideline	104
4.20	Relationship between classroom physical factors and the teaching and learning science practices	107
4.21	Usage of facilities during science class	108
4.22	Physical factors in classroom	110
4.23	Science lesson plan of Year 1 in School 1 (R1)	112
4.24	Science lesson plan of Year 2 in School 2 (R2)	113
4.25	Results of coded interview data	115

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

LIST OF FIGURES

Figure No.		Page
1.1	Conceptual framework	18
3.1	Research methodology framework	55
4.1	Classroom design	110
4.2	Results of coded interview	116

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

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LIST OF ABBREVIATIONS

FPK	Falsafah Pendidikan Kebangsaan
ICT	Information Communication Technology
KBSR	Kurikulum Bersepadu Sekolah Rendah
KSSR	Kurikulum Standard Sekolah Rendah
NEP	National Educational Philosophy

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CHAPTER 1

INTRODUCTION

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1.1 Introduction

Education is being a strong pillar and backbone in the chapters of life in individuals and national as well. It is the light of schools which awakes and digs out the intelligence among learners. Considering on this matter, educational zone in Malaysia has dashed out to meet 2020 visions and aspirations in facing lots of competitive challenges in parallel with the country's rapid development.

The headlines of newspapers, educational magazines are often yelling on "Our schools are failing," "Our students poorly perform compared to students from abroad countries," "Education management and styles need to revamping." To end this, government, education and private departments and organizations have revamped and

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amended the national curriculum from time to time at all stages in schools on the purpose to fulfill the desires and expectations of the society and the educationa needs.

Aligned with our country's development and success in the challenges of globalization, Ministry of Education ensures the education system is transforming according to the demands of national development. Considering this, Malaysia primary curricular system is undergoing a tremendous change in order to be top priority for national transformation and development (Ghavifekr, Hoon, Ling & Ching, 2014).

In this 21st century, Malaysia science educators recognise the need for the science curriculum to keep in line with the international trends (Lee, 1992) if Malaysia were to achieve the vision of becoming a developed country by the year 2020. According to this objective, Primary Standard Science Curriculum aims to inculcate students' interests in science and technology. Besides, the curriculum also stressed more on developing the creativity of students through process of experience, experimental and research to master scientific knowledge, skills, attitudes and values.

In general, learning environment is a crucial role play in student's daily transition and transformation life. It helps in producing a well being, quality and successful students in terms of behavior, cultural practices, social and academic. It is defined as the social context, psychological and pedagogical which can affect learning, achievement and attitudes of the students. Moreover, learning environment and features are able to improve students learning in schools and are identified as major determinants of students learning. Learning environment is also capable in

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stimulating students to engage in the learning process and being able to influence the behavior of students as well as to assist in the development of their skills or cognitive perception (Fraser, 1994).

It is also in relation with physical environment settings which help in shaping the students intellectual, social, friendship and cooperation apart from promoting students' developments in academic performance, growth and transmit their skills and knowledge in academic. Thus, the classroom is a suitable and appropriate place in promoting this socio-cultural setting among the students.

In Malaysia context, all educational processes including science curriculum at the national level are envisioned with the ultimate aim of building a united and progressive society (Ministry of Education Malaysia, 2001). In general, the Ministry of Education (2001) Malaysia has categorized the elements of the NEP into fifteen sub-groups as stated in the manual entitled, "National Education Philosophy, Goal and Mission" (*Falsafah Pendidikan Kebangsaan, Matlamat dan Misi*). One of these subgroups stressed on physical elements in schools which is playing a vital role in order to ensure the quality of delivering the education and academic achievements.

Students engage their huge amount of time in a school classroom. In general, classroom is being a place where they will learn various skills deemed necessary and proper for them to achieve success in the global society (Hannah, 2013). It is where the students thrive to develop and fulfill their needs to colour their beautiful futures as well as knowledge of the skills needed to reach that goal. As classroom plays a dynamic role in the process of teaching and learning and increase growth of students

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as well, it is essential that each school needs to pay more attention on establishing suitable physical settings in the classroom based on the trends of century. This will help the teachers and students in creating a positive learning environment which consists approaches of teaching, learning, motivation, mood, healthy interaction and communication. Physical environment of a classroom is one of the first areas that make a noticeable impact on student success (Grubaugh and Richard, 2013). On the other hand, this also helps in promoting intellectual, cooperation and supportive activities which encourage students' process of learning and development (Fraser, 1998).

1.2 Research Background

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Approaching towards Vision 2020 and facing the challenges of global education competitiveness, Malaysia education system has moving like a streak of lightning on the way of diversification process from non-formal system to a systematic unified formal and forward looking system.

In retrospect history of science education in Malaysia, the development of science curriculum has continued since pre-independence (Kamisah, 2006). However, science curriculum in Malaysia had been standardized and became official after the year 1956 when Razak Report 1956 was submitted by Cabinet Committee on Review of the Implementation of Education Policy 1979 (*Jawatankuasa Kabinet Mengkaji Pelaksanaan Dasar Pendidikan 1979*). This suggests that primary science curriculum was designed according to three segments namely the,"Communication", "Man and

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Nature Around" and "Individual Personal Development" in accordance with the needs, interests, talents and mental ability and willingness of the disciples (Lay, 2010).

But before that, in year 1968, the schools and Ministry of Education initiated a project called Special Projects which targeting on students from year one until six on the purpose to improve the quality of science teaching, strengthen the knowledge of science and increase the students interests in investigating and understanding the world in primary schools. Following that, there had another amendment in primary science curriculum when "Nature and Mankind" was introduced with the aim to help the students to acquire knowledge and understanding of people and the environment. This curriculum is particularly targeting on students year four until six. Generally, the assessment is based on multiple choice which comprises aspects of knowledge, skills and values of learning (Pusat Perkembangan Kurikulum, 2003).

In year 1994, KBSR (*Kurikulum Bersepadu Sekolah Rendah*) was introduced due to improve the science education and achieve the target drew in National Education Philosophy. KBSR science was taught from year one to six focusing on knowledge and also diverges and covers nature of science process skills, manipulative skills, inculcation of scientific attitudes and noble in line with FPK which stressed on developing the potential of individuals in a holistic and integrated act to create a balance and harmonious in term of intellectual, spiritual, emotional and physical (Pusat Perkembangan Kurikulum, 2003).

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The science curriculum again was changed when KSSR (*Kurikulum Standard Sekolah Rendah*) was introduced. This curriculum system is categorized as a modular standard based curriculum. This module encapsulates Basic Core Modules, Themes Core Modules and Elective Modules. Briefly, KSSR objectively conducted to cultivate students interests in science and technology besides develop their creativity through experience and investigation for master scientific knowledge, skills, attitudes and values (Bahagian Pembangunan Kurikulum, BPK, 2012a).

To date, tremendous changes in science curriculum is necessary to ensure the country's science education system is moving in tandem with changing time and in line with National Science Education Philosophy (BPK, 2012b). Align with this, students were exposed with different paradigm of learning approaches which satisfy the characteristics of cognitive science teaching and learning (Lee, 1992).

Currently, Malaysia science curriculum is in a state of flux to fulfill the demand of current science and technological advancement in schools. It is being one of the challenging subjects and present learning difficulties among the young learners. Therefore, numerous factors were concerned on upgrading the curriculum align with new technologies on the optimal way to teach the students. The importance of creating optimal conditions to enable and sustain learning has sometimes been overlooked as a 'peripheral' factor in the provision of quality education. Thus, a rapidly expanding body of research on the conditions of learning suggests that physical environments is being one of the central role in teaching and learning processes (UNESCO, 2012).

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Students spent most of their time in the classroom environment, therefore quality of the classroom environment has highly focused (Noraini et al., 2013). The classroom is a place where the students develop what they want their future look like as well as knowledge of the skills needed to reach that goal. The quality of learning environment has strong influence on the academic standard which is an index of quality assurance in the school. Hence, a good quality learning environment in the classroom reinforces the efforts of the teacher by providing a good stimulus for effective teaching and learning to take place (Ayeni & Adelabu, 2012).

Based on study of Lemessa (2015), the classroom is being multidimensional environment where students with different goals, needs and abilities share the resources, materials and other infrastructures in the classroom. With the classroom being such an important place in the growth of a child, it is important to understand the ways in which to affect this environment in order to receive maximum quality and effectiveness in instruction and learning. Thus, one of the first areas that make a noticeable impact on student success is the physical environment of the classroom (Hannah, 2013).

Physical environment refers to physical characteristics of the room. Physical classroom environment is a combination of variety things such as lighting, temperature, ventilation system, space, size of the room, floor, wall, desks, chairs, rugs, whiteboards, computers and etc. Favorable physical environment has a significant positive effect on the efficiency of any organization and acts as catalyzing agent to provide a straight way for achieving predetermined objectives of an organization (Suleman & Hussain, 2014). According to Osman and Marimuthu

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(2010), settings of physical elements in classroom is an important criteria of learning environment for the students' success in academic performance in the 21st century.

Arzi (2003) stated that physical aspects in the classroom able to influence the teaching and learning process and are usually regarded as second teacher due to the facilities able affects relationship between teacher and students. Moreover, the study also shows active learning in the classroom has a connection with the physical facilities provided (Arzi, 2003).

From the teaching and learning aspects, Abdul Hakim (2005) found that facilities play a significant role on teaching and learning process. Suitable and sufficient facilities will assist the students to be more focus on learning process and also to increase the quality as a student. In addition, educational equipment and materials have their own effects on the academic performance of the students. They are being channels through which contents stimuli are presented to the learner (Koroye, 2016).

Suitable and comfortable accommodation of physical facilities in the classroom stimulate intellectual activity, enhance social relationships and encourage student learning and development among students (Arzi, 2003). This is in turn will make teaching and learning happen in a comfortable and enjoyable situation. As a result, there is enhancement in term of students' knowledge and understanding (Che Ahmad et al., 2010).

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Consider on this matter, to ensure a favorable classroom environment, it should be well facilitated and equipped. This provides enormous opportunity of effective instruction and promotes smooth teaching and learning process. Furthermore, physical facilities should be provided as they are helpful in improving the overall performance of the school (Suleman & Hussain, 2014).

On the basis, the current study was specially designed to identify the physical factors that help in contributing to the implementation of lower primary science curriculum in schools. This study will help in structuring a constructive reformation and revolution in the classroom arrangements and settings to assure potential and effective teaching and learning practices in the classroom (Fraser, 1998).

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1.3 Problem Statement

In today's world, education systems must constantly evolve in order to respond to the rapid changing demands of the societies they serve. Innovations in curriculum, methodologies, materials and technologies may require major changes in the design of the learning environments (UNESCO, 2012). In same view of this, UNESCO (2008) points out that quality assurance oriented schools are characterized by core values and elements include quality learners, classroom facilities, curriculum content, teaching and learning processes and learning outcomes.

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Learning is a unique process that is directly and indirectly influenced by variables such as teaching instruction, students' attitudes and the classroom learning environment (Odeh, 2015). Therefore, quality of science education is not only emphasized on the teachers' performance but also effective utilization of the facilities and infrastructures in the classroom. This was supported by study of Odeh (2015) that opined learning can occur via one's interaction with environment which refers to facilities that are available in the classroom to facilitate the students learning outcome.

Ajayi and Ayodele (2001) study emphasizes that availability of the resources are quite important to achieve effectiveness in instructional delivery and supervision in the classroom. Besides the study also indicates that by using facilities, teachers are seen as actively presenting the subject matter. Besides, Adesola (2005) found that the poor level of available resources is indeed a plus to the teachers and shows the level of ingenuity and commitment of the teachers toward effective delivery of lesson.

Education of the student and his achievement is determined to a large extent by varied and dynamic role of teachers and the facilities provided by them for the student's education (Miah, 2015). Explicitly, teaching and learning in most schools that took place in unconducive learning environments ended up performing dismally in national examinations in the country (Orodho et al., 2014). It was notable that inadequate provision of classroom resources has been a major factor of poor students' academic performance (Ademilua, 2002). In addition, Lemessa (2015) states that learning environment should have good infrastructural development, adequate trained teachers and adequate instructional materials among others which could have positive impact on academic achievement of students in primary schools. Availability,

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adequacy and relevance of facilities in the classroom influence efficiency and high productivity. Significantly, there is no effective science education exists without the availability of necessary equipment because facilities enable the teachers and students to develop problem solving skills and scientific attitudes. This lead the students not only access to the reference materials mentioned by the teacher but individual student will also learn at their own pace. The net effect of this is increased overall academic performance of the entire students (Mfreke, 2016).

School age is an important stage in life that shapes each student over time into a unique adult. The majority of the school day is spent learning from a teacher and curriculum. School is a place where learning goes beyond the teacher at the front of the classroom which also shaped by physical environment that has a significant impact on the students and how they learn (Moehring, 2012). Essentially, the physical environment plays a vital role in determining on how students perform or respond to circumstances and situations around them (Tsavga, 2011). Hence, on purpose to nourish students' intellectual and to create enthusiastic pedagogical practices, there needs enhancement of classroom by accommodating of relevant and sufficient facilities that could highly benefit the teachers and students.

On the other hand, Adeyemo (2012) asserts that the quality of facilities in classroom has impacts not only on educational outcomes but on well-being of the students and teachers. Physical factors measure the conducive, successful, interesting and achievable teaching and learning practices as well as behavioral performance in the classroom. They have variety effects on teachers, students and teaching learning processes. Undoubtedly, these factors could adversely affect student behavior and

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lead to higher levels of frustration among teachers and poor learning attitude among the students (Sabitu, Babatunde & Oluwole, 2012). This was corroborated by Suleman (2014) in his study that physical facilities is one of the stimulating factors that plays a fundamental role in improving academic achievement and behavioral performance in the school system.

If the teaching and learning environment is adequately enriched through high quality and interesting presentation, the probability that learning effectiveness results very high. Benjamin (2014) believes that the facilities and infrastructures in teaching and learning process stimulate to engage information and actively initiate to acquire knowledge skills and cognitive processes. This fully mobilize the enthusiasm of both teaching and learning, teaching information, improve information exchange between teachers and students, the efficiency and quality and the diversification of development of teaching style. Thus, lack of the physical resources could inevitably hampers the teaching; depress spirit of the students and enthusiasm of the teachers. Besides, direct effects of poor facilities create an uncomfortable and uninviting workplace for teachers combined with frustrating behavior by students include poor concentration, hyperactivity and also create stressful set of working conditions for teachers. Crucially, negative attitude include stress and job dissatisfaction are common pre-cursors to lowered teacher enthusiasm. Thus, teacher's unmotivated or negative characteristics and inadequate facilities in classroom are highly affect upon the academic performance of students (Hannah, 2013).

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In addition, if the classroom size is large which means enroll between 30 to 45 students, they are unable to engage in the tasks actively and this also can increase disruptive behavior in the classroom. Moreover, teachers only had time to cover the basic lessons and less spend working with each individual student and also could not spend extra time with slow learners. This also reduce the facilities and materials the teacher can cover and also reduce the learning by reducing the kind of teaching methods that the teacher can employ in the classroom (Epri, 2016). In contrast, Yaman and Uygulamada (2009) found that small class size enhances students' effective learning and academic success. The quality and academic success are higher in class with less students compared with many students. Furthermore the study shows that small class size improves students' achievement, reduces discipline problems and provides quality benefits to teachers and students due to sufficient resources are available for the fewer students in small class size and also individual attention can be provided to the learners' particular needs (Epri, 2016).

Based from studies in Malaysia, to date most of the classroom physical factors are still not upgraded which lack of smooth, conducive teaching and learning process that lead to increase of fatigue, unconscious in studies and frustration among the students and teachers (Marzita et al., 2012). Previous studies also found that the students apparently still did not satisfy with the existing learning environment (Che Ahmad et al., 2010; Marzita et al., 2012; Mohd Hairy et al., 2012). On the other hand, lack of completeness of educational facilities in classroom and inconvenience of class size will lower motivation and creativity of teachers and students as well as limiting learning and teaching activities (Nurul Jannah Amirul, 2013). This cause the teachers and students are being under stress, depression, other negative emotional

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expressions and also being demotivated as most of their time in school (Mohd Hairy et al., 2012).

Undoubtedly, inadequacy of physical factors is one of the crucial factors that could be impediment for effective of science teaching and learning. Apparently, the physical factors is being one of the crucial elements that help the teachers to be creative in meeting the needs of different levels of students in the classroom (Ehrenberg, Brewer, Gamoran & Willms, 2001). Basically, primary education is the platform of basic education of any educational system. If this basement is weak, then whole educational system could be highly weakened and distort. Concern on this matter, there were many studies conducted primarily on identifying the physical factors in secondary schools and higher institutions in Malaysia that contribute in implementing science curriculum as shown in Table 1.1. However, the researches based on classroom physical environment particularly at lower primary science curriculum were still at the preliminary stage. On the grounds, this study seeks to fill gap by using descriptive methods of research to study the identification of the physical factors that contribute in the implementation of lower primary science curriculum.

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Table 1.1

Previous studies on physical infrastructures in the institutions in Malaysia

TITLE	AUTHOR	YEAR
Tahap Kepuasan Pelajar Terhadap Kemudahan Dan Perkhidmatan Yang Disediakan Di Politeknik Port Dickson (PPD) Bagi Sesi Disember 2010	Noremy Bt. Che Azemi Fadilah Bt Mat Assain	2010
Teacher's Perspective On Infrastructure Of Special Education's Classroom In Malaysia	Mohd Hanafi Mohd Yasin Hasnah Toran Mohd Mokhtar Tahar Safani Bari	2010
Tinjauan Terhadap Tahap Kesesuaian Infrastruktur Program Integrasi Pendidikan Khas Bermasalah Pembelajaran	Mohd Hanafi Mohd Yasin Hasnah Toran Mohd Mokhtar Tahar Noraini Mohd Salleh Rabaishah Azirun	2011
Penilaian Kemudahan Pembelajaran, Peruntukan Kewangan Dan Kursus Dalam Perkhidmatan Bagi Kursus Pendidikan Islam Di Politeknik Malaysia	Alias Mat Saad Nik Mohd. Rohimi Nik Yusoff Ruhizan Mohammad Yassin	2011
Pengaruh Persekitaran Fizikal Bilik Darjah Terhadap Tahap Keselesaan Pengajaran Dan Pembelajaran	Che Nidzam Che Ahmad Noraini Mohamed Noh Mazlini Adnan Marzita Putih Mohd Hairy Ibrahim	2013

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Table 1.1 *(Continued)*

TITLE	AUTHOR	YEAR
Improving The Classroom Environment: Classroom Users' Perception	Nur Hidayahtuljamilah Ramli Shamsidar Ahmad Mawar Haji Masri	2013
Learning Outside Classrooms On Campus Ground: Malaysia	Norhayati Ibrahim Nur Hafisah Fadzil Masran Saruwono	2013
Principals' Perception On Classroom Physical Environment	Nur Hidayahtuljamilah Ramli Shamsidar Ahmad Mohd Zafrullah Mohd Taib Mawar Haji Masri	2014
Relationship Between Constructivist Learning Environments And Educational Facility In Science Classrooms	Che Nidzam Che Ahmad Wang Chiao Ching Asmayati Yahaya Mohd Faizal Nizam Lee Abdullah	2015

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1.4 Research Objectives

The primary objectives for this research:

1. To assess the existing physical factors and practices for the implementation of science curriculum at the primary schools.
2. To determine whether the schools have accommodated the physical factors as in accordance to the Ministry of Education guideline.
3. To identify the relationship between the classroom physical factors and the teaching and learning science practices.

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1.5 Research Questions

Specifically the study focused on the following questions:

1. What are the existing physical factors and practices in the primary schools for the implementation of science curriculum?
2. Do the schools have accommodated the physical factors as in accordance to the Ministry of Education guideline?
3. Is there any relationship between the classroom physical factors and the teaching and learning science practices?

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1.6 Research Hypothesis

Based on the research questions above, the following hypothesis was generated.

Ho1 : There is no significant relationship between the classroom physical factors and the teaching and learning science practices.

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1.7 Research Conceptual Framework

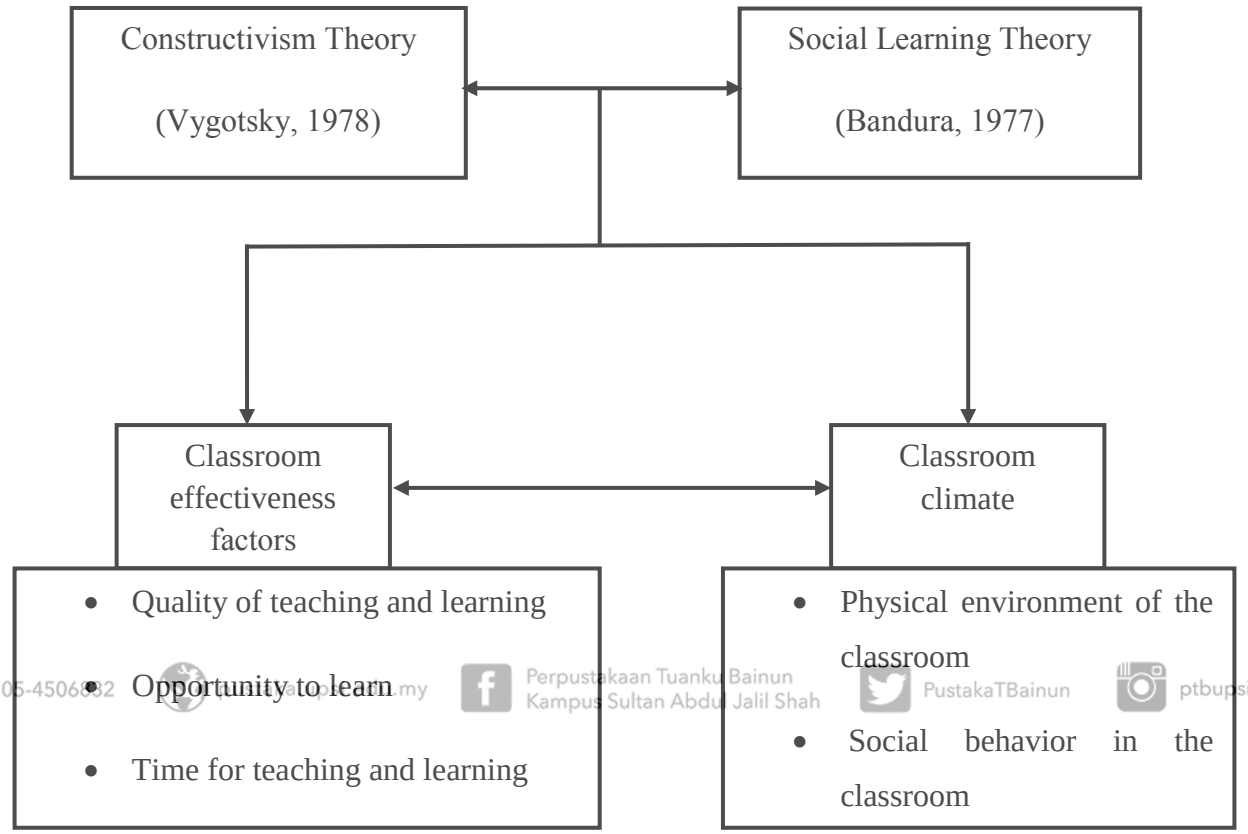


Figure 1.1. Conceptual Framework. Modified and adapted from Creemers and Reezigt, (1999).

Based on Figure 1.1, this study was guided by constructivism theory (Vygotsky, 1978) and social learning theory (Bandura, 1977). In this framework, Vygotsky and Bandura theories conceptualize on teaching and learning perspectives as well as emphasizes on physical environment and social system in the classroom. In particular, the conceptual framework comprises of optimal learning environment which filled with adequate facilities that foster students' interest; inspires and enhances social behavior among the teachers, students and with their shared learning environment. Overall, the theories guide in engaging the students and teachers in good

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condition of teaching and learning practices within highly supportive and stimulating of quality of educational environments.

1.8 Significance of the Study

Science is being a core subject of the National Curriculum. Often it connects positively between students engagement with the science activities which provokes their interest, motivation, self efficacy, self belief, excitement, attainment and achievement. Teaching and learning science emphasize on most crucial concepts and skills. This encountered multiple contexts and facts which help imbedded in a student's cognitive and knowledge system, encourages their behavioral and attitude changes apart from stimulate the development of national socio economic (Werang, 2014). Along with, the excellent classroom facilities also is one of the basic ingredients for good education programmes and being imperative for good science education programmes besides attaining education goals (Khan & Iqbal, 2012). This was supported by (Werang, 2014) statement which reported an explicit relationship between the physical elements and educational outcomes.

Currently, execution of primary science education by using physical elements is being one of the power basements for the students' development in term of their knowledge, practices, skills, attitudes and behaviors. The existence of quality learning infrastructures and facilities in the classroom help to create a strong bond with the quality of teaching and learning practices. Comfortable classrooms and adequate provision of instructional resources facilitate teacher's instructional task performance

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and students' learning outcomes. These facilities also boost the morale of teachers and students besides to ensure the realization of the set educational objectives in schools (Ayeni & Adelabu, 2012). Concisely, the quality infrastructures provide an impact on access and quality of science education besides improve the enrolment rates and learning outcomes.

Emphasize on the matter, this study will help the schools' organizations take initiative and proper actions to upsurge the academic achievements among primary school students. Besides, the findings of the study will be benefit various parties include education departments, school management, teachers, students and policy makers because it will discover about the contribution of physical factors to implement the teaching and learning practices at lower primary science curriculum in the schools.

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Prioritize on this issue, there need more studies essentially on implementing the physical settings in lower primary science curriculum which is crucial in requiring much care and attention for the lower primary students but vice versa, up till now, most of the educational studies were focused immensely on secondary and higher of science education environment. The implementation of physical factors in science teaching and learning practices may create the framework of foundation for students' development of their future attributes, beliefs, positive relationships, motivation, and interests by experience and value them.

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1.9 Limitation of the Study

There are several limitations to this study that must be acknowledged. The study scope is limited only for the primary schools around District Larut, Matang and Selama in Perak which covers urban and rural schools. Population of the study is imposed to 146 of primary school science teachers. Thus, the results of study can be generalized directly to all primary school science teachers around Larut, Matang and Selama district in Perak state. The preferable results provide to this study through questionnaires as a prime instrument and additional supportive instruments such as interviews and observation along with field notes, checklist, document analysis, documental evidence include photographs.

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1.10 Operational Definition

In this study, there are several terms need to be understood by the readers. In order to ease the readers, researcher has listed some of the terms and definitions of concepts to understand every term. The research topic is titled, ‘Identification of the physical factors that contribute to the implementation of lower primary science curriculum.’ Definition of concepts that elaborated used by the researcher is to facilitate the review of problem statement on the research topic that has been chosen.

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i) Physical factors

Knapp and Hall (1992) define physical factors as facilities that influence communication in number of ways. The physical factors establish a set of expectations and constraints that influence attitudes and communication. Akomolafe (2016) believes that physical facilities are germane to effective learning and academic performance of students. Meanwhile, Taylor (2009) in their theory mentioned that the physical factors in classroom being as the silent curriculum. This means that the environmental design of a classroom has the power to facilitate and enhance the learning process in ways similar to that of the overt curriculum.

Physical factors include spatial elements such as floor, windows, walls as well as other classroom equipments and tools include desks, rug, whiteboards, smartboards, tack boards, easels, counter, computer equipments, audio-visual equipments (Fisher, 2008). On the other part, the physical factors also encapsulates lighting, temperature, ventilation system and size of the room (Halstead, 1974). Besides the physical facilities also include books, audio-visual, software and hardware of educational technology, size of classroom, sitting postion and arrangement, availability of tables, desks, chairs, chalkboards, shelves on which instruments for practicals are arranged (Odeh, 2015).

In this study, physical factors refer to desks, chairs, table, white board, shelves, cupboard, notice board, fans, lamps, lighting and ventilation system, mini library, chatting corner, science gallery showcase, science bulletin board, classroom space, classroom wall, outdoor facilities, laboratory, instructional materials include

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text book, exercise book, reference book, charts, teaching aids and ICT facilities such as LCD, projector, smart board, computer, television and radio. and ICT equipment include audio-visual tools, projector, LCD, computer and smartboard.

ii) Physical environment

Physical environment defined as the room arrangement, materials, facilities, equipment, space, display of students' works, elements of design (e.g. decoration, color, etc.) and physical design of the room (Hensley-Pipkin, 2015).

According to Suleman et al. (2014), physical environment refers to characteristics of the room. Physical classroom environment is a combination of different things include lighting, temperature, ventilation system, size of the room, floor, walls, desks, chairs, rugs, white boards, computers and etc. Teacher and students are considered the main elements of the classroom environment. In this study, physical environment refers to classroom arrangement and accommodation of necessary physical factors in the classroom as aforementioned in the physical factors.

iii) Lower primary

Primary relating to education for children between the ages about six to twelve. It is the initial stage of education and has its basic aim to create, establish and offer opportunities to all children regardless of age, gender or country of origin to achieve a balanced cognitive, emotional and psychomotor development standardisation of the

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primary education was significant for enculutration and socialisation in term of education (UNESCO, 2015).

Lower primary education or known as Level 1 assumed as the first stage of primary or basic education and covers six years of full time schooling with the legal age of entrance normally being not younger than five years older than seven (UNESCO, 2015). In this study, lower primary covers students of year one until year three.

iv) Curriculum

A curriculum is broadly defined as a selected blueprint for learning that serves from content and performance standards (McTighe & Wiggins, 2012). This means the curriculum includes content and shapes it into a plan for effective teaching and learning. On the other hand, Finney (2002) refers curriculum to all aspects of the planning, implementation and evaluation of an educational programme, the why, how, and how well together with the what of the teaching-learning process. Thus, in this study the curriculum is defined as a specific plan with identified lessons in an appropriate form and sequence for directing teaching which is synonymous with a syllabus.

The curriculum is the overall plan or design for a course and how the content for a course is transformed into a blueprint for teaching and learning which enables the desired learning outcomes to be achieved Richards (2013). Werang (2014) defines curriculum as a set of plan and regulation about the objective, content and

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teaching learning materials as well as method which is being used as the guideline of the implementation of learning activities. This study emphasizes curriculum as a set and guideline of education plan in implementing teaching and learning practices to achieve the specific educational goals and objectives.

v) Classroom

According to Weinstein (1979), classroom is the most pivotal supporting elements in teaching and learning processes. Traditionally, it is a space which is designed by the architect to accomodate various elements such as chair, desk, cupboard, white board and other equipments.

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Meanwhile, Leonard and Karen (1996) in their study defined classroom as a place of conducting process of teaching and learning and it should be placed at school. In addition, classroom also being the main battle ground for teacher career.

On the other hand, in general the classroom is a room in the school that involves a group of pupils or students pursuing studies or learning any subject taught by the teacher. For a broad concept, the classroom is not simply a space only for teaching and learning process but accounts for students and teachers to learn and teach and also interacts with each other in it (Meng, 2000).

Zedan (2010) has defined the classroom as a place meant for the students to acquire knowledge and has been identified as a critical factor in a student achievement. It is also being significant in emotions and attitudes towards their

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classmates, teachers, the subjects that they study and the entire education system. Moreover, the classroom attempts to provide a space where learning can take place uninterrupted by outside distractions. In this study, classroom is being a place that provides opportunity for smooth, meaningful and effective teaching and learning practices while creating healthy and comfort interaction environment between teacher-student, student-student and student- physical factors.

vi) Learning environment

Learning environment defined as the complete physical, social and pedagogical context in which learning is intended to occur. The term often refers to school classrooms but may include any designated place of learning such as science laboratories, libraries, tutoring centers, teachers' lounge and non-formal learning spaces and also refers to the natural environment surrounding school buildings when they are used as a learning space (UNESCO, 2012). In addition, based on study of Warger, Eduserve & Dobbin (2009), learning environment not only refers to physical location but it also encompasses learning resources and technology, means of teaching, modes of teaching and connections to societal and global contexts. In this study, learning environment addressed on classroom and outside classroom of resources and facilities.

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vii) Physical infrastructures guideline

Physical infrastructures guideline is being as a planning guide for improving the facilities. It also intended in evaluating the existing facilities for functional adequacy and in determining the facility needs in order to ensure the school facilities support the principles of good teaching and learning, (McKoy et al., 2008). In this study, physical infrastructure guideline refers to a list of essential facilities drew by Ministry of Education Department that need to be equipped in the classroom which could contribute in enhancing and stimulating teaching and learning practices.

viii) Social behavior

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Rummel (1976) defines social behaviors as acts, actions or practices that tries to affect or take account of each other's subjective experiences or intentions. On the other hand, Myers (2007) refers social behavior is the behavior of how people influence and react to one another; respond to various stimulus with their environment. Social behavior consists of conduct and actions exhibited by individuals within society. In this study, social behavior focuses on interaction, attention, communication and participation in the classroom activities.

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ix) Classroom climate

Classroom climate defined as a comprehensive structure made up of culture, physical plant, organizational structure, social relationships and individual behaviors. The climate was fluctuating, influenced by changes in outside forces as well as by the emotions of the teachers and students (Dietrich & Bailey, 1996). Classroom climate is the perceived atmosphere, both positive and negative, resulting from the physical and social environment (Bennett, 2001). In this study, classroom climate refers to the contribution of physical environment to social behavior among the students and teachers in the classroom.

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1.11 Summary

In conclusion, a positive classroom learning environment which encompasses physical factors is crucial for 21st century learners to succeed in academic performance and educational development as well. Many studies showed a significant relationship between better quality of physical infrastructure and students academic achievement. The purpose of this study is to identify the contribution of physical factors on lower primary science curriculum. The focus of this study is to assess, evaluate and determine the existing physical factors indoor and outdoor of the classroom in accordance to the guideline and also investigate whether or not the classroom physical factors appearance affects the teaching and learning practices, opportunity and time for learning as well as influence social behavior of teachers and students in the classroom.

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CHAPTER 2

LITERATURE REVIEW

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2.1 Introduction

In the paradigm of racing towards high quality education goals and visions, the physical factors is being one of the pivotal factors that would help in promoting quality of teaching and learning practices, enhance academic achievement and proper behavioral performance among the students and teachers.

Instead of implementing traditional method of teaching and learning practices, in this new millennium, the students are more encouraged towards involvement for active learning, critical thinking, team work, project based learning, and higher order thinking skills of learning and student centered learning. Therefore, it is imperative that the classroom physical factors is one the important tools that help

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the students to perform well to their potential level. In this chapter, attention focuses on the previous studies and related readings regarding with identification of the physical factors that contribute to the implementation of lower primary curriculum.

2.2. Malaysian Primary Science Curriculum

Analysis of the historical panorama of Science education in Malaysia leads to the conclusion that science curriculum innovation is continuously in the state of flux. To date, continuous modification has been planned and hence implemented to suit the current national as well as global needs. As it has been described, curriculum developers make conscious efforts to emulate western science curriculum with the help of foreign expertise (Osman, Halim & Meerah, 2006). For a change, new Malaysian Science curriculum attempts to introduce new emphasis in the objective and content, new teaching styles and new types of instructional materials. This intended that the philosophy of the new curriculum incorporated a child-centered curriculum (Sumintono, 2015).

As the science curriculum have been revised, the new Malaysia Science Curriculum for primary schools was introduced in stages beginning in 2011 with Year 1, Year 2 in 2012 and Year 3 until 2013. The new implementation of Primary School Standard Curriculum (KSSR) focuses on a more fun way of learning science. According to Ministry of Education Malaysia (2011), the KSSR was an improvement as one of its purposes to inculcate the interest and to promote student's creativity through experience and investigation in order to master science knowledge, scientific

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skills, thinking skills and noble values. Therefore, promoting creative thinking abilities is a value-added skill to be achieved in KSSR (Siew, 2013).

In order to ensure that the school science curriculum can develop students' creativity, learning objectives related to creativity should be developed. This can be increased via interest and creativity which should be provided with the knowledge, skills and tools that enable them to develop their creativity as well as to develop attitudes and creative individual personalities. One of the education emphases in Malaysia science curriculum is creativity and innovation which is the ability to produce something new in an imaginative and fun-filled way. Pupils display interest, confidence and self-esteem through performance and producing simple creative works. (Erdogan, 2009).

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Comparing with the other subjects in the curriculum, changes in the primary science curriculum occurred at a much faster pace. This is due to significant impact created by science and technology advancement of human civilization. As a result, to keep abreast with the changes, primary science teachers must be well-equipped with necessary knowledge, skills and physical settings so that what is outlined in the curriculum is being recognized in the classroom. In other words, science teachers must deliver their lesson effectively as envisaged in the curriculum (Osman, Halim & Meerah, 2006).

The main aim of science at the primary level is to lay the foundation for building a society that is culturally scientific and technological, caring, dynamic and progressive. This is to be achieved through providing opportunities for students to

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acquire sufficient skills, knowledge and values through experiential learning that inculcates the sense of responsibility towards the environment and a high regard of nature's creation. Emphasis is given on the mastery of scientific skills needed to study and understand the world. At the lower primary level, elements of science are integrated across the curriculum (Keong, 2008).

It is important to note that the current primary science curriculum in Malaysia scrutinizes children as experimenters, discoverers and problem solvers. A teacher in this new programme acts as guide, counselor and facilitator with a diminished authoritarian role. This programme also requires teachers to develop an approach through which children construct their learning meaningfully. Hence, this makes it clear that the curriculum is not primarily about learning content but it is a programme in which children are given learning tasks, materials and resources with which they interact with to construct their knowledge. This indicates that the approach to be taken by teachers is a constructivist one (Yunus, 2004).

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2.3 Classroom Physical Environment

Predominantly, classroom physical environment includes the classroom design, color, lighting, acoustic and air quality, classroom decoration, seating arrangement and others that make the whole classroom (Tanner and Lackney, 2006).

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In Malaysia, the science curriculum has periodically undergone reviews which aimed at improving science teaching and learning based on the changes and shifts in educational theories and approaches. Along with that, science teachers are to adopt and implement innovative science teaching and learning strategies espoused by contemporary educational theories. However, as noted by Che Nidzam, Lilia, Tamby, Kamisah and Arbaat (2009), the Malaysian science classroom design does not reflect the needs of these new pedagogies.

According to Weinstein and Mignano (2003), there are six basic functions of the physical environment for security and protection; as the social context, as a symbolic identifier, as a tool to do the task, having the function of fun as a place for students growth.

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Futhermore, Suleman (2014) stated that proper arrangement of classroom environment plays a remarkable role in making instructional process more effective and establishes an atmosphere that is favorable and encourage to learning. The quality of physical classroom setting significantly affects academic achievement of the students and these physical facilities in classrooms ensure effective and successful teaching learning process. Moreover, students get more information from their teachers in well-facilitated classrooms and consequently they show good performance. Suleman (2014) also stressed that poor school facilities adversely impact teachers' effectiveness and also their performance. Consequently, it negatively affect the student achievement.

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Significantly, the classroom physical learning environment has a major influence to the students in terms of psychological and social behavior and also has a crucial impact on learning (Chism, 2006). This is one of the ways to improve the learning environment and to prevent behavior problems before they occur. Precisely, this also helps in permitting more positive interactions between teachers and students and reducing probability that challenging behaviors will occur (Martella, Nelson & Marchand-Martella, 2003). Hence, these proactive strategies able to make changes to the learning environment to promote learning which modifies the learning environment to prevent unproductive student behavior (Simmons, 2015).

Physical classroom design intended to promote social interaction among teachers and students on purpose to increase ability in 21st century skills of collaboration and cooperation. Meanwhile, the physical classroom environment is a reflection of each teacher's personal beliefs and the environment signals to students' expectations of the teacher. The optimal overall design of teaching and learning spaces will directly linked to the student outcomes (Berris & Miller, 2011).

Current research (Hill & Epps, 2010) certainly suggests that students are perceptive of changes to classroom environments and more satisfied with science curriculum taught in improved classrooms. Students satisfaction is important consideration with what the group is also interested in is whether improvements to a classroom environment have an impact on student learning and by extension, the quality of their academic outcomes. Aligned with this statement, Hensley-Pipkin (2015) asserts many of the visible changes will be evidenced through how teachers design their physical classroom environment in an attempt to foster higher-order

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thinking skills. Moreover, today's students require opportunities for investigation, collaboration and higher order thinking skills in order to become capable and contributing citizens (Duffy, Lowyck & Jonassen, 2012).

In essence, classroom designs support different teaching and learning styles in the aspects of collaborative learning, inclusive, motivating as well as being flexible as the school adapts to changing needs, both pedagogical and technological (Mitchell, White & Pospisil, 2010). Well-designed classrooms not only promote teamwork and interest in student learning but also encourage active class participation (Veltri et al., 2006). These settings can motivate or discourage many room occupants. Hence, a classroom's arrangement of visual, furniture and equipment should be carefully considered in order to empower both teachers and students. As described by Cornell (2002), in order to accomodate the shift to cooperative learning, the classroom physical environment should be more flexible in a way that encourages interaction, mutual learning and a "sense of community" among students. This means that classroom settings should assist students and instructors with the achievement of their goals.

Taylor and Vlastos (2009) found the relationship between environment and design within the classroom from a theoretical perspective. They found that physical environment of the classroom acts as "Silent curriculum". It means that classroom environmental design can facilitate and improve the learning process like the overt curriculum. Individual teachers reshuffle classroom furnitures and there is evidence of innovative and effective schools making active use of their setting, reorganising or adjusting as needed to support their educational endeavours (Uline et al., 2009).

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2.4 Classroom Physical Factors

Physical factors from ergonomics science perspectives consist of various elements such as temperature, humidity, noise, thermal, air pressure, ventilation, air quality, acoustic, vibration, lighting, air flows, radiation and etc. On the other hand, Hunley and Schaller (2006) stated that the physical aspects of learning space include the size of space, furniture, seating arrangement and availability of ICT tools.

Although the physical factors do not determine the educational activities but there is evidence of a relationship between classroom physical factors and the activities that took place there and many researches tend to suggest that different physical factors facilitate some pedagogical and social practices while hindering others. It seems clear that a consideration of the physical factors can be a useful part of initiating change, sometimes as an instance of small-scale individual reflection but also as an aspect of larger scale, whole school innovation (Priestley, 2011). In addition, classroom physical facilities is mandatory in order to make the school peasant, safe and comfortable that will increase the students' attendance motivation and willingness to participate in curriculum activities (Ayeni & Adelabu, 2012).

In reality, the students spend most of their time with classroom settings. Thus, it is very important in maintaining the quality of learning environment in classroom (Noraini et al., 2013). Quality classroom learning environment also depends on the physical factors. These factors can affect the teaching and learning practices. Jeffrey and Zein (2017) emphasizes that the sufficient classroom facilities enable teachers to do their work very well and to help the students to learn effectively. Lack

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of completeness of educational facilities affect teacher and student self-esteem, peer, student-interaction, discipline, motivation and also triggers stress which eventually impedes teaching and learning performance. In regards, Likoko et al. (2013) also states that teachers can only be effective and productive in their work if they have relevant and adequate instructional facilities and materials. Inadequate of appropriate facilities could unable to stimulate the students' cognitive and affective domains during teaching and learning practices. In addition, the study also showed that active learning in the classroom has a relationship with the physical facilities available. Appropriate physical facilities and services will stimulate intellectual activity, improving social relationships, promote student learning and development as well as limiting the negative behavior among students. This in turn will make teaching and learning take place in a comfortable and fun environment (Che Ahmad et al., 2010). Thus, it is clear that the physical aspects of the learning environment should be well planned as it reflects the ideas, values, behavior and culture to expect in the classroom (Sanoff et al., 2000).

Realizing the importance of education, Ministry of Education in Malaysia had drawn some basic guidelines particularly for school physical facilities development in order to enhance the science teaching and learning programmes. Based on this guideline of School Performance Development Programme under School Improvement Plans and Instruments in the 10th Malaysia Plan, basically each classroom must accomodate with good quality of roofs, ceilings and paint. Besides, the school must be supplied 12 hours electricity and also considerations should be given to one desk and one chair per student, one workspace for teacher, one white board or chalk board and internet connectivity in the classroom. On the other session,

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doors should be easy to open and close. The doors with adequate glazed viewing panel should be provided which benefit the students and the windows should be equipped with double glazed and also easy to clean. The position and size of windows opening sashes should ease to operate in order to have natural ventilation. Furthermore, the wall must be durable, easy to clean and resistant to wear by users in the classroom while floor must be suitable, safe and hardwearing for their daily use (Ministry of Education Malaysia, 2013). Presented below is description about the physical factors that focused in this study.

i) Ventilation

Ventilation system inside classroom is a crucial factor that affect classroom learning environment. It plays a fundamental role in making a classroom atmosphere favorable and comfortable and hence affects the students' behavioral and academic performance. Classroom too cold or too hot negatively affect the students' performance and concentration as they feel uncomfortable in such conditions. This also creates physiological and psychological problems include expedite fatigue, causes people to work more slowly, apply much efforts and causes to make more mistakes and errors (Suleman, 2014). In addition, exposure of low quality air is related to decreased student attendance and affect teachers' abilities to teach well (Alexander & Lewis, 2014).

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ii) Lighting

Students exposed to more natural light in their classrooms perform better than students exposed to less natural light (Tanner, 2006). Culp (2006) found that lighting is one of the most important physical characteristics of classroom. Further stated that visual environment can affect the capability of students to perceive visual stimuli and also affect their mental attitude. Although incorporating more daylight into classrooms may be beneficial, it should be done carefully, to avoid visual discomfort and temperature increases (Leigh, 2012). Consequently, improper lighting negatively affect students' academic performance and promotes distress and obstruction for students in the classroom (Suleman, 2011).

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iii) Instructional materials

Instructional materials are essential and significant tools needed for teaching and learning of school subjects to promote teachers' efficiency and improve students' performance. They make learning more interesting, practical, realistic and appealing. Inadequate facilities have affected learning outcomes, attitudes, achievement, self-concept and social perspective taking (Bennett, 2001). Besides, Izadpanah & Gunce (2014) describe that availability of various facilities and materials in the classroom also able stimulate students' interest and exploration. Apart from this, utilization of vary instructional materials enable both the teachers and students to participate actively and effectively in lesson sessions as well as enhance interaction among teacher and students and engagement teaching and learning with physical facilities. This agreed by study of Benjamin (2014) that stresses the teaching and

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learning practices are not to rely only on a teaching method with chalk and black board as in the traditional classroom teaching where there is hardly any scope for the students to interact with teacher, teaching-learning materials and the teaching-learning environment, where teaching becomes very monotonous and students have to mostly rely on rote learning. They give room for acquisition of skills and knowledge and development of self-confidence and self-actualization (Olayinka, 2016).

Instructional materials appeal to the sense of organs during teaching and learning. Walklin (2000) clarified that instructional materials enhance perception and retention and so improve the efficiency of learning. The limitations of words in conveying new concepts of subject matter are greatly minimized by the use of relevant teaching and learning materials.

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It has described as objects or devices that assist the teachers to present their lesson logically and sequentially to the learners (Isola, 2010). Furthermore, Oluwagbohunmi and Abdu-Raheem (2014) acknowledged that the instructional materials are such used by teachers to help for their lesson explanations and make learning of the lesson understandable to the students during teaching and learning.

Hanging visual posters and charts are quality resources and crucial determinant of the quality of the knowledge and skills which the prospective teachers store in their repertoire (Riggs & Gholar, 2009). In addition, visual posters and charts are also essential tools in strengthening engagement among the students which ensure effective learning happens (Riggs & Gholar, 2009).

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iv) ICT facilities

ICT is the set of activities which facilitate by electronic means the processing, transmission and display of information. Modern developments of innovative technologies have provided new possibilities to teaching professions but at the same time have placed more demands on teachers and students to use these new technologies in the teaching and learning process (Jung, 2005).

Instructional technology makes teaching and learning process to be more successful, interesting and fruitful due to ICT able to enrich skills, knowledge, innovation, acceleration, motivation, students' engagement, help them experience with the practical works as well as strengthening the teaching and learning practices in the schools Noor-Ul-Amin (2013). Besides, wider availability of best practices and best course material in education, which can be shared by means of ICT, enhance motivation and changes in behavioral performance among the students (Noor-Ul-Amin, 2013). ICT equipment are also helps in slowly transforming the way instructors teach and the way students learn as supported by study of Noor-Ul-Amin (2013) that ICT has an important role to play in changing and modernizing educational systems as well as ways of teaching and learning. The teachers able to generate meaningful and engaging learning experiences for their students using ICT to enhance learning. On the other hand, learning without ICT guidance also could distort students' enthusiasm and curiosities as well as could lead to poor attainment in developing their knowledge and skills. The use of computer technology in the classroom helps retain the students' attention and enables them to

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experiment with what is being taught (Suleman, 2014). Besides, ICT constitutes an input in the student learning process that should help produce better learning output.

The availability of ICT resources can enhance learning by making education less dependent on differing teacher quality (Mbwesa, 2002). The use of ICT also can positively transmit knowledge to the students. Furthermore, the availability and use of ICT can help students exploit enormous possibilities for acquiring information for schooling purposes and can increase learning through communication (Geoffrey, 2010).

v) Spatial environment

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Spatial environment includes space and furniture. The space and furniture of the classroom often reflect teachers differing ideas on the optimal way to learn. Organization of space and furniture able to help students' ideas of conceptual order and foster engagement with learning material (Allen & Hessick, 2011). Creation of flexible classroom space helps in promoting a smooth transition between spaces and maximizing learning opportunities (Ellis & Goodyear, 2016). The ability for all the spaces to be used as potential learning spaces increase flexibility and support students-centered pedagogies (Bisset, 2014).

The spatial environment has a great impact on behavior particularly on communication (Suleman, 2014). The physical space of a learning environment communicates to the students a message from the teacher of what is to be expected in that environment. The research found that by rearranging furniture and creating new

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pathways in the classroom, students demonstrated changes in their behaviors. If the arrangement of space is unplanned and ineffective, unexpected conflicts can arise. Today many teachers design space in the classroom in order to foster and support variety learning strategies such as project based learning, teamwork and etc (Wannarka & Ruhl, 2008).

On the other hand, furniture plays an important role in 21st century schools, providing critical support to learning. The ultimate purpose is to contribute to student success. Furniture in the classroom are desk, chair, table, shelves, cupboard, white board, ICT equipment, For that, furniture suits the learning activity; supports diverse learning styles and new teaching styles; meets the physical needs of students to help them comfortable and engaged in learning; fosters a sense of community, maximizes utilization of space and meets sustainability criteria (LS3P, 2012).

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Wheldall and Bradd (2010) as the best seating arrangement is dependent on the task that students are being asked to complete. Activities involving collaboration and communication will be more suited to arrangements where students are closer proximity to one another while activities involving concentrated individual work are more suited to an arrangement that does not encourage interaction.

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vi) Laboratory

Science education needs to build on the knowledge and skills acquired by the learners so that students can understand the scientific principles, laws and theories. This can be done via utilization of laboratory facilities which functions as an activity-oriented instruction, students centered and leads to self-reliant instruction (Amba, 2015). There is a direct relationship between the availability and the use of laboratories in schools on the one hand and the performance in science subject questions on the other (Mulela, 2015). The adequacy of laboratory facilities used during science instruction helps to develop values that aid the learners in decision making (Neji, Amba, Ukwetang, John, Nja & Cecilia, 2014). When there are less adequate laboratory facilities that utilized by students would unable elicit their desirable behavioral change (Amba, 2015). Laboratory is a room with specific equipment specially built for teaching by demonstration of theoretical phenomenon into practical terms. Practical work forms an important feature in any science course (UNESCO, 2008). Ogweno (2015) agreed with the statement "seeing is believing" as the usage of laboratory in teaching and learning of science and other science related disciplines as students tend to understand and recall what they see than what they hear or were told.

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2.5 Theories Presentations on Physical Settings in Classroom

Theories consist of variety contents in term of meanings, ideas and features that have been established to apply for desired outcomes. Most theories are associated with social learning problems arising among learners. This research addresses on identifying the physical factors that contribute in the implementation of lower primary science curriculum. The theoretical framework for the study worked out to explore based on the constructivism theory and the social learning theory.

It is believed that the young learners still find some difficulties in adapting to the classroom environment during class session. Thus, this study conducted based on constructivism theory perspective which postulates basis knowledge of their experience actively constructed by young learners via cooperation with the physical environment. Besides, social learning theory has been implemented as for the subjectof the matter. Here their social interaction and learning can be encouraged and supported by the physical classroom design (Hannah, 2013). By merely being in contact with their collegues and physical environment, students are able to construct their knowledge, improve their learning and their social and behavioral performance. Both theories are significantly related to the study in discovering the quality of science teaching and learning, inculcation of students' interests and motivation in science curriculum as well as to determine their influence level of psychology and social behavior during class session by utilizing surrounding classroom infrastructures.

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2.5.1 Constructivism Theory

Constructivism theory is an approach in education which emphasizes knowledge is created through the exploration of one's environment. Meanwhile, the theory also stressed that learning is shaped with situations and the condition of classroom environment. The physical classroom environment design based on constructivist teaching practices provides meaningful and activity based experiences for all learners (Duffy, Lowyck & Jonassen, 2012).

In terms of constructivist theory, student to student and student to teacher interactions are essential in the classroom environment. Besides, learning is also considered most effective when the teacher's primary delivery method of information and the physical environment is designed to ensure individualized learning (Beck, 2009). Barbash (2012) asserted that the teacher changes the learner only through the manipulation of environmental variables. A central aspect of constructivist learning theory pointed that teachers formulate classroom lessons and differentiate instruction settings in classroom based on individual student's needs and interests. Secondly, they structure lessons to challenge students' suppositions. This means they are aware of the unique experiences of each individual and therefore provide a physical classroom environment designed to encourage students to construct knowledge relevant to their own lives and experiences (Evanshen & Faulk, 2011).

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Teachers' expectations for learning outcomes as well as plans for organizing and structuring both the physical environment settings and instructions are directly impacted by one's belief about knowledge acquisition as well as professional development experiences (Avalos, 2011). Constructivism theory guided teachers to engage in their professional development experiences that would potentially increase positive outcomes for students (MacPhail, Tannehill & GocKarp, 2013). Thus, the teachers are now able to support learning by designing a physical classroom space which addresses the tenets of a 21st century curriculum and expected skills (Ogu & Schmidt, 2013).

Evanshen (2010) notes that designing a physical classroom environment aligned with what is known about how students learn and develop is the foundational step toward fully engaging in appropriate and meaningful learning. By empowering educators to apply pedagogical knowledge, instructional strategies and design of physical classroom environments aligned with principles of constructivism would yield teachers to have greater confidence in the teaching process and students who demonstrate positive outcomes.

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2.5.2 Social Learning Theory

On the other corner, in retrospect of Bandura (1989) theory based on social learning concerns on behaviorism which refers to the observable change in behavior through an explorative process. This exposes the students to external stimuli until a desired response is received. In addition, the theory also interprets learning process as an

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interaction and observation in social context aligned with the physical arrangement in the classroom that can impact student behavioral performance. Thus, there is a need to be structured in order to support behavioral expectations (Guney, 2012).

Albert Bandura's social learning theory explains how the student models their behavior after those around them in classroom. Shortly, the theory provides relationship between classroom physical settings and students' behavioral performance. Behavior refers to action or skill. It may include the creation of one's immediate environment and personal characteristics such as expectations, beliefs, self-perceptions, goals and intentions all of which give shape and direction to behavior (Kinahan, 2017).

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In addition, the behavior and physical environment is also considered as learner's beliefs and expectations. This theory emphasizes the importance of observing and modeling the behaviors, attitudes and emotional reactions of others. Social learning theory also explains how their behavior in terms of continuous reciprocal interaction between cognitive, behavioral and physical environment influences (Bandura, 1989). On the other hand, Lyimo, Too and Kipng'etich (2017) outlines that the primary purpose of teaching and learning practices is to bring a significant change in behavior through active participation, motivation and critical thinking of the learners. Tsavga (2011) acknowledges that learning is being a relatively permanent change in behavior as results of insight, practice, experience and stimuli with learning materials. Effective, evidence based management strategies are the foundation of primary interventions in the classroom setting. Because there is a

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significant relationship between student behavior in the classroom and the surrounding environment (Kern & Clemens, 2007).

Educators play a significant role in the social behavior of students through the organization of classroom facilities and arrangement in the classroom (Kinahan, 2017). By manipulating arrangements, teachers can influence a variety of social behavior such as asking questions and interacting with peers. With this arrangements, teachers were able to present more active and collaborative lessons. With interactive behavior, close proximity to peers and teachers facilitated communication. More social interaction was possible with a greater number of students (Fernandes et al., 2011). In line with this, Wheldall and Bradd (2010) also suggests that the best seating arrangement is dependent on the task that students are being asked to complete. Activities involving collaboration and communication will be more suited to arrangements where students are closer proximity to one another while activities involving concentrated individual work are more suited to an arrangement that does not encourage interaction.

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2.6 Summary

Briefly, the study focuses on the contribution of the physical factors in the execution of Malaysian lower primary science curriculum. The literature indicates that there are significant impacts or effects of physical settings in classroom on students behavior, attitudes, academic achievement and healthy interaction between teacher and students and also among students.

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Well accomodated classroom with suitable facilities provides fruitful of positive results and effects to students, teachers and schools. On the other hand, the ideal arrangement of physical facilities and environment in classroom also strengthen students' academic achievements and their behaviors.

Based on highlighted theories, physical environment design followed the students-centered, collaborative, cooperative and experiential. The physical learning environments respond to the spatial requirements and relationships when creating a physical context for learning environments. While educational specifications should reflect a school's learning theory, they may get updated as school systems adopt new pedagogical philosophies (Good, 2015).

Overall, physical factors in classroom based on lower primary science curriculum are tremendously benefiting the students, teachers, classroom and school as a whole transforming groups into better version of themselves.

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CHAPTER 3

RESEARCH METHODOLOGY

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3.1 Introduction

The sample comprises of 146 lower primary science teachers from the District of Larut, Matang and Selama in Perak state. The sample size was determined using Krencjie & Morgan (1970) table. Simple random sampling technique allowed the researcher to achieve the targeted population. Simple random sampling is a random selection procedure from the population to ensure that each respondent has the equal chance of being selected into the sample. This method is often used with a small number in the population (Ariffin, 2012). It has been stated that application of simple random sampling approach removes bias from the selection procedure and should result in representative samples (Gravetter & Forzano, 2011).

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The research instruments implemented in this study are questionnaire as a prime instrument and additional supportive instruments include interviews and observation along with field notes, checklist, document analysis and photographs.

The questionnaire contains of 5 segments named demographic, classroom design, physical environment in the classroom, physical environment in the laboratory and the facilities for teaching and learning process. The research instrument utilized 4-Likert scale questionnaire in Table 3.1 indicating response of Never, Seldom, Sometimes and Often; and also Strongly Not Agree, Not Agree, Agree and Strongly Agree. These are summarized in Table 3.1 (a) and Table 3.1 (b) which were adapted from Benjamin (2014).

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Table 3.1(a)

Likert scale and interpretation value

Likert Scale	Response Mode
1	Never
2	Seldom
3	Sometimes
4	Often

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Table 3.1(b)

Likert scale and interpretation value

Likert Scale	Response Mode
1	Strongly Not Agree
2	Not Agree
3	Agree
4	Strongly Agree

Adapted from Benjamin (2014)

The researcher conducts observation on the designated spot inspection prepared by the science teachers. The observation was carried out by listing in the checklist and write down the field notes. Semi structured face to face interview was used to collect the information from the two lower primary science teachers. The interviews were recorded using digital voice recorder.

Then, the instruments were tested using construct validity. The construct validity of a scale for this study was determined through the statistical method known as confirmatory factor analysis (Green & Salkind, 2003). The questionnaire instruments were scrutinized by two expertise in science education. Ultimately, the instruments were modified and adjudged to be suitable in measuring the items. The questionnaire instruments and checklist items were validated through Cohen Kappa method. The value of Cohen Kappa for questionnaire instruments is 0.797 (Appendix B) while value of Cohen Kappa for checklist items is 0.897 (Appendix D). Meanwhile, the Cronbach's Alpha coefficient for inner consistency of the survey instruments generates 0.943 (Appendix F). The study employed descriptive survey

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design. In part of analysis data, the responses from survey instruments were analyzed through statistical techniques include mean, percentage and mode using SPSS while relationship between the classroom physical factors and the teaching and learning science in different group settings was determined through Spearman Rho correlation test using atlas ti.

In this chapter, researcher discusses and elaborates in detail on methodology which includes research design, research sampling, instruments, pilot study, validity and reliability of the instrument, review procedures and data analysis. The research will be conducted at the primary schools around District of Larut, Matang and Selama in Perak state.

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3.2 Research Design

The research design utilized in this study is descriptive study. The main objectives on driving this study are to evaluate the existing physical factors and practices in the primary schools for the implementation of science curriculum; determine whether the schools provide the physical factors in accordance to the Ministry Education guideline and Malaysian Public Works Department (JKR) and to identify the existing relationship between the classroom physical factors and the teaching and learning science. Fundamentally, the data were collected through questionnaires as the prime instrument and also other additional supportive resources such as interviews and observation along with field notes, checklist, document analysis and photographs.

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The researcher established a research framework based on the research, theory and practice. In short, this study generalizes the suitability of the survey approach utilized. Figure 3.1 below presents the overview of research methodology framework:

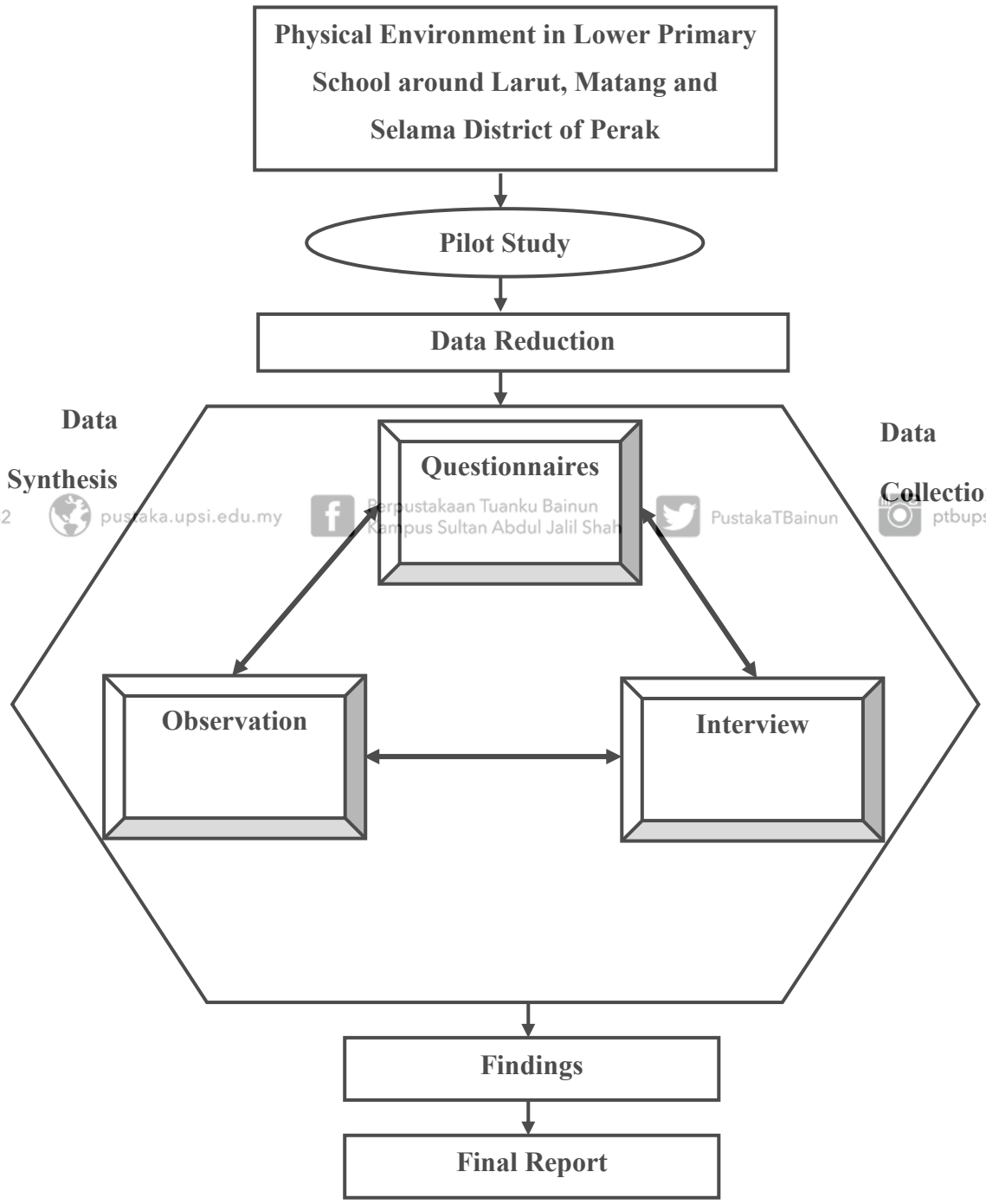


Figure 3.1. Research Methodology Framework

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3.3 Population And Research Sampling

This study has apply simple random sampling approach to select the samples. The samples were chosen via lottery method which is the most popular and simplest method that minimize the relevance of bias in the process of random sampling selection (Saunders, Lewis & Thornhill, 2012).

From the total population of 285 lower primary science teachers, 146 teachers are sampled randomly from all of the primary schools around District Larut, Matang and Selama in Perak state by using Krencjie and Morgan (1970) table. Samples are scattered in urban and rural areas around the district. The procedure of selecting the random samples as follows:

1. Define the targeted population which help in generalizing this study.
2. Determine sample size based on Krenjcie and Morgan (1970) table.
3. Write number for each respondent in each piece of paper.
4. The pieces of paper are folded and mixed in a box.
5. Required folded paper pieces are taken from the box in random manner.

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3.4 Instruments

The main instrument used in this study are in the form of questionnaires. The survey instruments was modified through systematic and succinct discussions with experienced science teachers and also modified from researches of Che Ahmad, Osman, Halim (2014), Barrett (2015), Musyoka (2013), Guardino and Antia (2012) and Akaname & Ngwoke (2010). Besides, this study has also implemented additional supportive instruments include interviews and observation along with field notes, checklist, document analysis and photographs. The questionnaire method helps to save cost, time and much easy to get the respondents' cooperation. This survey was executed on purpose to know the profile of respondents and to identify level of implementation the physical factors during teaching and learning practices in school.

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3.4.1 Questionnaires

Questionnaire is a paramount instrument that implemented for this present study. The survey design is chosen to make the generalizations from the samples representing the population (Creswell, 2005). The respondents were explained briefly on how to answer the items in the instrument given. They were given for a week to answer the questions completely and succinctly.

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On the questionnaire (Appendix G) encompasses a total of 86 items which are divided into five segments namely:

1. Segment A for demographic

   Segment A seeks for information about background of the teacher and location of their schools. Those questions include gender, race, age, academic qualification, status whether they are science-option teacher or non-option teacher, teaching experience of science subject, type and location of school.

2. Segment B for the classroom design

   This section encompasses the questions to obtain information regarding the design of furnitures the layout and resources in the classroom.

3. Segment C for the physical environment in the classroom

   This segment comprises twenty eight questions based on the existing furniture, angle and space, content of notice board, key elements, sources of ventilation and lighting in the classroom.

4. Segment D for the physical environment in the laboratory

   Segment D covers the existing furniture and its layout, instruments, the angle and space, content of notice board, existing resources, key elements and sources of ventilation, lighting and safety elements in the science laboratory.

5. Segment E for the facilities for teaching and learning process

   This segment vastly comprises types of teaching aids, ICT facilities and facilities outside of the classroom.

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The questionnaires and the subconstructs of questionnaires were built and modified from researches of Che Ahmad, Osman and Halim (2014), Barrett (2015), Musyoka (2013), Guardino & Antia (2012) and Akaname & Ngwoke (2010). It also improved through discussions and review with two experienced science teachers.

Pilot study was conducted with questionnaires which consist of 147 items with 5 constructs. Then, by employing the findings of pilot study through Cronbach Alpha, the questions were deducted into 86 questions with 5 constructs.

Data of questionnaires were analysed through score of frequency, percentage and mean. The mean range were interpreted based on Amin (2005) Likert scale as stated in Table 3.2 below.

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Table 3.2

Interpretation level of score mean

Mean Range	Interpretation Level
1.00 – 1.75	Poor Satisfactory
1.76 – 2.50	Less Satisfactory
2.51 – 3.25	Satisfactory
3.26 – 4.00	Very Satisfactory

(Modified from Amin, 2005)

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3.4.2 Teacher Interview Protocol

The semi structured face to face interview in the participating schools was conducted with two purposively selected science teachers. According to Zhang and Wildemuth (2009), semi structured interview is defined as a guided interview that has prepared questions but the interviewer is able to adjust the sequence of questions to be asked and added by any necessary questions based on the participants' answers.

This study has highlighted the key research questions relevant to the scope of topic. The selected questions arise as much related to the objective of research tool which may help in answering the research questions. Moreover, the questions chosen are clear and easy to understand by the respondents and also ascertain in providing sufficient answers to the scope of study. The interview was done on preferable time schedule with the participants and it's duration was between 30 to 50 minutes. The interviews were recorded by using a digital voice recorder. Through the preserved data, the researcher is able to listen repeatedly and analyzed them accurately.

There was a requisition of permission letter which was adapted and modified from Ogunmade (2005) was sent to all of the primary schools around Larut, Matang and Selama district in Perak state to interview lower primary science teachers and observe the classroom (Appendix J).

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3.4.3 Observation

The observation schedule was used to collect information regarding the study. The observation was performed during class session. The researcher captured the observations by listing in the checklist as shown in (Appendix E) during class session and writing the field notes (Appendix K) and did the document analysis (Figure 4.2, Figure 4.3) after the class session. During the observation session, the researcher sat at the spot designated specially by the teacher. This help the researcher to look around the classroom and take notes regarding the study. Moreover, this also could avoid from making eye contact with any of the students or teacher in the classroom during the observation session. This also may help in highlighting the crucial features in complementing the information through the interviews. The time spent in the classroom observation was between 30 to 50 minutes. During the class session, photographs and video recording were strictly not permitted. By collecting all these data, the researcher was able to explore in detail the importance and the needs of physical factors in facilitating the teaching and learning.

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3.4.4 Checklist

The instrument used for classroom observation is the checklist. Checklist in this study was used to gather related information on the availability or unavailability of the facilities as well as implementation of the availability facilities and resources during teaching and learning practices in the classroom. Checklist in this study has adapted and modified from Dockrell, Bakopoulou, Law, Spencer & Lindsay (2015),

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Chesterfield (1997) and Ajaja & Eravwoke (2013). The checklist was validated by two experts. The complete instrument of checklist found in (Appendix E). The checklist was divided into 5 segments that are relevant to this study as shown below:

1. Existing physical factors in classroom

   In this segment, mainly this study investigates presence or absence of necessary physical factors as listed in the observational checklist.

2. Availability of teaching materials/ resources/ aids in classroom

   The study focuses on availability of instructional materials and resources which help for effective lesson content delivery, for teacher to organize and manage the classroom environment and also help the students to discover knowledge.

3. Interaction and collaboration in classroom

   The researcher observes active participation of students in the classroom activities, social interaction between teacher and students; students with students and also usage of physical factors in the classroom during teaching and learning session.

4. Organization and engagement in classroom

   The researcher explores the teacher's initiative in organizing and engaging the students in activities and tasks given by utilizing the physical factors in the classroom.

5. Students' behavior performance

   The researcher examines the impact from condition of classroom environment on the students' behavioral performance during learning session.

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3.4.5 Field Notes

Field notes is another data collection method of this study. During classroom observations, the researcher writes field notes on the implementation of physical factors and resources during teaching and learning science practices in the classroom. The field notes guides and helps this study to attain much better understanding and gather information regarding on usage of physical factors during teaching and learning practices in the classroom. The importance of field notes can be described as follows: The keen observations and important conversations one has in the field notes cannot be fully utilized in a rigorous analysis of the data unless they are written down. Field notes contain what has been seen and heard by the researcher without interpretation. It is the participant observer's primary task which is to record without inferring feelings to the participants and without inferring why and how something happened. In addition, the field notes also assisted to access the subject and to record what have been heard and observed (Maykut and Morehouse, 2002).

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3.5 Pilot Study

A pilot study can be defined as a small study to test research protocols, data collection instruments, sample recruitment strategies and other research techniques in preparation for a larger study. The pilot study is one of the important stages in a research project and is conducted to identify potential problem areas and deficiencies in the research instruments and protocol prior to implementation during the full study (Zailinawati, Schattner & Mazza, 2006).

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The pilot study was conducted on February 2016. A total of 25 lower primary science teachers around District Larut, Matang and Selama in Perak state were involved in this pilot study. The pilot study was carried out on evaluating the existing physical factors and practices in the primary schools for the implementation of science curriculum as well as identifying the existing relationship between the classroom physical factors and the teaching and learning science in different group settings.

Steps that undertaken for this pilot study are as followed:

1. Validity test through discussion and review with two experts before the actual study was conducted.
2. Meet the respondents.
3. Brief explanation of the prospective study and the questionnaires to the respondents.
4. Researcher re-checked and edited the contents of the questionnaire after the return from the respondents.
5. The data of questionnaires were entered in SPSS.
6. Calculation of reliability test.

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3.6 Validity and Reliability of Instrument

Factor analysis used as a data reduction technique to identify and minimize the huge items from the questionnaire to certain constructs in a research (Chua, 2009). KMO Bartlett test was used to identify the necessary items that suit for factorial analysis which the results. The KMO value for the study is 0.622. The factor analysis is conducted based on stages of principal components analysis, factor extraction and factor rotation. SPSS achieved both functions in one command. At stage of principal components analysis, all of the factors are extracted from a correlation matrix in order to make decisions about the number of factors underlying a set of measures (Costello and Jason, 2005). At second stage, factor extraction, determine the factors that to be extracted which consist of eigen value greater than 1 based on the principal components to assess their total amount of variance. At final stage, factor rotation, statistically manipulate the results through varimax rotation to make the factors more easily interpretable and determine the final number of underlying factors (Chua, 2009).

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To ascertain the validity of instruments, all the items were scrutinized by two experts in science education before the actual study was conducted. This was done on purpose in line with the research questions in which each statement is relevant with the goal of study. Ultimately, they evaluate the relevance of contents, elaborate and improve the structural changes on purpose to adjudge the instruments to be suitable in measuring constructs before embarking on actual data collection. The validity of research instruments was established by employing Cohen Kappa method. The output of this study produced through cross tabs matrix. The Cohen Kappa statistic has a

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range from 0 -1.00 with larger values indicating better agreement. Generally, a Kappa of 0.00 to 0.39 is considered weak, 0.40 to 0.59 is considered moderate, 0.60 to 0.75 is considered good and over 0.75 is considered excellent (Giesler, 2005). The value of Cohen Kappa for questionnaire instruments generated is 0.797 as showed in (Appendix B) while value of Cohen Kappa for checklist items generated is 0.897 as showed in (Appendix D). This shows that both Cohen Kappa values are considered excellent.

The researcher key in the information and scores of two raters in Variable View. To analyze the data, the researcher first highlights both scores of raters in Data View, then click on analyze > Descriptive Statistics > Cross Tabs on the main menu. In the Cross Tabs box, the researcher transfers one variable into Row box and another variable into Column box. Next, click Statistics button which presents Cross Tabs: Statistics dialogue box, select Kappa box and click continue. Then, click on Cells button which presents Cross Tabs: Cell Display dialogue box. Click on Observed checkbox and click continue button. Finally, click OK button to generate output for Cohen Kappa.

Reliability is essential part in scale development. This refers to the amount of variance attributable to the true score of the latent constructs. Reliability refers to the repeatability, stability or consistency of an instrument. In this study, the reliability of research instruments was determined by employing Cronbach Alpha approach as for internal consistency. The coefficient chose for this study as high as possible. The items that contribute to low reliability means low item to total correlations were deleted. Then the selected items were developed. Cronbach alpha should exceed 0.7

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for tools development. The alpha values generated for these items are 0.943 as displayed in (Appendix F).

3.7 Review Procedures

There are 146 lower primary school science teachers around Larut, Matang and Selama district were chosen for this study. This study's data were triangulated via questionnaires, interviews and observations as stated below.

3.8 Data Analysis

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Survey data for the study were analyzed through Spearman Rho correlation test and descriptive statistics in terms of frequency distribution, median, mode; the interviews were analyzed using atlas ti and the observations were analyzed through checklist.

3.9 Summary

Overall, this chapter discusses succinctly on research design, research sampling, instruments, pilot study, validity and reliability of the instrument, review procedures and data analysis. The procedures stated in this chapter intended to simplify the process of the study and easier to analyse the data. Moreover, this chapter also would be as a guidance when to write the conclusions and discussions which will be

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described in detail in next chapter. To summarize this chapter, a detailed explanation and discussion of data collection procedures and analysis data collection methods provided are shown on the Table 3.3 below:

Table 3.3

Data collection procedures and analysis data collection method

Research Objectives	Research Questions	Data Collection	Analysis Data
Assess the existing physical factors and practices in the primary schools for the implementation of science curriculum.	What are the existing physical factors and practices in the primary schools for implementing science curriculum?	Questionnaire Observation	Frequency Percentage Mode Checklist
Determine whether the schools provide the physical environment in accordance to the Ministry of Education guideline.	Do the schools provide the physical environment in accordance to the Ministry of Education guideline?	Questionnaire Observation	Frequency Percentage Mode Checklist
Observe the existing of relationship between classroom physical factors and the teaching and learning science.	What kind of relationship exists between classroom physical factors and teaching and learning science?	Observation Questionnaire Document Analysis Interview	Checklist Spearman Rho Correlation Atlas ti

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CHAPTER 4

RESULTS

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4.1 Introduction

This chapter discusses the presentation and interpretation of findings on the identification of the physical factors that contribute to the implementation of Malaysian lower primary science curriculum. The samples for survey questionnaires comprised of 146 lower primary science teachers from the District of Larut, Matang and Selama in Perak state. The semi structured face to face interview in two participating schools was conducted with two purposively selected science teachers. Several observations were carried out. In this study, the researcher made use of Spearman Rho correlation, frequency, median, mode table, percentage and atlas ti to analyse and present data in order to answer all the studied research questions.

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4.2 Demographic Data

A total of 146 respondents from 285 teachers' population in District of Larut, Matang and Selama, Perak were participated. All respondents are teaching lower primary science at the primary schools in this district. There were 146 sets of questionnaire distributed to the respondents and all of the sets have been retrieved successfully. All of the sets can be used for the analysis.

4.2.1 Gender

Table 4.1 demonstrates a total of 42 male respondents (28.8%) and 104 female respondents (71.2%) have been included in this study. The appropriation of the respondents demonstrated that there are more female than male.

Table 4.1

Gender of respondents

Gender	Number of Respondent (n)	Percentage (%)
Male	42	28.8
Female	104	71.2
Total	146	100.0

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4.2.2 Race

Table 4.2 demonstrates a total of 63 Malay respondents (43.2%), 48 Indian respondents (32.8%), 32 Chinese respondents (21.9%) and 3 from other respondents (2.1%) have been included in this study. The appropriation of the respondents demonstrated that there are more Malay respondents than other races.

Table 4.2

Race of respondents

Race	Number of Respondent (n)	Percentage (%)
Malay	63	43.2
Indian	48	32.8
Chinese	32	21.9
Others	3	2.1
Total	146	100

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4.2.3 Age

Eight groups (A1 – A8) of age factor have been included in this survey. Table 4.3 below demonstrates a total number of respondents range age from 21 to 60. The appropriation of the respondents demonstrated that there are more respondents range 41 - 45 than other age levels of respondents.

Table 4.3

Age group of respondents

Age	Number of Respondent (n)	Percentage (%)
(A1) 21 - 25	3	2.05
(A2) 26 - 30	11	7.54
(A3) 31 - 35	42	28.77
(A4) 36 – 40	34	23.29
(A5) 41 – 45	41	28.08
(A6) 46 – 50	14	9.59
(A7) 51 -55	1	0.68
(A8) 56 – 60	0	0.00
Total	146	100.0

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4.2.4 Academic Level

Table 4.4 demonstrates the academic level of the total number of 146 respondents; 48 Degree students, 69 Diploma, 18 Master and 11 PhD have been included in this study. The appropriation of the respondents demonstrated that there are more Diploma students than other academic levels.

Table 4.4

Academic level group of respondents

Aacdemic Level	Number of Respondent (n)	Percentage (%)
Degree	48	32.88
Diploma	69	47.26
Master	18	12.33
PhD	11	7.53
Total	146	100.0

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4.2.5 Experience of Respondents in Teaching Science

Table 4.5 demonstrates years of experience in teaching science. A total of 11 (7.5%) respondents range (1-5) years, 44 (30.2) respondents range (6-10) years, 48 (32.8%) respondents range (11-15) years, 25 respondents (17.2%) range (16-20) years and 18 (12.3%) respondents range (21-25) years.

Table 4.5

Experience of respondents in teaching science

Years of teaching science	Number of Respondent (n)	Percentage (%)
1 - 5	11	7.5
6 - 10	44	30.2
11 - 15	48	32.8
16 – 20	25	17.2
21 – 25	18	12.3
Total	146	100.0

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4.3 The Existing Classroom Physical Environment Setting and Practice

This section shows data to answer the RQ1.

RQ1: What are the existing physical factors and practices in the primary schools for implementing science curriculum?

The question comprises of:

1.0 ` Classroom design

- 1.1 Classroom design
- 1.2 Furniture layout and resources in the classroom

2.0 Physical environment in the classroom

- 2.1 The existing furniture in the classroom
- 2.2 The angle and space in the classroom
- 2.3 Content of notice board in the classroom
- 2.4 Key elements in the classroom
- 2.5 Ventilation in classroom
- 2.6 The lighting in classroom

3.0 Physical environment in the laboratory

- 3.1 The existing furniture in the laboratory
- 3.2 The layout of existing furniture in the laboratory
- 3.3 The existing furniture in the laboratory
- 3.4 The angle and space in the laboratory
- 3.5 The content of notice board in the laboratory
- 3.6 The existing resources in the laboratory
- 3.7 The lighting in the laboratory
- 3.8 Safety in the laboratory

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4.0 Facilities

4.1 Teaching aids in the classroom

4.2 ICT facilities in the classroom

4.3 Facilities outside of the classroom

Findings of questionnaires for RQ1 were analysed through the score of frequency, percentage and mean. The mean level were interpreted based on Wiersma (1995) four-Likert scale stated as in Table 3.1.

4.3.1 The Existing Physical Factors in Classroom

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Table 4.6 below interprets about analysis on the existing furniture in the classroom. Overall mean for the analysis is 2.86. This table indicates more than 80 percent with mean level above 3.00 agreed (AG) and strongly agreed (SA) with item 1; acquisition of students size desks and chairs (mean = 3.01), item 2; provision of duster, marker pens, chalks (mean = 3.34), item 3; provision of standard size white board or black board (mean = 3.04), item 7; notice board (mean = 3.38) and item 8; cupboard (mean = 3.04) in the classrooms. While the mean rating of 2.33 achieved by the item 4; accommodation of projector for Power Point teaching in the classroom. The lowest mean rating 1.41 with 144 respondents were strongly not agreed (SNA) and not agreed (NA) for item 5; the accomodation of smart board for interactive teaching and learning activities in the classroom.

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Table 4.6

The existing furniture in the classroom

No.	Item	Mean	Interpretation Level
1.	My school provides students sized desks and chairs.	3.01	Satisfactory
2.	My school provides duster, marker pens or chalks in classroom.	3.34	Very Satisfactory
3.	My school provides a standard sized white board or black board in classroom.	3.04	Satisfactory
4.	My school accomodates projector in classroom for Power Point teaching.	2.33	Less Satisfactory
5.	My school provides smart board in classroom for interactive process of teaching and learning.	1.41	Poor Satisfactory
6.	My school prepares shelves for students to keep their personal resources, activity books, completed work stuffs.	3.00	Satisfactory
7.	My school provides notice board at the entrance of classroom.	3.38	Very Satisfactory
8.	My school provides cupboard for storing essential files, resources and materials in classroom.	3.04	Satisfactory
	Overall mean:	**2.86**	**Satisfactory**

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4.3.2 Practices of the Existing Furniture in Classroom

Table 4.7 below shows data analysis on the practices of the existing furniture and resources in the classroom. The overall mean level for this analysis part is 2.87. The result presented on Table 4.6 shows poor supports, 39% agreed and strongly agreed on item 9; usage of science subject bulletin board with mean level 2.41 and poorer supports, 29% agreed and strongly agreed on item 10; usage of science gallery showcase with mean score 2.18. Besides, the elements that show mean rating more than 3.00 include item 8; store important materials on low shelves for students to take and return them easily and independently (mean = 3.01) supported by 80% respondents, item 4; keep books in the students' shelves neatly for them to see and choose their options easily (mean = 3.14) agreed and strongly agreed by 90% respondents, item 5; arrange and adapt the furnitures oriented students' needs and interests (mean = 3.31) supported by 92% respondents and item 6; arrange the furniture in order and systematically in classroom to prevent the windows blocking entry of air and light (mean = 3.34) agreed and strongly agreed by 98% respondents. Two elements achieved equal mean level at 2.66 include item 1; arrangement of desks and chairs in different form from time to time and item 2; designation of mobile seating arrangement for teacher's ease of movement. Meanwhile the other two items; item 3; seats arrangement to facilitate in monitoring the students for the tasks and item 7; provision of comfortable seating for different levels of students also achieve equal mean rating, 2.99.

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Table 4.7

The practices of existing furniture and resources in the classroom

No.	Item	Mean	Interpretation Level
1.	I arrange desks and chairs in different form from time to time.	2.66	Satisfactory
2.	I design mobile seating arrangement for teacher's ease of movement.	2.66	Satisfactory
3.	I arrange seats to facilitate in monitoring the students for both individual and group tasks.	2.99	Satisfactory
4.	I make sure in keeping books in the students' shelves neatly for them to see and choose their options easily.	3.14	Satisfactory
5.	I arrange and adapt the furnitures oriented students' needs and interests.	3.31	Very Satisfactory
6.	I arrange the furnitures systematically in classroom to prevent the windows blocking entry of air and light.	3.34	Very Satisfactory
7.	I provide comfortable seating for different levels of students.	2.99	Satisfactory
8.	I store important materials on low shelves for students to take and return them easily and independently.	3.01	Satisfactory
9.	I encourage on maximum usage of science subject bulletin board.	2.41	Less Satisfactory
10.	I display students' activities in science gallery showcase.	2.18	Less Satisfactory
	Overall mean:	**2.87**	**Satisfactory**

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4.3.3 The Existing Furniture in the Laboratory

Science education is closely linked to experimentation and laboratory work (ICSU, 2011). Laboratory is a place that offers opportunities for productive, cooperative interactions among students and with the teacher that have potential to promote a positive learning environment. It is influenced, in part, by the materials, apparatus, resources and physical factors that result to much more a function of the climate and expectations for learning, the collaboration and social interactions between students and teacher (Hofstein & Lunetta, 2003).

Table 4.8 below shows the analysis of the existing furniture in laboratories of randomly selected primary schools around District Larut, Matang and Selama in Perak. There are five indicators outlined under this segment where mean levels ranges between 2.55 and 3.25. Overall mean for this section is 2.81. From this table, the obtained results clearly state that mean rating for item 1; school provides long tables and chairs of students' size in laboratory that were agreed and strongly agreed by 58% respondents and item 3; school provides projector or LCD and white screen in laboratory supported by 53% respondents are similar, 2.58. Besides, more than 75% gave good response for item 2, school provides a white board or a black board (mean = 2.91) and item 5, a notice board (mean = 2.99) which are crucial infrastructures in the laboratory. From the data, the highest response rate is 90 percent or 132 respondents for item 4; school provides cabinets or cupboards at students' height level in laboratory.

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Table 4.8

The existing furniture in the laboratory

No.	Item	Mean	Interpretation Level
1.	My school provides long tables and chairs of student size in laboratory.	2.58	Satisfactory
2.	My school provides a white board or a black board in laboratory.	2.91	Satisfactory
3.	My school provides projector or LCD and white screen in laboratory.	2.58	Satisfactory
4.	My school provides cabinets or cupboards at students height level in laboratory.	3.14	Satisfactory
5.	My school provides notice board in laboratory.	2.99	Satisfactory
	Overall mean:	**2.81**	**Satisfactory**

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4.3.4 The Practices of Existing Furniture in the Laboratory

Table 4.9 below shows data analysis on practices of the existing furniture in laboratory. Overall mean for the analysis is 2.69. Looking at the Table 4.8 below indicating mean level of the current practices of the existing furniture in laboratory shows good range for elements. Table 4.8 indicates that items 1 and 2 involves to great extent, item 3 involves to some extent while items 4 and 5 involves to least extent. For example, in item 1; arrangement of students' desks and chairs in proper for easy visibility which agreed and strongly agreed by 99% respondents shows mean level 3.43 while item 2; placement of appropriate furniture neatly as to facilitate easy movement and observation supported by 97% respondents indicates mean level 3.48

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respectively. On the other hand, item 4; provide record book in laboratory for laboratory incidents which were agreed and strongly agreed by 26% respondents (mean = 1.89) and item 5; prepare laboratory handbook for students in laboratory which were agreed and strongly agreed by 24% respondents (mean = 1.95) achieve the lowest mean range. Meanwhile, analysis respondents at mean level for item 3; store and display fragile or breakable items in safe places in laboratory is 2.68.

Table 4.9

The practices of existing furniture in the laboratory

No.	Item	Mean	Interpretation Level
1.	I arrange students desks and chairs in proper for easy visibility.	3.43	Very Satisfactory
2.	I place appropriate furnitures neatly as to facilitate easy movement and observation.	3.48	Very Satisfactory
3.	I store and display fragile or breakable items in safe places in laboratory.	2.68	Satisfactory
4.	I provide record book for laboratory incidents.	1.89	Less Satisfactory
5.	I prepare laboratory handbook for students in laboratory.	1.95	Less Satisfactory
	Overall mean:	**2.69**	**Satisfactory**

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4.3.5 Safety in the Laboratory

Safety is one of the vital platforms for student's effective practical works in the laboratory. Table 4.10 below depicts the result of analysis of respondents' opinions on safety in the laboratory. Overall mean for this segment shows 2.33. There are four indicators listed out in the questionnaires. From the data, 40% respondents agreed and strongly agreed on item 1; provision of first aid kit box (mean = 2.39) and 82% respondents agreed and strongly agreed on item 2; provision of fire extinguisher (mean = 3.01) in the laboratory. On the other part, the statistics of support on item 3; the school provides sand bucket is 18% (mean = 1.90) while for item 4; school places alarms sensors such as fire suppression sensor and heat sensor is 22% (mean = 2.03) in the laboratory. Therefore, overall mean is at low level, 2.33 that considered the safety in the school laboratories is less satisfactory level. Overview of this data shows that laboratories in schools are not well equipped with this essential equipment for safety purpose.

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Table 4.10

Safety in the laboratory

No.	Item	Mean	Interpretation Level
1.	My school provides first aid kit box in laboratory.	2.39	Less Satisfactory
2.	My school provides fire extinguisher in laboratory.	3.01	Satisfactory
3.	My school provides sand bucket in laboratory.	1.90	Less Satisfactory
4.	My school places alarms sensors such as fire suppression sensor and heat sensor in laboratory.	2.03	Less Satisfactory
	Overall mean:	**2.33**	**Less Satisfactory**

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4.3.6 Safety Management in the Laboratory

Data in Table 4.11 below describes about the analysis on practices of safety in the laboratory with overall mean, 3.06. Data presents that more than 80 respondents are highly responded to the scale value of sometimes with mean rating more than 3.00 to all of four indicators outlined in the questionnaire.

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Table 4.11

The practices of safety in the laboratory

No.	Item	Mean	Interpretation Level
1.	I label all chemicals clearly for students easy identification.	3.02	Satisfactory
2.	I label the materials in laboratory clearly.	3.12	Satisfactory
3.	I keep all chemicals in their original containers.	3.03	Satisfactory
4.	I make sure on flexible connections of electric and water in laboratory.	3.06	Satisfactory
	Overall mean:	**3.06**	**Satisfactory**

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4.3.7 Management Of Classroom Space

Students spent more time in the classroom compared with other spaces at school. Generally, classroom has been a place in making up students to develop their knowledge and various skills. Therefore, the classroom which is students' growth place and world that helps to achieve their future dreams come true always need to be spacious. Classroom with much space is able to create positive and efficient teaching and learning environment that helps students thrive success in the education. According to Ramli et al. (2012) Malaysian Public Works Department (JKR), had standardized the Malaysian size for the classroom as 24 feet x 30 feet or 9000mm x 7300mm with 30 students and one teacher per classroom (Appendix L).

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Table 4.12 below shows data analysis on the usage of space in classrooms of the randomly selected primary schools around District Larut, Matang and Selama in Perak. Overall mean of data from the survey shows 2.49. About 66% or 96 respondents (mean = 2.24) are not concern on item 4; provide the chatting corner for students to ask questions, express their ideas and opinions while 63% or 92 respondents are strongly not agreed and not agreed (mean = 2.33) on item 2; classroom wall displayed with rich array of students' works and activities. These two elements were categorized under low mean level in this segment. In contrast, on item 3; there are only 53% or 78 respondents were agreed and strongly agreed (mean = 2.58) in creating a mini library corner in the classroom and only 66% or 97 respondents support on item 1 (mean = 2.80); organize the classroom space well with students comfort out of 146 respondents respectively. This data clearly demonstrates that teachers have moderately managed the classroom space and trivial initiative in promoting good learning environment for students' good academic performance.

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Table 4.12

Management of space in classroom

No.	Item	Mean	Interpretation Level
1.	I organize the classroom space well with students comfort.	2.80	Satisfactory
2.	I display classroom wall with rich array of students' works and activities.	2.33	Less Satisfactory
3.	I create a mini library corner in classroom with books and reference books ranging from easy to complex level.	2.58	Satisfactory
4.	I provide chatting corner for students to ask questions, express their ideas and opinions.	2.24	Less Satisfactory
	Overall mean:	**2.49**	**Less Satisfactory**

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4.3.8 Ventilation and Lighting in Classroom

Table 4.13 below clearly describes the details of analysis of ventilation and lighting in the classroom and laboratory. The findings for this segment shows an overall mean of 2.83. The item 1; school provides fans and windows to get fresh air in classroom achieves mean rating 3.02 were agreed and strongly agreed by 80% respondents but item 4; school provides fans and windows to get fresh air in laboratory only reaches mean rating 2.90 which were agreed and strongly agreed by 71% respondents. On the other part, the mean rating for school provision of sufficient lamps and windows for adequate lighting in classroom is 2.95 while in laboratory is 2.46. The responses in

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agreement and mean level on provision of lamps, fans and windows in the classroom is higher than in the laboratory. Thus, there were average satisfactory responses on the accommodation of lights, fans and windows in either classroom or laboratory.

Table 4.13

The ventilation and lighting in classroom and laboratory

No.	Item	Mean	Interpretation Level
1.	My school provides fans and windows to get fresh air in classroom.	3.02	Satisfactory
2.	My school provides sufficient lamps and windows for adequate lighting in classroom.	2.95	Satisfactory
3.	My school provides sufficient lamps and windows for adequate lighting in laboratory.	2.46	Less Satisfactory
4.	My school provides fans and windows to get fresh air in laboratory.	2.90	Satisfactory
	Overall mean:	**2.83**	**Satisfactory**

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4.3.9 Implementation of Teaching Aids in the Cassroom

The analysis on usage of teaching aids in classroom shown in Table 4.14 below. Overall mean accumulated is 2.59. Out of five indicators studied, mean rating more than 3.00 are item 3; label activity books, note books, reference books and text books clearly (mean = 3.12) which supported by 86% respondents and item 4; usage of white board or black board during the teaching and learning practices (mean = 3.40)

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which were in agreement by 88% respondents. The mean rating level more than 2.00 are item 1; hang posters and charts around classroom at students' eye level (mean = 2.60) which were agreed and strongly agreed by 63% respondents and item 2; display attractive chart to announce students' achievements in science activities and examinations (mean = 2.16). Meanwhile, the least mean rating level out of 5 constructs in Table 4.14 is 1.66 achieved by item 5; implementation of science laboratory for students do experiments which were supported by only 10% respondents. The study notices that majority respondents are less offer the science laboratory to their students for learning purpose.

Table 4.14

The usage of teaching aids in classroom

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No.	Item	Mean	Interpretation Level
1.	I hang posters and charts around classroom at students eye level.	2.60	Satisfactory
2.	I display attractive chart to announce students achievements in Science activities and examinations.	2.16	Less Satisfactory
3.	I label activity books, note books, reference books and text books clearly.	3.12	Satisfactory
4.	I use white board or black board during teaching and learning practices.	3.40	Very Satisfactory
5.	I use science laboratory for students to do experiments.	1.66	Poor Satisfactory
	Overall mean:	**2.59**	**Satisfactory**

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4.3.10 Existence of ICT Facilities in the Classroom

Education becomes essential to answer the needs of technology and society (Waters, 1998). Moreover, education regarded as the means to meet the ICT revolution but also means to keep pace with the continuing ICT development (Ilomaki, 2008). The role of information technologies in educational development has established even to the extent that it has believed that there could be no educational development without ICT (Selwyn, 2002). Besides, ICT also been regarded as a strategy to improve teaching and learning and to implement and facilitate the new pedagogy of the information society (Voogt & Pelgrum, 2005).

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Table 4.15 below presents the analysis on existence of ICT facilities in the classrooms at randomly selected primary schools around District Larut, Matang and Selama in Perak. Three crucial items were used to survey include computer, radio and ASTRO that facilitate the teaching and learning in the classroom. As the table below indicates, overall mean shows 1.96. Ranges of mean level for these 3 indicators are between 1.90 and 1.99. Findings clearly show that respondents are highly response on schools seldom provide or install these ICT facilities in the classroom; for item 1; provision of computer facilities is 101 respondents (mean = 1.99), item 2; provision of radio is 104 respondents (mean = 1.97) and provision of ASTRO is 98 respondents (mean = 1.92) and also quite number of respondents answered that schools never provide such facilities for teaching and learning purpose. Overall, it is known that the schools are still unable to upgrade ICT amenities align with 21st century learning environment.

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Table 4.15

The existence of ICT facilities in the classroom

No.	Item	Mean	Interpretation Level
1.	My school provides computer facilities in classroom.	1.99	Less Satisfactory
2.	My school provides radio in classroom.	1.97	Less Satisfactory
3.	My school provides ASTRO in classroom.	1.92	Less Satisfactory
	Overall mean:	**1.96**	**Less Satisfactory**

4.3.11 Existence of Facilities Outside Classroom

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Facility outside of the classroom is one of the flexibility approaches in conducting teaching and learning science for primary school students. Apparently, it ensures the students to have better quality and balanced learning. Furthermore, this approach also helps teachers to plan and design the effective lesson where students are able to meet their needs.

Table 4.16 below describes the data analysis on the existence of facilities outside the classroom. The findings show that overall mean is 2.03. Data shows that 141 respondents or 97% (mean = 1.62) were respond never and seldom for item 3; schools provide fauna-park for students while 128 respondents or 98% (mean = 1.73) were respond never and seldom for item 4; schools provide flora Park for students

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learning activities. This means schools lack in emphasizing on establishment of flora and fauna parks that help students to achieve healthy science curriculum. On the other hand, item 2; school establishes hut for process of teaching and learning shows mean level 2.12 while item 1; school provides computer facilities in computer laboratories reaches mean rating 2.66. These can conclude that the schools neglected in providing accessible of such outdoor facilities for students' healthy emotional and physical learning.

Table 4.16

The existence of facilities outside the classroom

No.	Item	Mean	Interpretation Level
1.	My school provides computer facilities in computer laboratories.	2.66	Satisfactory
2.	My school establishes hut for process of teaching and learning.	2.12	Less Satisfactory
3.	My school provides fauna park for student learning process.	1.62	Poor Satisfactory
4.	My school provides flora park for student learning process.	1.73	Poor Satisfactory
	Overall mean:	**2.03**	**Less Satisfactory**

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4.3.12 Observation Analysis

The observations for the provision of school facilities about science curriculum were taken place at two selected primary schools around District Larut, Matang and Selama in Perak. From the observation checklist evaluations in Appendix E, both observed classrooms had been arranged with few appropriate facilities including the students' desks and chairs, a teacher's table and chair, a cupboard, a white board and a science subject bulletin board. The desks and chairs appropriate to students' size. Both teachers had used the white board as the main resource for teaching and learning process while the textbook and exercise book as learning tools for students. The furniture are well organized in the classroom that create more space for students' activities and prevent the windows from blocking the entry of air and light. From the classroom observations, the students sat comfortably during the lesson.

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However, physical factors such as smart board, projection screen, science gallery showcase, mini library, chatting corner, science laboratory, computer facilities, radio, television and internet services are not available in both classrooms. This could lead the classroom users lack of visually appealing materials as well as reduce opportunity to make use the resources that are relevant and motivating the students' learning performance.

Due to both teachers stick to their classroom subject time schedule, they lack of time in arranging the students' desks and chairs for classroom group and individual tasks. This seems reduce the chances for students to work cooperatively with their

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peers. Furthermore, no informative charts, students' hands-on works or news related subjects displayed around the classroom.

On part of instructional management, the teachers have part of the day's written lesson on white board and the teacher from School 2 has used manila card drawing to draw attention from her students. The teachers really keep the students on task. In this area, the researcher noted that these two teachers had not utilize or access physical factors to inspire their lesson delivery. Besides, the students also are not encouraged to explore the physical factors that are available in the classroom to conduct their activities.

On students' behavior perspective, the researcher noted that during teaching period, most of the students were less pay attention, less response to teacher's question, less cooperate with their peers during class activities session, chat with their colleagues and few of them often wandered around the classroom.

Another aspect in classroom is the availability of the reading corner that helps in promoting and encouraging the students to ask questions, express their ideas and opinions. However, both teachers did not consider in establishing a suitable reading corner in the classroom. In addition, school 1 (S1) has created mini library corner but there was no science reference books and other related science books for students to refer. The shelves placed far at the corner in the classroom for students to keep their personal resources, activity books, ongoing and completed work stuffs while cupboard for storing essential files, resources and materials but none of science tools are displayed.

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Concerning the students' tasks, there was none of the activities or other science related subjects displayed on the science bulletin board or on classroom wall. None of attractive interesting charts or students hands-on works displayed on notice board and science gallery showcase. There also no posters or charts are hanged around the classroom. From the observation, the classroom wall looked empty and has not used extensively. The classroom wall has not displayed with rich array of students' science works and activities. Potentially, this could lead to students become moody and lazy.

Naturally, classroom decoration is able to create positive learning environment. In contrast, the result of observation shows that both observed classrooms were not taking this matter into consideration where classrooms were not decorated either with soft elements such as rugs and lounge carpets or even natural items such as flowers or fish in a small aquarium. Therefore, this could lead to poor conducive environment for the students and ultimately reducing their learning performance.

In other perspective, there are sufficient fans and windows to allow the flow of fresh air as well as sufficient doors and lights for lighting in the classroom. However, a few of them need replacement. On the aspect of the implementation of ICT facilities, projector, LCD, smart board and other ICT amenities such as computer, chrome book, internet, audio, video materials and ASTRO were not accomodated for lower primary classrooms. Thus, science teaching and learning practices fail to be conducted via using technology method.

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Unfortunately, there were also science laboratories that were not prepared for lower primary science classes in both observed schools. Here they might find it hard to identify any of science tools and perhaps inexperience in handling them practically. Furthermore, the present students are more attracted to visual aid learning compared to wording aid learning. In contrast both teachers observed did not hang any posters or charts related science subjects around the classroom for students' effective learning. As for outdoor learning, both schools provide small huts or 'pergola' but during the observation teachers did not promote the students to do their group activities in the huts. They were only assigned in the classroom for the whole class session.

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4.3.13 Summary of RQ1

The overall results for the sub-constructs to answer RQ1 are presented in Table 4.16. From the overall sub-constructs in Table 4.17(a) below, the sub-constructs include existing furniture in the classroom, existing furniture in laboratory and ventilation and lighting in the classroom and laboratory show satisfactory of mean level while sub-constructs; safety in the laboratory, existence of ICT facilities in the classroom and existence of facilities outside the classroom show less satisfactory of mean level. Besides, in Table 4.17(b), sub-constructs include practices of the existing furniture and resources in the classroom, practices of existing furniture in the laboratory, practices of safety in the laboratory and usage of teaching aids in classroom show satisfactory of mean level and only sub-construct on management of space in classroom shows less satisfactory of mean level. Overall, the mean rating level for

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analysis of existing practices in Table 4.17(b) is slightly higher than analysis of existing physical factors in Table 4.17(a).

Table 4.17(a)

The overall analysis of existing physical factors (RQ1) in the primary schools for implementing science curriculum

No.	Item	Table	Mean	Interpretation Level
1.	Existing furniture in the classroom	Table 4.6	2.86	Satisfactory
2.	Existing furniture in laboratory	Table 4.8	2.81	Satisfactory
3.	Safety in the laboratory	Table 4.10	2.33	Less Satisfactory
4.	Ventilation and lighting in classroom and laboratory	Table 4.13	2.83	Satisfactory
5.	Existence of ICT facilities in classroom	Table 4.15	1.96	Less Satisfactory
6.	Existence of facilities outside the classroom	Table 4.16	2.03	Less Satisfactory
	Overall mean:		**2.47**	**Less Satisfactory**

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Table 4.17(b)

The overall analysis of existing practices (RQ1) in the primary schools for implementing science curriculum

No.	Item	Table	Mean	Interpretation Level
1.	Practices of the existing furniture and resources in the classroom	Table 4.7	2.87	Satisfactory
2.	Practices of existing furniture in the laboratory	Table 4.9	2.69	Satisfactory
3.	Practices of safety in the laboratory	Table 4.11	3.06	Satisfactory
4.	Management of space in classroom	Table 4.12	2.49	Less Satisfactory
5.	Usage of teaching aids in classroom	Table 4.14	2.59	Satisfactory
	Overall mean:		2.74	**Satisfactory**

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In conclusion for the RQ1, there is a need for existing physical factors to be increased and upgraded in order to implement the science teaching and learning activities. The findings shown a major part of challenges for effective teaching and learning in the classroom. Teachers are less engaging to the existence physical factors in their daily teaching and learning practices with students in the classroom as well as in the laboratory. The overall analysis of RQ1 shows that the accommodation of physical factors in the classroom are less supportive and contribute to effective science teaching and learning practices.

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4.4 Provision of Physical Environment

This result focuses on the second research question; Do the schools provide the physical environment in accordance to the Ministry of Education guideline? The findings for the second research question were obtained from the survey and observation.

4.4.1 Survey Findings

Malaysian Education Guideline guides this study by providing lists of necessary physical factors that should be available in the classroom.

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Table 4.18 below indicates that approximately 80 percent respondents agreed with acquisition of student size desk and chair while more than 75 percent agreed with accomodation of adequate fans, lamps and windows in the classroom as per listed in the Malaysian Education Guideline.

Classroom space is another keystone focused in the education guideline. Findings in Table 4.18 below shows that 65 percent respondents agreed with well organization of classroom space. Yet 35 percent respondents have to pay more critical attention on classroom space.

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However, on the element of acquisition ICT facilities in the classroom, total percentage disagree for usage of computer is 85 percent, radio is 87 percent and ASTRO is 93 percent. These data show that those schools are unable to follow as per requisition of national education guideline. Besides, due to unavailability of these ICT facilities in the classroom could provide highly negative impact on science teaching and learning environment.

Moreover, there are 82 percent respondents still proceed their traditional teaching and learning session via utilizing black board or white board if compared to 37 percent who use technology tool include projector or LCD in the science classroom. It is clearly noted that 118 schools did not provide projector or LCD in the classroom for teaching and learning purpose. This indicates the schools did not follow with the current fundamental changes as stated by Ministry of Education guideline or perhaps did not have sufficient budget to equip the classrooms.

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Table 4.18

The provision of schools' physical factors in accordance to the Ministry of Education guideline

No.	Item	Agree (%)	Disagree (%)	Remarks
1.	Standard size desks and chairs.	80	20	Create good learning environment.
2.	Desks and chairs are in good condition.	70	30	Able to support students' positive learning development in classroom.
3.	School provides a standard size white board or black board in classroom.	82	18	Students unable to explore much information regarding their lessons.
4.	School accomodates projector or LCD in classroom for Power Point teaching.	37	63	Less accomodation of projector or LCD could decrease provision of students' visual access.
5.	The classroom space organized well with students comfort.	65	35	Schools with much space could increase flexibility in students doing their essential activities.

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4.4.2 Observation Findings

In promoting good condition atmosphere of teaching and learning, the classroom should be made up of desks, chairs, table, space, instructional materials, lighting, ventilation as well as the latest Information Communication Technology (ICT) equipment and others include chalkboard or white board, projection screen, students, teachers who have come together for the purpose of teaching learning and etc. The availability of facilities and resources plays a key role in engendering the teaching and learning practices (Okeke, 2013).

Table 4.19 below shows overview analysis on classroom facilities in two observed classrooms. Ministry Education Guideline determines that dimension for primary school student's chair is 400mm(W) x 400mm(D) x 670mm(H) (Appendix M) and for student's desk dimension is 700mm(W) x 500mm(D) x 700mm(H) (Appendix M). As per requested by Ministry Education Guideline, both observed schools organized and equipped well the standard sized of desks and chairs for students. Meanwhile, the dimension for teacher's table is 1800mm(W) x 900mm(D) x 760mm(H) for School 1 (Appendix M) while School 2 (Appendix M) but both schools use a plastic chair for teacher which is not under the list of Ministry Education Guideline. Actually, both observed school teachers are not familiar with this guideline.

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Both classrooms acquired a white board at the center in front of the classrooms and facilitate a notice board in the classroom. School 1 (S1) accommodates 30 standard sized of student desks and chairs while School 2 (S2) accommodates 6 student desks and chairs. For teacher seat, both schools facilitate 1 table and 1 chair as per requested in the Ministry Education Guideline.

Spacious classroom environment enhances good stimulus for effective teaching and learning process. According to Malaysian Public Works Department (JKR), a classroom area should be 9000mm length x 7300mm width. From the observation, knowing that both schools have adequate space as according to the guidelines that promote teachers' ease of movement around the classroom while delivering lesson and observing the students and also for students to conduct their individual and groups activities.

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In another perspective, ventilation and lighting also play major roles in shaping the quality of academic achievement. These factors have great influence on the students' academic achievement (Murugan & Rajoo, 2013). According to Malaysian Public Works Department (JKR), a classroom should accommodate 3 fans and 6 fluorescent lamps which enable the students sit in a comfortable environment as shown in Appendix 13. Furthermore, Malaysian Public Works Department (JKR) also states a classroom should occupied 2 hardwood plywood doors and 6 sets of window (Appendix L). In both schools, fans, lamps, doors and windows are fixed in the classroom in accordance of Malaysian Public Works Department (JKR) but a few fans and lamps need to be repaired and replaced. This led some students sat and studied

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under uncomfortable situation. None of ICT facilities for teachers' instructional and students' learning performance has facilitated in the classroom.

Table 4.19

Classroom facilities based on Ministry Education Guideline

No.	Item	School 1	School 2	Remarks
1.	Student standard sized desk and chair.	/	/	Standard sized.
2.	Table and chair for teacher.	/	/	Accomodated as per requested by Ministry Education Guideline.
3.	Standard sized white board or black board.	/	/	Standard sized.
4.	Classroom space.	/	/	Both classrooms have more space.
5.	Fans, lamps and windows.	/	/	School 1 (S1) needs to replace 2 fans and 2 lamps. School 2 (S2) needs to replace 2 lamps and 1 fan.
6.	ICT facilities.	X	X	None of ICT facilities installed in School 1 and School 2.

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4.4.3 Summary of RQ2

The establishment of Ministry Education Guidelines in schools encourages the students and teachers to contribute positive environment in the classroom. Strategically, placement of listed furniture in the classroom according to the guideline could also engage the students and teachers to optimize the teaching and learning process. However, the schools need to give high priority on ICT facilities placement in the classroom to improve the students' learning environment via searching information in order to develop 21st century learning skills.

4.5 Existence Relationship between Classroom Physical Factors and the Teaching and Learning Science Practices

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This result focuses on the third research question; What kind of relationship exists between classroom physical factors and the teaching and learning science practices? Third question encompasses of the relationship between classroom physical factors and the teaching and learning science through questionnaire, observation and interviews.

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4.5.1 The Relationship between Classroom Physical Factors and the Teaching and Learning Science Practices

In analysing the relationship between classroom physical factors and the teaching and learning science practices, Spearman Rho correlation test was used. This test measures the strength and association between the variables of classroom physical factors and teaching and learning science practices. The test was carried out based on the survey questionnaires. The result presented below in Table 4.20 shows the Spearman Rho correlation between classroom physical factors and teaching and learning science practices. The correlation is significant at 0.05 level (2-significant tailed) along with the correlation coefficient at 0.876. This suggests that there is a significant relationship between classroom physical factors and the teaching and learning science practices ($r = 0.876$, $n = 147$, $p < 0.05$) and the correlation is positive. So, the null hypothesis that "There is no significant relationship between classroom physical factors and the process of teaching and learning science practices" was rejected.

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Ho1: There is no significant relationship between the classroom physical factors and the teaching and learning science practices.

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Table 4.20

Relationship between classroom physical factors and the teaching and learning science practices

Nonparametric Correlations

			Facility	PdP
Spearman's rho	Facility	Correlation Coefficient	1.000	.876**
		Sig. (2-tailed)	.	.000
		N	147	147
	PdP	Correlation Coefficient	.876**	1.000
		Sig. (2-tailed)	.000	.
		N	147	147

* Correlation is significant at the 0.05 level (2-tailed).

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4.5.2 Observation Findings

According to Wilson (1996), a classroom environment wherein students are given room to explore and determine the goals and learning activities seems to be an attractive concept. Unlike findings from the observation in Table 4.21 below show that the students in classroom were unable to access any information regarding science subject due to the unavailability of the necessary infrastructures in the classroom. Therefore, they do not have any opportunity or support to access information via reference books, video, internet or any other searching tools. The

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teachers conducted their lesson by using white board, pictures in exercise books, drawing simple black and white pictures on white board and manila cards.

Table 4.21

Usage of facilities during science class

No.	Item	Respondent 1 (R1)	Respondent 2 (R2)	Effects
1.	Topic of the lesson	Skin to touch and feel	Plants	
2.	Duration	1 hour	1 hour	
3.	Use of facility in classroom	White board Activity book	White board Manila card Text book Activity book	Less students' engagement and interaction with white board.
4.	Use of ICT facility	None	None	No ICT resource based learning. No interctive learning. No performance of tasks using ICT tools. Less possibilities for acquiring more information.
5.	Use of facility outside classroom	None	None	Less captivate students' interest.
6.	Use of laboratory	None	None	Practical lesson taught in the class. No hands-on experience. Lack of scientific inquiry skills.

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4.5.3 Classroom Setting

As for the classroom setting, based on observation data, the teachers did not arrange the classroom seatings for individual and group works in different range from time to time during class session (Table 4.22). They remained practicing the traditional seating methods; verb shape with path and theatre style in the current classroom as showed on Figure 4.1 below. This arrangement indicates that the teacher controls learning and limits movement throughout the day (Hung et al., 2006). In nature, variety kind of arrangements would be able to increase student to student interaction which could also enhance their performance.

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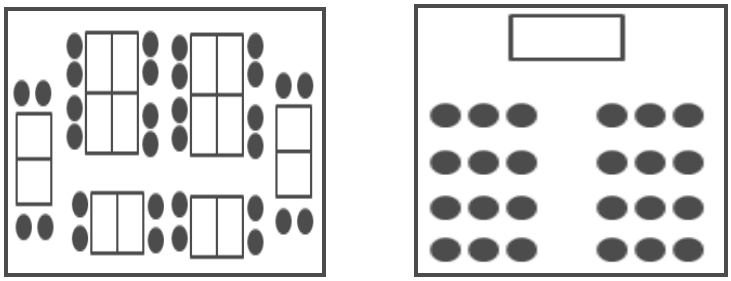
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Table 4.22

Physical factors in classroom

No.	Item	Respondent 1 (R1)	Respondent 2 (R2)
1.	Students' seating arrangement during science class.	Verb shape style	Theatre style
2.	Students' seating arrangement for individual task.	None	None
3.	Students' seating arrangement for group task.	None	None
4.	Furniture settings for individual or group task during class session.	None	None
5.	Use of facility outside classroom	None	None
6.	Use of laboratory	None	None

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Verb shape style Theatre style

Figure 4.1. Classroom design. Adapted from Scott-Webber, Strickland & Kapitula (2013)

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Briefly, the findings from the classroom observation reveal that teachers were not using enough resources and physical factors due to unavailibity in the classroom for effective teaching. Apparently, this could yield low improvements and achievements in the science subject. Overall, the findings show that the physical factors have a strong relationship in process of teaching and learning science practices.

4.5.4 Document Analysis Findings

Document analysis in Table 4.23 and Table 4.24 below describe that the respondents had written activities shortly in their daily lesson plan. In R1 lesson plan, the respondent did not specify the types of activities whether individual or group tasks that are going to be conducted in the class. Meanwhile R2 from School 2 did not emphasize in listing out the relevant instruments or tools that will be implemented to access lesson information during teaching and learning session in the classroom and also did not stress either individual or group activities.

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Table 4.23

Science lesson plan of Year 1 in School 1 (R1)

	Theme	Physical Science
	Title	Skin to touch and feel
8.40 – 9.40 a.m.	**Standard Content**	8.1
Year 1	**Standard Lesson**	8.1.1
Science	**EMK**	Creative and Innovative
	Teaching Aids	Text book and activity book
	Objective	In the end of the lesson, Students were able to analyze the body parts.
	Activities	1. Students identify human body parts related with touch sense. 2. Students do exercise.

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Table 4.24

Science lesson plan of Year 2 in School 2 (R2)

	Title	Plants
	Standard Content	4.1
	EMK	Creative and Innovative
8.00 – 9.00 a.m. Year 2 Science	**Objective**	In the end of the lesson, Students were able to list out the basic needs for plants.
	Activities	1. Students list out the basic needs for the plants. 2. Students share their information with others in front of the class. 3. Students do exercise.

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4.5.5 Interview Findings

Atlas.ti is a powerful workbench for qualitative data analysis. This software offers support to the researcher during the data analysis process where the texts are analyzed and interpreted using coding and annotating activities (Smit, 2002). Furthermore, it provides a comprehensive overview of a research project which is called the *Hermeneutic Unit* (HU) in Atlas.ti. Overview of transcription and analysis of interview data, in practical terms, audio interview recordings were transcribed into text known as primary document. Transcribed texts are opened in a '*hermeneutic unit*' where all the data and codes that belong to the analysis are stored. Then, process of

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reduction and analysis began. The researcher read the transcriptions while listening again and loaded text into Atlas.ti computer software. Data were then classified, a process that involved breaking up data into bits known as process of coding (Miles and Huberman, 1994). Once data had been classified, the patterns identified. These transcriptions are then analysed with computer programme, Atlas.ti. (Smit, 2002).

The findings in this research interview provides data on relationship between classroom physical factors and the teaching and learning science practices. Two respondents were chosen from two different schools. The researcher asked 11 questions to Respondent 1 from School 1 and 13 questions to Respondent 2 from School 2 (Appendix J).

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The interview findings obtained show that there are five patterns based on classroom infrastructures were concerned as emerging issues from the interview data include the patterns of actual needs of facilities in classroom, behavioral differences in good and poor facilities condition, consequences of poor infrastructures, correlation facilities and academic performance and factors affect students' perceptions. These five patterns were extracted from the interview data transcript due to the patterns explored significantly on the relationship between classroom physical factors and the teaching and learning science practices. These five patterns are displayed in Table 4.25 and Figure 4.4 below.

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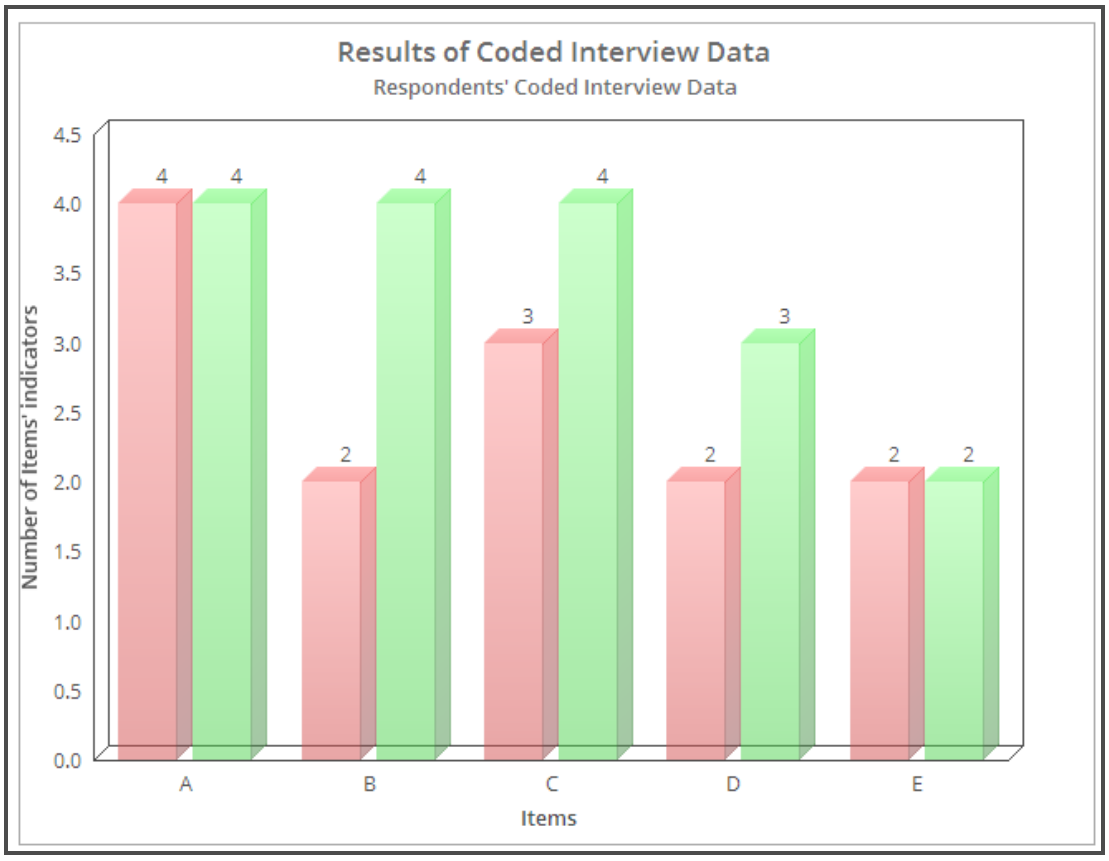
Table 4.25

Results of coded interview data

No.	Item	School 1	School 2	Remarks
1.	Actual needs of facilities in classroom	4	4	8
2.	Behavioural differences in good and poor facility conditions	2	4	6
4.	Correlation of school facilities and academic performance	2	3	5
5.	Factors affecting students' perceptions on teaching learning session.	2	2	4
	Total	**13**	**17**	**30**

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A = Actual needs of facilities in classroom

B = Behavioural differences in good and poor facility conditions

C = Consequences of poor facilities

D = Correlation of school facilities and academic performance

E = Factors affecting students perceptions on teaching learning session

Figure 4.2. Results of coded interview data

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1. The actual needs of facilities in classroom

The most common pattern dominated by both participants with 8 indicators out of 30 is the actual needs of facilities in classroom. Table 4.24 above indicates that both respondents understood well on the actual needs of physical facilities in the classroom. In regard as R1 addressed,

"*the most important one should be good condition of desk and chair not only for students but for teachers as well. Other than that movable furniture so that you can move the furniture such as cupboards, white board, projector and a big space of classroom for teachers to handle science class in a better way and easy to access the technology devices*". (R1: 045,046, 047, 048, 049)

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Meanwhile R2 stressed on,

"*attractive charts and teaching aids, display rack and bookshelves, proper size of desk and chair for students, easily accessible internet connection and good condition of furnitures and also spacious class for the students*". (R2: 053, 054, 055, 056)

From the interviews, both respondents had greater preference on daily use facilities such as desks, chairs, accessible technology devices and also agreed on comfortable spacious classrooms for teaching and learning purposes.

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2. The consequences of poor facilities

The second most crucial factor emerged in the interviews is about consequences of poor facilities. Throughout experience there are three indicators of consequence listed out by R1 as follow,

"*The students fail in education*" (R1: 026)

"*… also increase their poor behavioural performance during classroom session*" (R1: 027, 028)

"*This cause them to demotivate towards their education*." (R1: 043)

While R2 noted four types of consequence due to scarcity of classroom amenities as in the statement,

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"*... in the abscence of appropriate classroom facilities may distort the students from accessing facilities properly*" (R2: 027, 028).

He also outlined on students behavioral performance as,

"*Possibly less accomodation of physical infrastructures in science classroom may affect adversely their motivation and personal attitude*" (R2: 029, 030).

Furthermore the respondent figured out that

"*... the students face lots of problems in developing positive study attitudes*" (R2: 036)

and also mentioned

"*...poor quality facilities raise up irrespective and low motivated students*" (R2: 039)

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3. The behavioral differences in good and poor facility conditions

Followed by the third factor with total of six indicators is the behavioral differences in good and poor facilities condition. From both interviewees teaching experiences in science classroom, they have found difficulties and discomforts among students when they were seated in the inconvenience and congested place as stated,

"*...I found there are great differences in their behavioural performance when they were seated in two different quality conditions. Significantly, they show their poor behavioural performance due to poor facilities accommodation*". (R1: 032, 033, 034, 035)

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"*Different quality condition of class facilities would give strong impact to their wellbeing. Apparently, nowadays the students face lots of problems in developing positive study attitudes and behaviors due to improper and inadequate facilitation of equipment in classroom. Then it also depends on good or poor quality facilities. For sure poor quality facilities raise up irrespective and low motivated students*". (R2: 034, 035, 036, 037, 038, 039)

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4. The correlation of school facilities and academic performance

The fourth node emerged for the correlation of school facilities and academic performance; both teachers agreed that facilities are very much engaged in students' academic performance as supported by these statements.

"*I understand that infrastructural facilities do correlate to students' academic performance. This also has support for their self-learning as well as for the informal group learning*". (R1: 013, 014, 015)

"*Availability of classroom resources are much significantly correlate students' academic performance. Consider facilities is one of the best aspirations for their education. Ermm...indeed facilities also create a good and creative environment of teaching and learning*". (R2: 015, 016, 017, 018)

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5. The factors affecting students perceptions on teaching and learning session

Finally, the least pattern dominated by both respondents is the factors affecting students' perceptions on teaching and learning session. When they were questioned, in what ways of classroom facilities can affect students' perceptions of the teaching and learning session? They answered;

"*... poor ventilation, dim lighting, inadequate desks and chairs even unattractive class may bring high chance to affect their perceptions on the classroom. This cause them to demotivate towards their education.*" (R1: 040, 041, 042).

"*... their perceptions affected when the classroom size is small and become hot crowded, inadequate and less usage of instructional materials and facilities during class session.*" (R2: 043, 044, 045).

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4.5.6 Summary of RQ3

The interviews with teachers and observations that carried out in two different school classes revealed deficiencies of physical infrastructures for teaching and learning process in the classrooms. This could debilitate the effective curriculum delivery and classroom management. Hence, both observed teachers have greater challenges in conducting their class under condition of non-availability of necessary facilities in the classroom which perhaps contribute to quality of science teaching and learning process.

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4.6 Summary

Concisely, findings from all research questions concluded that physical settings have strong influence on students' academic performance as well as for conducive and effective teaching. This was supported by Ayeni & Adelabu (2012) study that stated that the quality of learning facilities available within an educational institution has positive relationship with the quality of teaching and learning activities that in turn leads to the attainment of goals set. Besides comfortable classrooms and adequate provision of instructional resources facilitate teachers' instructional task performance and students' learning outcomes.

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CHAPTER 5

CONCLUSION

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5.1 Introduction

This study was to investigate the identification of the physical factors and practices for implementing lower primary science curriculum in District of Larut, Matang and Selama in Perak. This study has guided by three research objectives; 1) What are the existing physical factors and practices in the primary schools for the implementation of science curriculum? 2) Do the schools have accommodated the physical factors as in accordance to the Ministry of Education guideline? and 3) Is there any relationship between the classroom physical factors and teaching and the learning science practices?

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5.2 The Existing Classroom Physical Environment Setting and Practice

Availability of necessary physical factors in the classroom is a key to the successful implementation of science teaching and learning practices. These able to stimulate, motivate and assist the young learners in sustaining their focus to the lesson in the classroom.

As survey findings shown in Chapter 4 (Table 4.13), majority schools around the District of Larut, Matang and Selama, Perak carry out teaching practices with guidance of text books and white boards or black boards which are believed as obsolete techniques in this technology educational century. Current study also points out that majority schools are lack with up to date communication technology tools including smart board and projector (Table 4.5) in the classroom for teaching and learning purposes. However, teachers appeared to be tolerated to poor physical factors condition in the classroom. Nevertheless, teachers were unable to prepare advanced tasks for students to play active role in learning and also less transmit the knowledge to them. This was supported by study of Che Nidzam et al. (2015) that mentioned teaching method based on white board or black board is helpless in emphasizing on students' higher order thinking skills and this obsolete teaching and learning technique also does not challenge students' higher cognitive level. Meanwhile, the observation findings from Table 4.21 indicate that application of science curriculum based on white board causes less interaction between the teacher and students as well as students and classroom physical factors during class session. The students looked less enjoy interacting with white board, manipulating images and texts. They are not encouraged for physical interaction with white board such as students touch the white

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board, drag or stick the items on the white board. Thereby, observation found that they were less engagement and interaction with white board physically. The findings are in the line of view of Benjamin (2014) that stresses the teaching and learning practices are not to rely only on a teaching method with chalk and black board as in the traditional classroom teaching where there is hardly any scope for the students to interact with teacher, teaching-learning materials and the teaching-learning environment, where teaching becomes very monotonous and students have to mostly rely on rote learning.

5.2.1 The Presence of ICT Tools in the Classroom

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To date the presence of diverse range of ICT technologies provide enormous benefits and advantages in science curriculum. Potentially, ICT able to enrich skills, knowledge, innovation, acceleration, motivation, students' engagement, help them experience with the practical works as well as strengthening the teaching and learning practices in the schools Noor-Ul-Amin, 2013). Unfortunately, the findings of study (Table 4.14) indicate that majority schools around District Larut, Matang and Selama, Perak are lack in providing good ICT services which could lead the schools unable to use and practice broadly the ICT in teaching and learning practices. Therefore, teachers could face difficulties in conveying important information, varying and modernizing their teaching strategies to their students as well as could teach in distress without the guidance of ICT aids. This is in contrary with the study by Noor-Ul-Amin (2013), which states that ICT has an important role in changing and modernizing educational systems and in improving ways of teaching and learning.

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The teachers are able to generate meaningful and engaging learning experiences for their students using ICT to enhance learning. On the other hand, learning without ICT guidance also could distort students' enthusiasm and curiosities as well as could lead to poor attainment in developing their knowledge and skills. This corroborates the assertion of Che Nidzam et al. (2015) that learning environment in educational discourse is closely related to the emerging use of information and communication technologies together with the constructivist concept of knowledge and learning which help in enhancing students' interests and understanding of science and developing students' knowledge and skills with technological capability.

In addition, Noor-Ul-Amin (2013) reports in his study that a wider availability of best practices and best course material in education, which can be shared by means of ICT, enhance motivation and changes in behavioral performance among the students. ICT also provides opportunities to access various information using multiple information resources and viewing information from multiple perspectives, thus, fostering the authenticity of learning environments. In contrary to Noor-Ul-Amin (2013) study, current observation findings found out that both classrooms are lack of ICT facilitation tools which causes the teachers lack of opportunity in integrating teaching and learning elements with ICT tools. This could be a part of the reasons that cause the teachers and students lack of opportunities to access abundance of information. Consequently, without multimedia resources, teachers are unable to create their teaching lesson plans to be more creative, innovative, attractive and lively which directly lead the students show poor behavioral performance such as pay less attention, less active participation in class tasks, wander around the classroom and

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chat with their classmates during class period as listed out in the checklists (Appendix E).

5.2.2 Lack of Practical Activities in the Laboratories

Laboratory is another pivotal learning environment that influences the students' learning and promotes successful practical teaching and learning. However, survey findings (Table 4.7 –Table 4.10) address that accommodation and utilization of basic necessary facilities in the laboratory are at satisfactory level but still considered limited and scanty. This could be reduce the student's self-learning that oppose with study of Amba (2015) examines that utilization of laboratory facilities is an activity-oriented instruction, students centered and leads to self-reliant instruction. Moreover, this also could be affect the students' behavioral performance during learning session which stated by Amba (2015) as when there are less adequate laboratory facilities that utilized by students would unable elicit their desirable behavioral change.

On the other hand, observation findings from Table 4.21 indicate that both classrooms are lack of laboratory that cause the teachers were unable to give chance for the students to do practical works in the laboratory. Instead of laboratory, the practical lesson were taught in the classroom by teachers. This could poses less chance and a high challenge for the students who have to learn the experimental lessons theoretically without experience the practical works in the laboratory. With the fortitude to achieve the education goal, these competent teachers carried out the

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lessons by using manual tactics such as drawing and using activity books for students' learning purposes. Unfortunately, this could be helpless for the young learners' mental development and they are being demotivated in creating their knowledge by exploring, analyzing and understanding of the practical lesson because the tactics were unable to provide maximum advantages and even learning could not be optimized by only supported by presence of the teachers. Therefore, laboratory vastly helps them to learn and experience through practical learning compared to the lesson delivered without laboratory work guidance. In addition, findings also identify that the students find difficulties in answering the questions related to science experimental. This could be due to the students are less expose to the practical works in the laboratory. This was supported by study of Mulela (2015) as there is a direct relationship between the availability and the use of laboratories in schools on the one hand and the performance in science subject questions on the other.

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5.2.3 Lack of Conducive Learning Environment in the Classroom

Another crucial aspect in creating a conducive learning environment is by having attractive classroom physical factors include having science subject bulletin board, science gallery showcase, shelves, notice board, mini library and chatting corner as well as hanging posters and charts in the classroom. Apparently, observation findings (Appendix E) identify that in both classrooms, the science subject bulletin boards are not displayed with variety interesting news, theme-based displays, colorful charts and posters while notice board and science gallery showcase are also not equipped with attractive, creative and informative materials. On the other hand, mini library only has

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been established in School 1 while none of chatting corner has been found in both observed classrooms.

The classrooms are also lack of basic crucial instructional materials such as science reference books, papers, pencils, scissors, colour pencils, teaching aids and printing resources for teaching and learning purpose. Furthermore, observation findings (Appendix E) also found out that there are none of the posters or charts hanging around the classroom which unable peak the students' curiosity and motivation to learn in detail about the science content. Hanging visual posters and charts are quality resources and crucial determinant of the quality of the knowledge and skills which the prospective teachers store in their repertoire (Riggs & Gholar, 2009). Present study acknowledges that visually unattractive and uncreative classroom could increase unfavorable climate such as feelings of discontent, discomfort, disaffection and boredom. Besides, by hanging visual posters and charts around the classroom also could be reminder for the students of the particular lesson content. Ideally, the visual of the posters serve as markers or mental reminders of topics covered during the unit. According to Riggs and Gholar (2009), visual posters and charts are essential in strengthening engagement among the students which ensure effective learning happens. From the observation around the classroom, known that there are less usage of visual aids on purpose to encourage students' development of critical thinking as well as diverse the needs and interests of students.

Consequently, this scenario could be another reason that less likely to be negatively motivate the young learners. Here the students miss chance to interact with information to be learned in diverse ways and are being demotivate while the

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competent teachers miss the opportunity to increase the amount of relevant lesson input for their students, lack in creating learning that could encourage self-motivation, performance skills in learning as oppose to the study of Riggs and Gholar (2009), the learning via attractive posters and charts will motive and inspire the students to learn as well as stimulate interest in topic. Overall, lack of these resources and equipment in the classroom could be affect the students' behavioral performance and academic achievement. This corroborated the assertion of Bennett (2001) that the inadequate facilities have affected learning outcomes, attitudes, achievement, self-concept and social perspective taking.

Of all the factors, teachers are playing greater roles of responsibility and leadership in varying and changing the curriculum based on their students' needs and interests. Their attitude and approaches towards the students and creation of variety strategies of curriculum has created positive and cheerful classroom environment. Lack of teachers' contribution in creating attractive classroom physical factors could be less instill reading habits among the students besides demotivate the students to read any of science related materials during their leisure time. Environment with lack of these sufficient facilities also could create negative and unjoyful conditions among the young learners. Therefore, they could inexperience better learning and feelings of self-esteem.

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5.2.4 The Importance of Classroom's Lighting And Ventilation

In another perspective, lighting and ventilation also are being essential physical factors of classroom. Good and sufficient lighting and ventilation apply numerous advantages to the users include energize and create cheerful mood among the students and teachers. Conversely, current study has found that provision of lighting and ventilation in majority schools (Table 4.12) around the District of Larut, Matang and Selama, Perak have not been well support the classroom environments. Probably the users in the classroom could not receive sufficient lighting and ventilation. On the other hand, from the observations,(Appendix E) both classroom are lack of light and fresh air flow in and out due to the doors and few windows closed during the class session on purpose to avoid discomfort of lighting. Moreover, there are few lamps and fans need to be changed in the classroom. These show that the teachers and students receive poor natural lighting, electric lighting and sufficient ventilation in the classroom which cause the students feel sleepy, lazy, moody and distort their attention to the class.

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Since teaching and learning is being the heart of life; there needs special concern on development of educational facilities in line with the speed of the growing technology facilities. Among these facilities, good lighting and ventilation are vital elements that have powerful effect on users particularly in their behavioral performance, productivity and achievement. Unfortunately, poor attention on improving lighting and ventilation facilities as well as poor utilization of daylight and fresh air in the classroom could increase of negative effects on teachers' and students' performance in term of education. In the perspective of insufficient lighting in the

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classroom could affect their perception visual stimuli such as difficulty in focus and written texts. Students need to strain their eyes to look at the activities on the white board. Meanwhile, poor ventilation cause the classroom getting warm and the students become inactive. Overall, inadequate lighting and air ventilation could lead the students and teachers under stress, difficult for the students to concentrate on the lesson and reduce the capabilities of creative and critical thinking as well as increase of disciplinary problems by such poor environment. These are in agreement with statement of Hannah (2013) that described improper lighting and ventilation negatively affect academic achievement and promotes distress and obstruction in term of their academic and behavioral performance in the classroom.

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5.2.5 Flexible Space Arrangement of Classrooms

According to Ellis and Goodyear (2016), creation of flexible classroom space helps in promoting a smooth transition between spaces and maximizing learning opportunities. The ability for all the spaces to be used as potential learning spaces increase flexibility and support students-centered pedagogy (Bisset, 2014). In contrary, survey findings (Table 4.11) show poor satisfactory level for space management for implementation of science curriculum in the classroom. Align with this, observation findings show that furniture are arranged neatly to create more space in the classroom and do not obstruct the students' view while desks and chairs are arranged facing the teacher's desk that are able to make eye contact with the students and able to increase students' learning and thinking abilities as stated by Hensley-Pipkin (2015) in his study that many of the visible changes will be evidenced through how teachers design their physical classroom environment in an attempt to foster higher-order thinking skills.

Proper arrangement of the classroom could enhance the teachers' endeavor in preparing more effective lessons plans for teaching as well as increase the students' interests to perform well in academic. Lemessa (2015) in her study stated that proper arrangement of classroom environment plays a remarkable role in making instructional process more effective and establishes an atmosphere favorable and encourage to learning. On the other hand, the findings identify that observed classrooms have created adequate space for carrying out teaching and learning practices. Conversely, both respondents had not used extensively the classroom space to conduct innovative teaching strategies include individual or group activities. Furthermore, they did not entertain their students with different seating arrangements

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for the tasks given in the classroom. Either there was no re-shuffle or no instructions about the different group or individual seating arrangement for the class activities. Therefore, observation of this study has found that the students are not much interest and participate actively in the activities. This condition is not support variety opportunities for students either work individually or in group in the suitable area of learning space as the teacher is not design and organize the seating arrangement based on the students' tasks. Besides, current seating positions seems likelihood decrease the participation of the students in the tasks given. The finding is contrary to the study of Wheldall and Bradd (2010) as the best seating arrangement is dependent on the task that students are being asked to complete. Activities involving collaboration and communication will be more suited to arrangements where students are closer proximity to one another while activities involving concentrated individual work are more suited to an arrangement that does not encourage interaction. Thus, this could diminish the relationship between the students and increase disruptive behavior such as the students talking to peers and being out of their seat without permission in the classroom which are labelled as negative behaviors.

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5.2.6 Outdoor Facilities for Teaching and Learning

Implementation of teaching and learning practices by using hut, flora park and fauna park as additional physical environments could create a good and interesting academic environment. This factor also plays a significant role in motivating, instilling a feeling of great eagerness about learning the subject as well as increase various ways of thinking skills among the young learners. Conversely, current study

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(Table 4.15) has found that majority teachers are not much engaging and incorporating with the availability of such facilities in teaching and learning practices. This could be not adhere well to the effective educational environment.

In a nutshell, current study concludes that the accommodation and implementation of physical factors in the teaching and learning practices are still at unsatisfactory level. This means that the users in the primary schools around the District of Larut, Matang and Selama, Perak are entitled to moderately adequate physical factors in the classroom that permit the students and teachers engaging in teaching and learning practices. Intuitively, these scarcity of appropriate physical factors in the classroom could cause ineffective teaching and learning; lack of student-teacher interaction, student-physical environment interaction, increase undesirable and disruptive behavior among students; ineffective and improper of classroom management and lesson content delivery. These are contrary to study of Jeffrey and Zein (2017) emphasizes that the sufficient classroom facilities enable teachers to do their work very well and to help the students to learn effectively. Lack of completeness of educational facilities affect teacher and student self-esteem, peer, student-interaction, discipline, motivation and also triggers stress which eventually impedes teaching and learning performance. In this regard, current study posits that the physical factors plays a significant role in implementation of science curriculum.

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5.2.7 The Provision of Physical Environment

Emphasizing a guideline for facilitation of physical factors in the classroom is one of the essential criteria in providing pleasant and quality science curriculum while affirming positive effects of the students' academic performance.

Findings from the survey and observation reveal that the classrooms have accommodated the physical factors include student standard sized desks and chairs, tables and chairs for teachers, standard sized of white boards or black boards, well organization of classroom space and provision of lamps, fans and windows. Provision of these facilities are in accordance with set standards of Ministry of Education guideline to meet curriculum demands in teaching and learning using materials, improve learning environment and expand of education facilities.

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Out of all the listed facilities under the guideline, the study has found only ICT facilities are not well facilitated in majority schools around the District of Larut, Matang and Selama, Perak. Utilization of ICT facilities during teaching and learning practices would support the efficient system of curriculum delivery and students' academic achievements. In contrast, the findings show that majority of primary schools are lack in facilitating the ICT materials include projector or LCD, smart board, ASTRO, radio and computer in the classrooms for teaching and learning purposes (Table 4.14). Undoubtedly, this could create a huge gap in the quality of learning environment which oppose to the concept study of Noor-Ul-Amin (2013) states that effective use of ICT for the purpose of education potential to bridge the digital divide. In addition, this also causes the schools unable to attain 21st century of

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standard education goals which requires different skill sets include creativity and innovation that foster active learning, higher order thinking, cooperative learning and independent inquiry learning that fit into a spectrum of teaching and learning approaches as well as varying from traditional to innovative education system (Noor-Ul-Amin, 2013).

5.3 The Relationship between Classroom Physical Factors and the Teaching and Learning Science Practices

Physical factors are one of the potent factors that contribute in optimizing the school's productivity particularly in science curriculum. In fact, current study establishes that level of availability teaching-learning facilities in majority schools around the District of Larut, Matang and Selama, Perak are insufficient. Yet, the study demonstrates that there is a significant relationship between physical factors and the implementation of science curriculum. The statement was supported by Spearman correlation test result (Table 4.19) that shows the relationship is significant at 0.05 level (2-significant tailed) along with the correlation coefficient at 0.876.

5.3.1 The Relationship of Conducive Environment and Effective Learning

Odeh (2015) opines that provision of appropriate facilities enable create a conducive learning environment that has good climate for effective teaching and learning. In contrary, findings found that majority schools around the District of Larut, Matang and Selama, Perak are lack of physical factors that could unable

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promote appropriate positive learning environment. On the other hand, observation findings remark that due to inadequate of physical factors the teachers are unable to achieve effectiveness in delivery lesson content and find difficulties in bringing good teaching and learning environment.

In addition, present observation and interview findings of study describe that due to the absence of fundamental teaching and learning physical factors and resources cause the teachers unable to deliver the lesson in correspond to the goals and objectives of lesson. The white board, papers and text books teaching oriented, instead of implementing various creativity teaching strategies due to insufficient facilities cause ineffective and unproductive teaching. As opined by Likoko et al. (2013), teachers can only be effective and productive in their work if they have relevant and adequate instructional facilities and materials. Inadequate of appropriate facilities could not stimulate the students' cognitive and affective domains during teaching and learning practices. Moreover, this also could lead the young learners showing less interest that could invariably lead to low academic performance.

Meanwhile, Lyimo, Too and Kipng'etich (2017) outlines that the primary purpose of teaching and learning practices is to bring a significant change in behavior through active participation, motivation and critical thinking of the learners. Unfortunately, current study indicates that majority schools are unable to promote academic standard as required in the 21st century academic environment which is oriented engagement of instructional materials and resources with teaching-learning activities that could enhance students' active participation, encourage acquisition of knowledge, increase and varies students' competency and skills via give room to

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students for inquiry, critical thinking, problem solving and discussion their ideas during their class activities as agreed by Abdu-Raheem (2014). Thus, scarcity of such physical facilities could attribute to hindering academic performance as well as increase disruptive behavioral performance as shown in the checklist (Appendix E) among the young learners.

5.3.2 The Relationship of Conducive Environment and Behavior Change

Tsavga (2011) acknowledges that learning is being a relatively permanent change in behavior as the results of insight, practice, experience and stimuli with learning materials. Align with this, Oladejo et al. (2011) describes that instructional materials and physical factors are as concrete objects which provide sound, visual or both to the sense organs during teaching and learning. These are key ingredients in learning and teaching, thus, enhance students' academic achievement. In contrast, current observation findings show that due to fundamental facilities are not readily available that cause the students are unable to visualize, engage, experience and explore in reality the related lesson in the classroom. From here, the students do not have opportunity to touch, feel, hold and learn about the objects or the materials regarding the lesson which could be one of the reasons that discourage them from focusing to the lesson well. This finding is opposed to the study of Kyriakides and Creemers (2009), which confirms that concrete objects or materials that a learner can touch, feel, hold or move create initiative to learn as well as constructivism theory which emphasizes knowledge is created through the exploration of one's environment (Barbash, 2012). Izadpanah and Gunce (2014) also stated that the availability of

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various facilities and materials in the classroom could stimulate students' interest and exploration.

In addition, unavailability of physical facilities around the classroom cause less support on development of creativity tasks which highly encourage on collaborative learning, communicating and exploring by using various physical factors in order to promote creative and critical thinking among the young learners. Consequently, the students are less inspired to perform well in the tasks given to them. Apart from this, during class period, current study also found that the observed teachers are unable to obtain most of the real objects for teaching and learning purpose due to the materials are unavailable around the school. Conversely, the teachers use pictures in the text book as well as drawing pictures on manila card on purpose to illustrate the lesson. Intuitively, the demonstrative images in lesson help the teachers generate and form concept of the lesson. However, this scenario is unable to help much the teachers describe in detail about the concept as desired by students, broaden the concept of teaching as well as teach conveniently. This make the learners find difficulties in comprehending the lesson easily. Consequently, the students could not response and remain in silence when teacher asked question related to the lesson. As a result, this could distort their curiosity and interest towards the lesson.

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5.4 Summary of the Study

In summary, the physical facilities have a significant role in the implementation of science curriculum. The result shows that there is a significant relationship between classroom physical factors and teaching and learning science in the classroom. A classroom with insufficient physical factors could not contributes to stir up quality academic outcome of teaching and learning that could facilitate good academic performance via effective of teaching and learning practices.

Based on the findings, it is concluded that the primary schools around District of Larut, Matang and Selama in Perak are lack of adequate facilities and teaching and learning resources in the classrooms, which considered as the most of discouraging aspect in term of constructivist teaching and learning practices. Emphasizing specifically on classroom with appropriate physical facilities could enhance interactions, motivation, interest, relationship, active participation as well as experiences. This is in agreement with the study of Hensley-Pipkin (2015), which outlines that physical learning environment as the prime emphasis which placed on the unique interests, styles, motivations and capabilities of individual learner so that learning environment can be tailored to them. Moreover, current findings discover that effective teaching towards 21st century learning environment could not take place within the classrooms due to relevant instructional resources are not present. This could affect the teaching and learning activities as supported by the study of Lingam and Lingam (2013), the riverbed of students' learning experience can be severely affected by the lack of suitable facilities. While, Chiu and Khoo (2005) in their study states that this could lead the teachers increasingly being pressured in order to

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improve the children's learning achievements. They are also hampered by limited and scarce resources for carrying out the teaching and learning which could be the prime cause of poor academic and behavioral performance of the school students.

To date, students are given room for independent learning. This means they are given opportunities to contribute themselves in the learning practices through investigation, collaboration, active learning and higher order thinking by engaging themselves with physical facilities in the classroom. This is in line with constructivism theory that outlines learning is most effective when the teacher's primary delivery method of information and the physical environment is designed to ensure individualized learning (Beck, 2009). Students today are intensely social and interactive learners. The respectful relationship and interaction are both virtual and personal which improve students' engagement in learning (Willms, Friesen & Milton, 2009).

In addition, the physical classroom environment design based on constructivist teaching practices provides meaningful and activity based experiences for all learners (Duffy, Lowyck & Jonassen, 2012). Hensley-Pipkin (2015) defines the physical environment as the room arrangement, materials, facilities, equipment and display of children's work and physical design of the room. Unlike current findings that demonstrate insufficient and unavailability of physical facilities could limit the level of teaching and individual learning performance. Therefore, this could not meet the needs of the students to captivate and sustain their interests, invariably facilitates students' interests in learning practice, limit social interaction and learning as well as could not achieve high academic performance particularly in science curriculum.

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In conclusion, the physical facilities are directly linked to teaching and learning science curriculum. There is a positive relationship exists between the availability of physical facilities and the students' academic and behavioral performance. The physical facilities make teaching and learning more pleasant. Integration of physical facilities in science curriculum could reduce depression, frustration and apprehension; improve behavioral, attitude and personality development as well as enhance students' potentials and confidence level.

5.5 Recommendation

On the purpose to interact with students and stay focused on teaching session at the same time, teachers can set up and organize well and systematically the desks, chairs and other furniture in the classrooms. Thus, each student can engage in the classroom activities as well as meet their desires. So there will be less disruptive behavior.

Besides teachers also should display the students' works and assignments on the wall around the classroom. Moreover the teachers can display science related materials and the students' activities on the science gallery showcase and science bulletin board. This brings a bright opportunity to build a strong bond between teachers and students as well as able to create a visually stimulating environment. This idea will indirectly help in conveying the important information to the students. Simultaneously this approach encourages the students to value their tasks as well as to

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show that teacher cares about what they do. This also gives moral support to them to do much better in future works.

It is vital for a teacher to take into account that classroom should be homelike for the young learners as they spend much of their day in the classroom. Students feel uneasy and inattentive if the classroom is too warm or too cold. Thus, teacher should always make sure the room is in a convenient temperature for them. For instance, a classroom could be filled with warm and fresh air and the usage of natural lighting to make the room comfortable. Such ways could lead on creating a conducive atmosphere to teaching and learning while improving the students' behavioral performance, attitude and most important is to make them enjoy to be there.

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In general, basic instructional materials, ICT facilities and laboratory for level one primary can suit the students' learning styles as well as to show significant and positive impact on teaching and learning session. This will help in developing motivation of teachers and students while engaging them actively during class session. Therefore, the school management should always make sure the availability of appropriate instructional materials in each classroom for the quality teaching and learning purpose as well as to motivate students to be successful.

Based on the findings, it is best recommended that a good teacher needs to be aware and pays attention on the physical environment in the classroom to make the teaching and learning process a success. On the other hand every school management should concern in providing adequate physical infrastructures at each primary science

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classroom for effective teaching and learning purposes that benefit the students in enjoying their privileges and exposures to curriculum. Besides Ministry of Education needs to put much effort and take initiative in enhancing schools and classroom amenities inspection for upgrading the quality and services of physical infrastructures on purpose to provide good education for the young learners.

5.6 Conclusion

The present study provides an in depth look at the relationship between physical factors and implementation of science curriculum at the lower primary schools around the District of Larut, Matang and Selama, Perak. There are relevant literatures were reviewed to support the current study. The sample that used for the study was one hundred and forty six teachers around District of Larut, Matang and Selama in Perak state. Samples were selected randomly around the district. Three research instruments were implemented include questionnaires, interview and observation. The data from these instruments were obtained through statistical analysis; frequency, mean, median, mode and percentage and Spearman rho test; observation tools were tested via checklist while the interviews were coded using atlas ti to present data. The entire hypotheses were tested at significance 0.05 alpha level. The following findings attained from the data analysis:

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1. There is a significant relationship between classroom physical factors and the implementation of science curriculum.
2. Availability of physical facilities and resources related to classroom instructional purpose are at poor satisfactory level.
3. In addition, laboratories, mini libraries, chatting corners, computer rooms, flora and fauna parks are inadequate in most schools.

Excellent school facilities are the basic ingredients for good education programmes and are very important for attaining education goals (Khan and Iqbal, 2012). In contrast, this study obviously showed that the science environment of the schools is at a poor level condition, which become one of the crucial factors in determining the success of an effective science curriculum. Therefore, it is necessary for the schools and education department to give first priority to provide adequate physical facilities and instructional amenities in the classroom as well as in schools for good education achievements and quality behavior performance. Similarly, the schools need always upgrade and provide the good accessible facilities to nurture the students' and teachers' interest and motivation to proceed on good track of teaching and learning of science curriculum in the classroom. The findings of this study also reveal that the physical and infrastructural facilities may increase positivity in students' behavior, create a sense of love and affection, promote positive self-esteem, reduces behavioral aggression, develop emotional stability, encourage comprimising behavior, reduce frustration, anxiety and tension and further enhances the capacity to absorb and bring flexibility in behavior and personality of the students.

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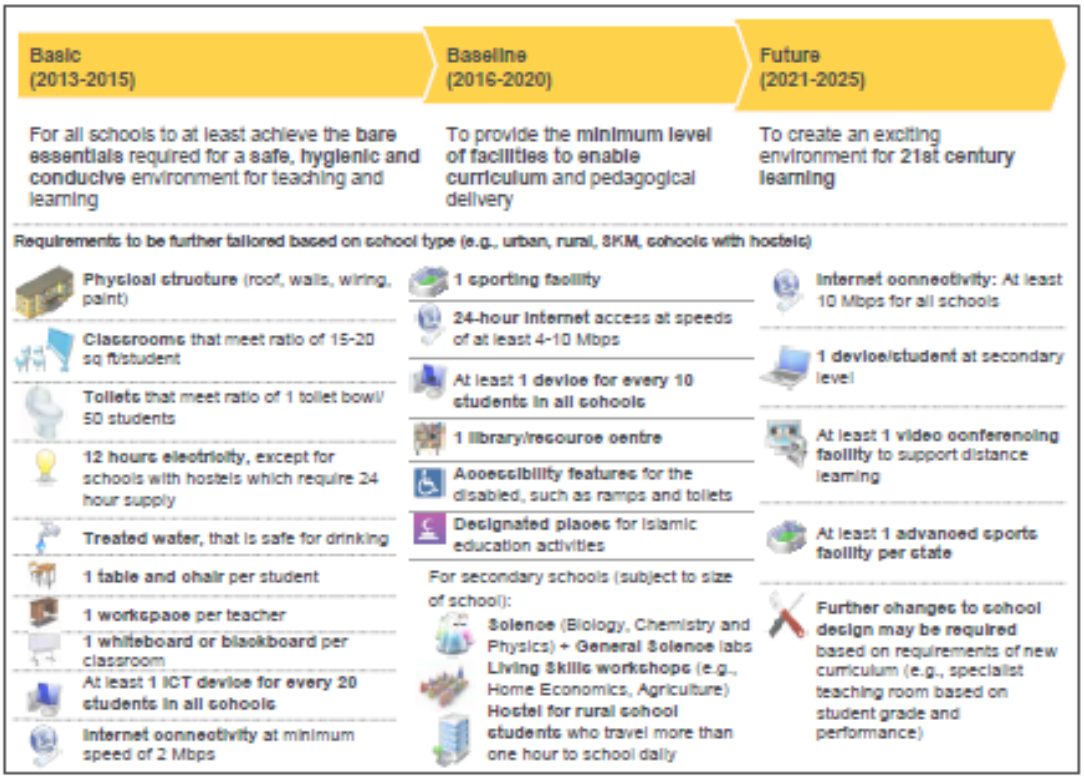
APPENDIX A

MALAYSIA MINISTRY EDUCATION GUIDELINES

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Source: Guidelines and Rules on Development Planning by the Commitee of Standards and Cos; Economic Planning Unit, Prime Minister's Office

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APPENDIX B

VALIDITY OF RESEARCH INSTRUMENT

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Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
E1 * E2	147	100.0%	0	0.0%	147	100.0%

E1 * E2 Crosstabulation

		E2		Total
		Agree	Disagree	
E1	Agree	144	1	145
	Disagree	0	2	2
Total		144	3	147

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Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Measure of Agreement Kappa	.797	.198	9.865	.000
N of Valid Cases	147			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

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APPENDIX C

VALIDATION OF RESEARCH INSTRUMENT

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Validation of Research Instrument

Research Title: Identification of the physical factors that contribute to the implementation of Malaysian Lower Primary Science Curriculum

Instruction: Based on your view, please give an assessment of the validity of this instrument.

Part A			
Question No.	Expert 1		
	Agree	Disagree	Comment / Suggestion
1	✓		
2	✓		
3	✓		
4	✓		
5	✓		
6	✓		
7	✓		

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Part B			
Question No.	Expert 1		
	Agree	Disagree	Comment / Suggestion
1	✓		
2	✓		
3	✓		
4	✓		
5	✓		
6	✓		
7	✓		
8	✓		
9	✓		
10	✓		
11	✓		

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Question No.	Expert 1		
	Agree	Disagree	Comment / Suggestion
12	✓		
13	✓		
14	✓		
15	✓		
16	✓		
17	✓		
18	✓		
19	✓		
20	✓		
21		✓	Not related to title
22	✓		
23	✓		
24	✓		
25	✓		

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Question No.	Expert 1		
	Agree	Disagree	Comment / Suggestion
26	✓		
27	✓		
28	✓		
29	✓		
30	✓		
31	✓		
32	✓		
33	✓		
34	✓		
35	✓		
36	✓		
37	✓		
38	✓		
39	✓		

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Question No.	Expert 1		
	Agree	Disagree	Comment / Suggestion
40	✓		
41	✓		
42	✓		
43	✓		
44	✓		
45	✓		
46	✓		
47	✓		
48	✓		
49	✓		
50	✓		
51	✓		
52	✓		
53	✓		

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Question No.	Expert 1		
	Agree	Disagree	Comment / Suggestion
54	✓		
55	✓		
56	✓		
57	✓		
58	✓		
59	✓		
60	✓		
61	✓		
62	✓		
63	✓		
64	✓		
65	✓		
66	✓		
67	✓		

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Question No.	Expert 1		
	Agree	Disagree	Comment / Suggestion
68	✓		
69	✓		
70	✓		
71	✓		
72	✓		
73	✓		
74		✓	Suggest amend the question.
75	✓		
76	✓		
77	✓		
78	✓		
79	✓		
80	✓		
81	✓		

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Question No.	Expert 1		
	Agree	Disagree	Comment / Suggestion
82	✓		
83	✓		
84	✓		
85	✓		
86	✓		
87	✓		
88	✓		
89	✓		
90	✓		
91	✓		
92	✓		
93	✓		
94	✓		
95	✓		

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Question No.	Expert 1		
	Agree	Disagree	Comment / Suggestion
96	✓		
97	✓		
98	✓		
99	✓		
100	✓		
101	✓		
102	✓		
103	✓		
104	✓		
105	✓		
106	✓		
107	✓		
108	✓		
109	✓		

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Question No.	Expert 1		
	Agree	Disagree	Comment / Suggestion
110	✓		
111	✓		
112	✓		
113	✓		
114	✓		
115	✓		
116	✓		
117	✓		
118	✓		
119	✓		
120	✓		
121	✓		
122	✓		
123	✓		

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Question No.	Expert 1		
	Agree	Disagree	Comment / Suggestion
124	✓		
125	✓		
126	✓		
127	✓		
128	✓		
129	✓		
130	✓		
131	✓		
132	✓		
133	✓		
134	✓		
135	✓		
136	✓		
137	✓		

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Question No.	Expert 1		
	Agree	Disagree	Comment / Suggestion
138	✓		
139	✓		
140	✓		
141	✓		
142	✓		
143	✓		
144	✓		
145	✓		
146	✓		
147	✓		
Total	✓		The instruments were developed well and the designed questions are easy to understand

ABU ASWATUDALI SYAWAL BIN MUHAMMAD
Guru Mata Pelajaran

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Validation of Research Instrument

Research Title: Identification of the physical factors that contribute to the implementation of Malaysian Lower Primary Science Curriculum

Instruction: Based on your view, please give an assessment of the validity of this instrument.

Part A			
Question No.	Expert 2		
	Agree	Disagree	Comment / Suggestion
1	/		
2	/		
3	/		
4	/		
5	/		
6	/		
7	/		

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Part B			
Question No.	Expert 2		
	Agree	Disagree	Comment / Suggestion
1	✓		
2	✓		
3	✓		
4	✓		
5	✓		
6	✓		
7	✓		
8	✓		
9	✓		
10	✓		
11	✓		

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Question No.	Expert 2		
	Agree	Disagree	Comment / Suggestion
12	/		
13	/		
14	/		
15	/		
16	/		
17	/		
18	/		
19	/		
20	/		
21	/		
22	/		
23	/		
24	/		
25	/		

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Question No.	Expert 2		
	Agree	Disagree	Comment / Suggestion
26	/		
27	/		
28	/		
29	/		
30	/		
31	/		
32	/		
33	/		
34	/		
35	/		
36	/		
37	/		
38	/		
39	/		

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Question No.	Expert 2		
	Agree	Disagree	Comment / Suggestion
40	✓		
41	✓		
42		✓	Not appropriate to this study.
43	✓		
44	✓		
45		✓	Not relevant item.
46	✓		
47	✓		
48	✓		
49	✓		
50	✓		
51	✓		
52	✓		
53	✓		

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Question No.	Expert 2		
	Agree	Disagree	Comment / Suggestion
54	✓		
55	✓		
56	✓		
57	✓		
58	✓		
59	✓		
60	✓		
61	✓		
62	✓		
63	✓		
64	✓		
65	✓		
66	✓		
67	✓		

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Question No.	Expert 2		
	Agree	Disagree	Comment / Suggestion
68	✓		
69	✓		
70	✓		
71	✓		
72	✓		
73	✓		
74		✓	Less suitable instrument.
75	✓		
76	✓		
77	✓		
78	✓		
79	✓		
80	✓		
81	✓		

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Question No.	Expert 2		
	Agree	Disagree	Comment / Suggestion
82	✓		
83	✓		
84	✓		
85	✓		
86	✓		
87	✓		
88	✓		
89	✓		
90	✓		
91	✓		
92	✓		
93	✓		
94	✓		
95	✓		

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Question No.	Expert 2		
	Agree	Disagree	Comment / Suggestion
96	✓		
97	✓		
98	✓		
99	✓		
100	✓		
101	✓		
102	✓		
103	✓		
104	✓		
105	✓		
106	✓		
107	✓		
108	✓		
109	✓		

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Question No.	Expert 2		
	Agree	Disagree	Comment / Suggestion
110	✓		
111	✓		
112	✓		
113	✓		
114	✓		
115	✓		
116	✓		
117	✓		
118	✓		
119	✓		
120	✓		
121	✓		
122	✓		
123	✓		

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Question No.	Expert 2		
	Agree	Disagree	Comment / Suggestion
124	✓		
125	✓		
126	✓		
127	✓		
128	✓		
129	✓		
130	✓		
131	✓		
132	✓		
133	✓		
134	✓		
135	✓		
136	✓		
137	✓		

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Question No.	Expert 2		
	Agree	Disagree	Comment / Suggestion
138	✓		
139	✓		
140	✓		
141	✓		
142	✓		
143	✓		
144	✓		
145	✓		
146	✓		
147	✓		
Total	144	3	Questions are significantly related to the title.

NURUL NOR SHAHIDA BT ABD TALIB
SEK. MEN. SAINS KEPALA BATAS

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APPENDIX D

VALIDITY OF CHECKLIST

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Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
R1 * R2	45	100.0%	0	0.0%	45	100.0%

R1 * R2 Crosstabulation

			R2		
			NOT AGREE	AGREE	Total
R1	NOT AGREE	Count	5	1	6
		% within R1	83.3%	16.7%	100.0%
		% within R2	100.0%	2.5%	13.3%
		% of Total	11.1%	2.2%	13.3%
	AGREE	Count	0	39	39
		% within R1	0.0%	100.0%	100.0%
		% within R2	0.0%	97.5%	86.7%
		% of Total	0.0%	86.7%	86.7%
Total		Count	5	40	45
		% within R1	11.1%	88.9%	100.0%
		% within R2	100.0%	100.0%	100.0%
		% of Total	11.1%	88.9%	100.0%

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Symmetric Measures

		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance
Measure of Agreement	Kappa	.897	.102	6.047	.000
N of Valid Cases		45			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

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APPENDIX E

CHECKLIST OF RESPONDENTS

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CHECKLIST: RESPONDENT 1

1. Existing Physical Factors in Classroom

No.	Item	Presence	Remarks
1.	Adequate desks and chairs for all students.	/	
2.	Adequate table and chair for teacher.	/	
3.	Adequate seating space for students.	/	
4.	Adequate space for movement between desks.	/	
5.	Adequate space for individual and group activities.	/	
6.	Adequate lighting.	X	2 lamps not function. Doors closed. No natural lighting come in.
7.	Ventilation comfortable.	X	2 fans not function. Class become warm.
8.	Cheerful classroom.	X	No charts and posters hanged around the classroom.
9.	Cupboard	/	

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2. Availability of Teaching Materials/ Resources/ Aids in Classroom

No.	Item	Presence	Remarks
10.	White board or black board	/	
11.	Projector or LCD	X	Not found in the classroom.
12.	Smart board	X	Not found in the classroom.
13.	Science subject bulletin board	/	None of educational materials displayed in bulletin board.
14.	Science gallery showcase	/	None of educational materials displayed in gallery showcase.
15.	Mini library	/	None science related resources found in mini library.
16.	Chatting corner	X	
17.	Science laboratory	X	
18.	Computer facilities	X	
19.	Radio	X	
20.	Television	X	
21.	Astro	X	
22.	Internet services	X	

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3. Interaction and Collaboration in Classroom

No.	Item	Presence	Remarks
23.	Lecture.	/	
24.	Writing notes.	/	
25.	Students work in groups.	/	
26.	Work with individual student.	/	
27.	Question and answer.	/	Few students only answer the questions. Students unable answer experimental related questions.
28.	Teacher demonstrates the instructional materials during lesson.	/	Teacher uses white board and text books.
29.	Students access facilities and resources in the classroom during activities.	X	

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4. Organization and Engagement in Classroom

No.	Item	Presence	Remarks
30.	Teacher arranges desks and chairs in attempt to foster higher order thinking skills.	X	
31.	Teacher influences the content of lesson by utilizing classroom physical factors.	X	
32.	Teacher provides adequate time for students explore their task and access the facilities in the classroom.	X	
33.	Teacher designs activities by accessing physical factors to encourage creativity, collaboration and communication.	X	
34.	Teacher inspires the lesson delivery by integrating classroom facilities.	X	
35.	Teacher engages students in conversation by using facilities.	X	
36.	Teacher engages students in discussion by using facilities.	X	
37.	Teacher engages students in active listening by using facilities.	X	

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5. Students' Behavior Performance

No.	Item	Presence	Remarks
38.	Attentiveness	/	Only few students pay attention during class.
39.	Inattentiveness	/	• Look around the classroom • Students look sleepy and moody during lesson.
40	Active	X	Not interest in doing class tasks.
41.	Overactive	X	
42.	Cooperative	/	Less cooperative during class activities.
43.	Anxiousness	X	
44.	Withdrawal	X	
45.	Aggressive	X	

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CHECKLIST: RESPONDENT 2

1. Existing Physical Factors in Classroom

No.	Item	Presence	Remarks
1.	Adequate desks and chairs for all students.	/	
2.	Adequate table and chair for teacher.	/	
3.	Adequate seating space for students.	/	
4.	Adequate space for movement between desks.	/	
5.	Adequate space for individual and group activities.	/	
6.	Adequate lighting.	X	2 lamps not function. Doors closed. No natural lighting come in.
7.	Ventilation comfortable.	X	1 fan not function. Classroom feel warm.
8.	Cheerful classroom.	X	No science subject related charts and posters hanged around the classroom.
9.	Cupboard	/	

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2. Availability of Teaching Materials/ Resources/ Aids in Classroom

No.	Item	Presence	Remarks
10.	White board or black board	/	
11.	Projector or LCD	X	
12.	Smart board	X	
13.	Science subject bulletin board	/	None of educational materials displayed in bulletin board.
14.	Science gallery showcase	/	None of educational materials displayed in gallery showcase.
15.	Mini library	X	
16.	Chatting corner	X	
17.	Science laboratory	X	
18.	Computer facilities	X	
19.	Radio	X	
20.	Television	X	
21.	Astro	X	
22.	Internet services	X	

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3. Interaction and Collaboration in Classroom

No.	Item	Presence	Remarks
23.	Lecture.	/	
24.	Writing notes.	/	
25.	Students work in groups.	/	
26.	Work with individual student.	/	
27.	Question and answer.	/	Students less active participate in question and answer session. Students unable answer experimental related questions.
28.	Teacher demonstrates the instructional materials during lesson.	/	Teacher uses white board, manila card and text book.
29.	Students access facilities and resources in the classroom during activities.	X	

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4. Organization and Engagement in Classroom

No.	Item	Presence	Remarks
30.	Teacher arranges desks and chairs in attempt to foster higher order thinking skills.	X	
31.	Teacher influences the content of lesson by utilizing classroom physical factors.	X	
32.	Teacher provides adequate time for students explore their task and access the facilities in the classroom.	X	
33.	Teacher designs activities by accessing physical factors to encourage creativity, collaboration and communication.	X	
34.	Teacher inspires the lesson delivery by integrating classroom facilities.	X	
35.	Teacher engages students in conversation by using facilities.	X	
36.	Teacher engages students in discussion by using facilities.	X	
37.	Teacher engages students in active listening by using facilities.	X	

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5. Students' Behavior Performance

No.	Item	Presence	Remarks
38.	Attentiveness	/	Few students only focus on lesson.
39.	Inattentiveness	/	• Chat with classmates. • Walk around the classroom.
40	Active	X	
41.	Overactive	X	
42.	Cooperative	/	Less cooperative during class activities.
43.	Anxiousness	X	
44.	Withdrawal	X	
45.	Aggressive	X	

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APPENDIX F

RELIABILITY OF QUESTIONNAIRE INSTRUMENTS

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Reliability

Scale: All Variables

Case Processing Summary

		N	%
Cases	Valid	25	100.0
	Excluded[a]	0	.0
	Total	25	100.0

a. Listwise deletion based on all variables in the procedure.

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Reliability Statistics

Cronbach's Alpha	N of Items
.943	147

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Item-Total Statistics

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Menggunakan bentuk baris dan lajur dengan laluan dalam bilik darjah.	386.76	1186.190	.090	.943
Menggunakan bentuk tradisi baris dan lajur dalam bilik darjah.	386.88	1190.610	-.003	.944
Menggunakan bentuk persegi berongga dalam bilik darjah.	388.20	1202.333	-.211	.944
Menggunakan bentuk U dalam bilik darjah.	387.88	1192.027	-.029	.944
Menggunakan bentuk tulang herring dalam bilik darjah.	388.12	1200.110	-.198	.944

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Menggunakan gaya bilik mesyuarat.	388.08	1200.077	-.180	.944
Menggunakan gaya teater dalam bilik darjah.	387.28	1178.710	.210	.943
Menggunakan gaya kabaret dalam bilik darjah.	388.32	1199.893	-.172	.944
Menggunakan gaya kluster dalam bilik darjah.	387.40	1161.250	.514	.942
Menggunakan gaya bankuet dalam bilik darjah.	388.48	1197.677	-.144	.944
Saya menyusun atur meja dan kerusi berbeza dari masa ke semasa.	387.00	1177.667	.279	.943
Saya mereka bentuk susunan tempat duduk mudah alih untuk memudahkan pergerakan guru.	387.00	1171.583	.411	.942

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya menyusun atur tempat duduk untuk memudahkan pemantauan aktiviti murid bagi individu dan kumpulan.	386.88	1168.693	.649	.942
Saya mereka kawasan dalam kelas mengikut tugasan individu, bersama rakan kongsi atau kumpulan kecil.	387.24	1180.440	.438	.943
Saya menggantung papan putih atau papan hitam di bahagian tengah hadapan kelas.	386.88	1187.527	.082	.943
Saya menyimpan pemadam, kapur atau pen marker di tempat yang sesuai.	386.76	1195.690	-.137	.943
Saya menggantung jam di bahagian tengah dinding bilik darjah.	387.92	1167.827	.301	.943

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya memasang projektor dan skrin putih di bahagian depan dalam bilik darjah.	387.76	1147.773	.596	.942
Saya meletakkan penyapu, penyodok dan tong sampah di satu sudut jauh dari tempat duduk murid.	386.84	1178.307	.361	.943
Saya memastikan susunan buku dalam rak murid kemas dan rapi bagi memudahkan mereka melihat dan memilih.	387.28	1185.960	.122	.943

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya menyusun pelbagai bahan bacaan dan bahan pembelajaran di sudut mini perpustakaan dari tahap mudah ke tahap kompleks mengikut tahap keupayaan murid dalam kelas.	387.64	1206.907	-.311	.944
Saya meletakkan perabot dengan kemas dan teratur untuk mewujudkan ruang yang luas.	386.88	1189.110	.051	.943
Saya menyusun dan menyesuaikan perabot berorientasikan keperluan dan minat murid.	387.08	1198.910	-.203	.944

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya menyusun perabot dengan teratur dan rapi dalam bilik darjah bagi menghalang tingkap daripada menyekat kemasukan udara dan cahaya.	387.44	1175.590	.254	.943
Sekolah saya menyediakan meja dan kerusi mengikut saiz murid.	386.72	1194.543	-.085	.944
Sekolah saya menyediakan meja dan kerusi untuk guru.	386.76	1178.773	.242	.943
Meja dan kerusi dalam keadaan baik.	387.04	1179.873	.306	.943
Saya menyediakan tempat duduk yang selesa mengikut tahap penguasaan murid.	386.76	1185.023	.143	.943

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Sekolah saya menyediakan pemadam, pen marker atau kapur dalam bilik darjah.	386.56	1172.923	.573	.942
Sekolah saya menyediakan papan putih atau papan hitam mengikut saiz standard bilik darjah.	386.72	1175.460	.286	.943
Sekolah saya memuatkan projektor dan skrin putih dalam bilik darjah bagi pengajaran power point.	388.28	1148.793	.542	.942

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Sekolah saya menyediakan layar paparan interaktif dalam bilik darjah bagi proses pengajaran dan pembelajaran interaktif antara guru dengan murid serta murid dengan murid.	388.96	1187.040	.085	.943
Sekolah saya menyediakan rak untuk murid bagi menjaga sumber peribadi, buku aktiviti serta sedang dan kerja yang telah disiap.	387.84	1196.723	-.167	.944

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya menyimpan bahan dan sumber penting pada rak bawah bagi memudahkan murid mengambil dan mengembalikan secara bebas.	387.56	1172.173	.442	.942
Sekolah saya menyediakan rak bagi setiap murid untuk menyimpan buku dan barangan aktiviti peribadi.	388.24	1192.940	-.049	.944
Sekolah saya menyediakan papan kenyataan di pintu masuk bilik darjah.	387.28	1168.710	.390	.942
Sekolah saya menyediakan almari untuk menyimpan fail, sumber serta bahan penting dalam kelas.	386.68	1186.060	.140	.943

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya menggalakkan penggunaan maksimum papan buletin bagi mata pelajaran Sains.	388.04	1163.290	.675	.942
Saya memaparkan aktiviti dan hasil kerja murid dalam galeri sains pameran.	388.44	1169.173	.419	.942
Saya menyimpan bahan-bahan sains dalam almari kaca untuk mempamerkan dalam bilik darjah.	388.80	1171.667	.477	.942
Saya menyusun ruang bilik darjah mengikut keselesaan murid.	386.96	1192.957	-.051	.943

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya menyediakan ruang berasingan bagi setiap pelajar untuk menyimpan barangan pembelajaran peribadi.	387.96	1190.790	-.006	.944
Saya menyediakan ruang dalam bilik darjah untuk menampung keperluan khas murid kurang upaya (jika mendaftar).	388.48	1176.177	.369	.943
Saya menampung ruang yang selesa dan tenang termasuk meja dan kerusi yang selesa.	387.08	1184.493	.185	.943
Sekolah saya meluaskan laluan pintu masuk bagi murid yang menggunakan kerusi roda atau tongkat untuk kawasan akses dalam kelas.	387.96	1166.207	.372	.942

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya memaparkan dinding bilik darjah dengan hasil kerja murid.	387.28	1190.877	.000	.943
Saya menghias dinding bilik darjah dengan lukisan berwarna-warni dan menarik.	387.20	1202.917	-.306	.944
Saya membiarkan ruang dinding kosong bagi membantu murid mempunyai fokus yang jelas.	387.92	1191.160	-.008	.943
Saya menyediakan sudut mini perpustakaan dalam bilik darjah dengan susunan buku dan sumber rujukan dari tahap senang hingga kompleks.	387.92	1200.577	-.163	.944

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya mewujudkan sudut atau ruang kecil untuk mempamerkan hasil kerja murid.	387.68	1173.143	.260	.943
Saya menyediakan sudut parking lot untuk murid meluahkan pertanyaan, idea serta rasa tidak puas hati.	388.64	1191.407	-.017	.944
Saya membahagikan bilik darjah kepada kawasan senyap dan kawasan bising.	388.24	1186.107	.089	.943
Saya menyusun perabot dan menyediakan ruang yang luas kepada murid untuk diperhatikan dan diselia dari mana-mana sudut pandangan dalam bilik darjah.	387.40	1207.250	-.395	.944

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya memaparkan jadual waktu pada papan kenyataan.	386.72	1206.543	-.389	.944
Saya memaparkan kalendar pada papan kenyataan.	386.80	1182.750	.231	.943
Saya memaparkan jadual tugasan pada papan kenyataan.	386.60	1186.417	.137	.943
Saya memaparkan carta organisasi kelas pada papan kenyataan.	386.88	1189.777	.012	.944
Saya memaparkan pelan keselamatan pada papan kenyataan.	387.32	1181.893	.211	.943

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Sekolah saya menggalakkan elemen-elemen dalam ruang selesa berorientasikan keperluan murid seperti dinding, lantai, siling, pintu dan tingkap.	386.72	1198.293	-.212	.944
Saya masukkan elemen-elemen lembut seperti tikar dan permaidani dalam bilik darjah.	388.64	1161.490	.493	.942
Saya masukkan sentuhan suasana rumah seperti bunga semulajadi atau buatan, langsir, tikar dan alas meja.	387.56	1163.340	.542	.942

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya menghias bilik darjah dengan bahan semulajadi seperti pokok bunga serta membela ikan dalam akuarium kecil.	388.00	1164.417	.368	.942
Sekolah saya menyediakan kipas dan serta tingkap untuk mendapatkan udara segar.	386.52	1186.093	.161	.943
Saya sentiasa membuka pintu dan tingkap bagi pengudaraan dalam bilik darjah.	386.44	1188.673	.090	.943
Saya mewujudkan suasana cahaya matahari semulajadi daripada tingkap, lampu bilik darjah dan cermin yang memantulkan cahaya semulajadi.	386.76	1187.940	.083	.943

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Sekolah saya menyediakan tingkap dan lampu yang mencukupi bagi memperoleh pencahayaan yang mencukupi dalam bilik darjah.	386.84	1187.140	.107	.943
Saya sentiasa membuka pintu dan tingkap bagi pencahayaan dalam bilik darjah.	386.64	1195.823	-.146	.943
Sekolah saya menyediakan meja panjang dan kerusi sesuai dengan saiz murid.	387.08	1141.910	.828	.941
Sekolah saya menyediakan papan putih atau papan hitam yang bersaiz standard dalam makmal.	387.24	1140.107	.795	.941

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Sekolah saya menyediakan projektor atau LCD dan skrin putih dalam makmal.	388.04	1155.623	.551	.942
Sekolah saya menyediakan sinki dan pili air mengikut ketinggian murid dalam makmal.	387.40	1163.083	.676	.942
Sekolah saya menyediakan kabinet atau almari mengikut ketinggian murid dalam makmal.	387.28	1142.543	.774	.941
Sekolah saya mewujudkan perabot dan lekapan dalam makmal yang mudah diakses oleh murid kurang upaya.	388.20	1154.167	.705	.941
Sekolah saya menyediakan makmal tanpa tiang di dalam.	387.48	1173.260	.395	.942

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Sekolah saya menyediakan papan kenyataan dalam makmal.	387.48	1149.260	.700	.941
Saya menggalakkan susun atur yang rapi dalam makmal.	386.84	1159.640	.639	.942
Saya menyusun meja dan kerusi murid untuk mudah dilihat.	386.92	1168.327	.514	.942
Sekolah saya menetapkan papan hitam atau papan putih yang bersaiz standard di bahagian tengah dalam makmal.	387.32	1170.560	.345	.943
Saya meletakkan perabot yang sesuai dengan teratur bagi memudahkan pergerakan dan pemerhatian.	387.24	1154.773	.782	.941

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya menyimpan kapur atau pen marker serta pemadam di tempat yang sesuai dalam makmal.	386.84	1170.723	.408	.942
Saya menggantung jam di bahagian tengah hadapan makmal.	387.68	1153.060	.571	.942
Saya meletakkan penyapu, tong sampah dan penyodok di satu sudut dalam bilik makmal.	386.96	1178.790	.315	.943
Sekolah saya menyediakan setiap meja dengan soket elektrik dalam makmal.	388.28	1177.460	.271	.943
Saya menyimpan semua peralatan makmal dan bahan kimia dalam almari atau kabinet yang dikunci.	387.68	1153.893	.765	.941

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya menyimpan dan mempamerkan peralatan mudah pecah di tempat yang selamat dalam makmal.	387.52	1147.427	.598	.942
Sekolah saya menyediakan projektor slaid dalam makmal.	388.08	1142.243	.741	.941
Sekolah saya menyediakan set komputer dalam makmal.	388.92	1176.410	.296	.943
Saya mewujudkan sudut untuk mempamerkan hasil kerja eksperimen murid dalam makmal.	387.92	1150.410	.616	.942
Saya mewujudkan suasana yang luas dalam makmal bagi memudahkan pergerakan murid.	387.28	1178.543	.249	.943

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya menyediakan ruang antara perabot dalam makmal bagi peredaran atau pergerakan guru dan murid.	387.40	1168.750	.358	.942
Sekolah saya menyediakan ruang pintu terbuka yang luas bagi mengelakkan kesesakan dalam makmal.	387.00	1162.750	.554	.942
Sekolah saya menyediakan dua jalan keluar dalam makmal pada jarak jauh.	387.96	1150.707	.649	.941
Saya memaparkan jadual waktu kemasukan makmal pada papan kenyataan dalam makmal.	387.36	1148.073	.652	.941

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya memaparkan kalendar pada papan kenyataan dalam makmal.	387.36	1188.240	.040	.943
Saya memaparkan jadual tugasan pada papan kenyataan dalam makmal.	387.20	1182.833	.161	.943
Saya memaparkan carta organisasi kelas pada papan kenyataan dalam makmal.	387.40	1184.083	.130	.943
Saya memaparkan pelan keselamatan pada papan kenyataan dalam makmal.	387.24	1157.107	.730	.942
Saya memaparkan peraturan-peraturan makmal pada papan kenyataan dalam makmal.	387.24	1151.940	.720	.941

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya menyediakan buku rekod dalam makmal bagi menyenarai kejadian-kejadian dalam makmal.	387.56	1139.423	.735	.941
Saya menyediakan buku panduan makmal dalam makmal.	387.44	1147.507	.793	.941
Saya merangkumkan elemen lembut seperti permaidani dalam makmal.	388.48	1155.927	.463	.942
Saya menghias ruang dalaman makmal dengan cat serta langsir yang terang dan lembut.	387.88	1151.277	.665	.941
Saya menguruskan makmal dengan sistem pengudaraan yang baik, sihat dan selamat.	387.04	1146.123	.788	.941

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Sekolah saya menyediakan peralatan kawalan yang mudah dicapai oleh murid yang menggunakan kerusi roda dan tongkat.	388.20	1157.167	.602	.942
Sekolah saya menyediakan kipas dan tingkap untuk mendapatkan udara segar dalam makmal.	386.80	1171.083	.439	.942
Saya sentiasa membuka pintu dan tingkap bagi pengudaraan dalam makmal.	386.92	1168.327	.514	.942

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya mewujudkan suasana cahaya matahari semulajadi daripada tingkap, lampu makmal dan cermin yang memantulkan cahaya semulajadi dalam makmal.	386.80	1170.167	.459	.942
Sekolah saya menyediakan tingkap dan lampu yang mencukupi bagi memperoleh pencahayaan yang mencukupi dalam makmal.	386.92	1161.410	.674	.942
Saya sentiasa membuka pintu dan tingkap bagi pencahayaan dalam makmal.	386.96	1160.957	.697	.942
Saya memaparkan peraturan-peraturan makmal di pintu masuk bilik makmal.	387.16	1154.973	.627	.942

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya memaparkan prosedur keselamatan latihan kebakaran dan laluan keluar dari makmal di setiap sudut dan di pintu masuk makmal.	387.36	1146.490	.712	.941
Sekolah saya menyediakan peti kecemasan dalam makmal.	387.96	1182.123	.125	.943
Sekolah saya menyediakan alat pemadam api dalam makmal.	388.44	1169.340	.387	.942
Sekolah saya menyediakan baldi dipenuhi dengan pasir dalam makmal.	389.28	1191.127	.000	.943

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Sekolah saya memasang penggera sensor seperti sensor penindasan kebakaran dan sensor haba dalam makmal untuk tujuan keselamatan.	389.20	1196.417	-.280	.943
Saya melabelkan semua bahan kimia dengan jelas untuk mudah dilihat oleh murid.	387.48	1132.427	.857	.941
Saya melabelkan nama peralatan dalam makmal dengan jelas.	387.24	1144.107	.730	.941
Saya menyimpan semua bahan kimia dalam bekas asal.	387.52	1143.677	.744	.941
Saya memastikan sambungan fleksibel untuk talian elektrik dan air dalam makmal.	387.72	1181.710	.226	.943

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya memastikan bekalan kuasa elektrik yang rendah dalam makmal sebelum bermula kelas.	387.68	1175.643	.309	.943
Saya menggantung poster dan carta di sekitar bilik darjah yang mudah dilihat.	386.88	1185.360	.120	.943
Saya memaparkan carta menarik untuk mengumumkan keputusan pencapaian aktiviti dan peperiksaan mata pelajaran Sains.	387.72	1187.377	.074	.943
Saya menyediakan buku rujukan semasa proses pengajaran dan pembelajaran.	387.04	1188.873	.055	.943

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya menyediakan buku aktiviti atau lembaran kerja sewaktu proses pengajaran dan pembelajaran.	386.44	1185.757	.203	.943
Saya melabelkan buku aktiviti, buku nota, buku rujukan dan buku teks dengan jelas.	386.72	1198.793	-.226	.944
Saya menggunakan papan putih atau papan hitam semasa proses pengajaran dan pembelajaran.	386.68	1158.060	.677	.942
Saya menggunakan layar paparan interaktif semasa proses pengajaran dan pembelajaran.	389.20	1189.417	.086	.943

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Saya menyediakan makmal sains bagi murid membuat eksperimen.	387.68	1153.060	.723	.941
Sekolah saya menyediakan kemudahan komputer dalam bilik darjah.	389.00	1190.583	.004	.943
Sekolah saya menyediakan kemudahan komputer dalam makmal.	389.12	1188.193	.108	.943
Sekolah saya menyediakan projektor atau LCD dalam bilik darjah.	388.20	1147.417	.696	.941
Sekolah saya menyediakan projektor atau LCD dalam makmal.	388.12	1147.193	.709	.941

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Sekolah saya memasang layar paparan interaktif dalam bilik darjah.	389.28	1191.127	.000	.943
Sekolah saya menyediakan mesin cetak dalam bilik darjah.	389.28	1191.127	.000	.943
Sekolah saya menyediakan televisyen dalam bilik darjah.	389.16	1195.890	-.212	.943
Sekolah saya menyediakan radio dalam bilik darjah.	389.12	1205.360	-.553	.944
Sekolah saya menyediakan chrome book dalam bilik darjah.	389.08	1198.827	-.230	.944
Sekolah saya menyediakan pemain CD/DVD dalam bilik darjah.	389.00	1201.167	-.223	.944
Sekolah saya menyediakan ASTRO dalam bilik darjah.	389.20	1196.417	-.280	.943

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Sekolah saya menyediakan Interactive CD-ROMs dalam bilik darjah.	389.20	1196.417	-.280	.943
Sekolah saya menyediakan internet dalam bilik darjah.	388.32	1196.560	-.094	.944
Sekolah saya mewujudkan pondok bagi proses pengajaran dan pembelajaran.	387.48	1179.593	.282	.943
Sekolah saya menyediakan makmal bagi proses pengajaran dan pembelajaran.	387.52	1152.677	.545	.942
Sekolah saya menyediakan taman flora untuk aktiviti pembelajaran murid.	387.56	1148.173	.698	.941
Sekolah saya menyediakan taman fauna untuk aktiviti pembelajaran murid.	389.16	1199.223	-.357	.944

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Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Sekolah saya menyediakan laluan alam semulajadi dalam kawasan sekolah.	388.72	1182.043	.194	.943

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APPENDIX G

LOWER PRIMARY SCIENCE TEACHERS SURVEY QUESTIONNAIRES

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Bilangan No. | | | | |

FAKULTI SAINS DAN MATEMATIK

UNIVERSITI PENDIDIKAN SULTAN IDRIS

BORANG SOAL SELIDIK

Pengenalpastian Faktor-Faktor Fizikal yang Menyumbang kepada Pelaksanaan Kurikulum Sains Sekolah Rendah Malaysia

Tuan/Puan yang di hormati,

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Soal selidik ini adalah bertujuan untuk mengumpul maklumat berkenaan pengenalpastian faktor-faktor fizikal yang menyumbang kepada pelaksanaan Kurikulum Sains Sekolah Rendah Malaysia. Segala maklumat yang diperolehi dirahsiakan dan digunakan untuk tujuan penyelidikan akademik sahaja. Soal selidik ini mengandungi lima bahagian seperti berikut:

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Bahagian A : Maklumat Guru

Bahagian B : Reka bentuk bilik darjah

Bahagian C : Persekitaran fizikal dalam bilik darjah

Bahagian D : Persekitaran fizikal dalam makmal sains

Bahagian E : Kemudahan

Sila jawab SEMUA soalan pada semua bahagian secara teliti dengan mengembalikan semula borang soal selidik ini setelah selesai dijawab. Para responden juga diharap dapat menjawab semua soalan dengan jujur. Jutaan terima kasih kepada anda kerana telah bekerjasama memberikan maklumat dan meluangkan masa untuk mengisi borang soal selidik ini.

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Yang benar,

.....

KALPANA DEEPA VENI A/P VELOOSAMY

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BAHAGIAN A: DEMOGRAFIK DATA

Arahan: Tandakan (√) di dalam kotak yang sesuai.

1. Jantina

☐ Lelaki ☐ Perempuan

2. Bangsa

☐ Melayu ☐ India

☐ Cina ☐ Lain-lain

3. Umur

☐ 21- 25 tahun ☐ 41-45 tahun

☐ 26-30 tahun ☐ 46-50 tahun

☐ 31-35 tahun ☐ 51-55 tahun

☐ 36-40 tahun ☐ 56-60 tahun

4. Kelulusan Akademik

☐ Sijil Perguruan ☐ Sarjana

☐ Diploma ☐ PHD

☐ Sarjana Muda

5. Taraf

☐ Opsyen

☐ Bukan Opsyen

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6. Pengalaman mengajar mata pelajaran Sains

☐ 0-5 tahun

☐ 6-10 tahun

☐ 10-15 tahun

☐ > 15 tahun

7. Jenis sekolah

☐ SK

☐ SJKT

☐ SJKC

8. Kedudukan sekolah

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☐ Bandar

☐ Luar bandar

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BAHAGIAN B: Reka bentuk bilik darjah

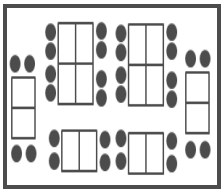
Sila tandakan (✓) pada ruang yang disediakan untuk menentukan penetapan susun atur dalam bilik darjah pada setiap penyataan berikut mengikut skala di bawah.

1. Tidak Pernah (TP) / Never

2. Jarang (J) / Seldom

3. Kadang-kadang (KK) / Sometimes

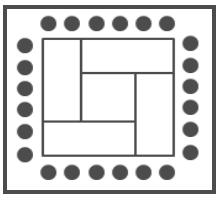
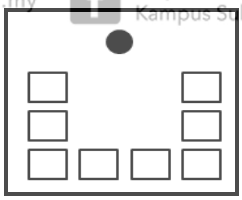
4. Kerap (K) / Often

1.1 Reka Bentuk Bilik Darjah **Classroom Design**					
No.	**Item**	**1** **TP**	**2** **J**	**3** **KK**	**4** **K**
1.	Menggunakan bentuk baris dan lajur dengan laluan dalam bilik darjah. *Use verb shape with path in classroom.* 				

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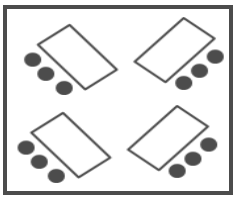
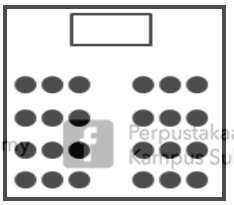
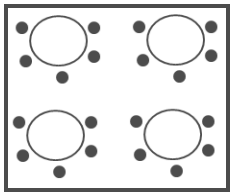
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No.	Item	1 TP	2 J	3 KK	4 K
2.	Menggunakan bentuk persegi berongga dalam bilik darjah. *Use hollow square shape in classroom.* 				
3.	Menggunakan bentuk U dalam bilik darjah. *Use U shape in classroom.* 				

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No.	Item	1 TP	2 J	3 KK	4 K
4.	Menggunakan bentuk tulang herring dalam bilik darjah. *Use herring bone shape in classroom.* 				
5.	Menggunakan gaya teater dalam bilik darjah. *Use theatre style in classroom.* 				
6.	Menggunakan gaya kabaret dalam bilik darjah. *Use cabaret style in classroom.* 				

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Sila tandakan (✓) pada ruang yang disediakan untuk menyatakan tahap kekerapan anda dengan kenyataan di bawah dalam kotak jawapan anda.

1. **Tidak Pernah (TP) / Never**
2. **Jarang (J) / Seldom**
3. **Kadang-Kadang (KK) / Sometimes**
4. **Kerap (K) / Often**

1.2 Susun atur perabot dan sumber dalam bilik darjah **Furniture layout and resources in the classroom**					
No.	**Item**	**1** **TP**	**2** **J**	**3** **KK**	**4** **K**
7.	Saya menyusun atur meja dan kerusi berbeza dari masa ke semasa. *I arrange desks and chairs in different form from time to time.*				
8.	Saya mereka bentuk susunan tempat duduk mudah alih untuk memudahkan pergerakan guru. *I design mobile seating arrangement for teacher ease movement.*				

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No.	Item	1 TP	2 J	3 KK	4 K
9.	Saya menyusun atur tempat duduk untuk memudahkan pemantauan aktiviti murid bagi individu dan kumpulan. *I arrange seats to facilitate monitoring the students for both individual and small group tasks.*				
10.	Saya menggantung papan putih atau papan hitam di bahagian tengah hadapan kelas. *I place white board or black board at center in front of classroom.*				
11.	Saya menyimpan pemadam, kapur atau pen marker di tempat yang sesuai. *I place duster, chalks or marker pens at appropriate place.*				
12.	Saya menggantung jam di bahagian tengah dinding bilik darjah. *I hang the clock on center of classroom wall.*				

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No.	Item	1 TP	2 J	3 KK	4 K
13.	Saya memasang projektor dan skrin putih di bahagian depan dalam bilik darjah. *I install projector and white screen in front of classroom.*				
14.	Saya meletakkan penyapu, penyodok dan tong sampah di satu sudut jauh dari tempat duduk murid. *I place broom, shovel and trash can at one corner in distance from students' seats.*				
15.	Saya memastikan susunan buku dalam rak murid kemas dan rapi bagi memudahkan mereka melihat dan memilih. *I make sure in keeping books in the students' shelves in neat and uncluttered for them to see and choose their choice easily.*				

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No.	Item	1 TP	2 J	3 KK	4 K
16.	Saya menyusun dan menyesuaikan perabot berorientasikan keperluan dan minat murid. *I arrange and adapt the furnitures oriented students needs and interests.*				
17.	Saya menyusun perabot dengan teratur dan rapi dalam bilik darjah bagi menghalang tingkap daripada menyekat kemasukan udara dan cahaya. *I arrange the furnitures in order and systematically in classroom to prevent the windows blocking entry of air and light.*				

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BAHAGIAN C: Persekitaran fizikal dalam bilik darjah

Sila tandakan (✓) pada ruang yang disediakan untuk menyatakan tahap persetujuan anda dengan kenyataan di bawah dalam kotak jawapan anda.

1. **Sangat Tidak Setuju (STS) / Strongly not agree**
2. **Tidak Setuju (TS) / Not agree**
3. **Setuju (S) / Agree**
4. **Sangat Setuju (SS) / Strongly agree**

2.1 Perabot sedia ada dalam bilik darjah **The existing furniture in the classroom**					
No.	**Item**	**1** **STS**	**2** **TS**	**3** **S**	**4** **SS**
18.	Sekolah saya menyediakan meja dan kerusi mengikut saiz murid. *My school provides students sized desks and chairs.*				
19.	Meja dan kerusi dalam keadaan baik. *Desks and chairs are in good condition.*				

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No.	Item	1 STS	2 TS	3 S	4 SS
20.	Saya menyediakan tempat duduk yang selesa mengikut tahap penguasaan murid. *I provide comfortable seating for different levels of students.*				
21.	Sekolah saya menyediakan pemadam, pen marker atau kapur dalam bilik darjah. *My school provides duster, marker pens or chalks in classroom.*				
22.	Sekolah saya menyediakan papan putih atau papan hitam mengikut saiz standard bilik darjah. *My school provides a standard sized of white board or black board in classroom.*				
23.	Sekolah saya memuatkan projektor dan skrin putih dalam bilik darjah bagi pengajaran power point. *My school accomodates projector and white screen in classroom for power point teaching.*				

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No.	Item	1 STS	2 TS	3 S	4 SS
24.	Sekolah saya menyediakan layar paparan interaktif dalam bilik darjah bagi proses pengajaran dan pembelajaran interaktif antara guru dengan murid serta murid dengan murid. *My school provides smart board in classroom for interactive process of teaching and learning between teacher with student and student with student.*				
25.	Sekolah saya menyediakan rak untuk murid bagi menjaga sumber peribadi, buku aktiviti serta sedang dan kerja yang telah disiap. *My school prepares shelves for students to keep their personal resources, activity books, ongoing and completed work stuffs.*				
26.	Saya menyimpan bahan dan sumber penting pada rak bawah bagi memudahkan murid mengambil dan mengembalikan secara bebas. *I store important materials and resources on low shelves for students easy to take and return them independently.*				

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No.	Item	1 STS	2 TS	3 S	4 SS
27.	Sekolah saya menyediakan papan kenyataan di pintu masuk bilik darjah. *My school provides notice board at the entrance of classroom.*				
28.	Sekolah saya menyediakan almari untuk menyimpan fail, sumber serta bahan penting dalam kelas. *My school provides cupboard for storing essential files, resources and materials in classroom.*				
29.	Saya menggalakkan penggunaan maksimum papan buletin bagi mata pelajaran Sains. *I encourage on maximum usage of science subject bulletin board.*				
30.	Saya memaparkan aktiviti dan hasil kerja murid dalam galeri sains pameran. *I display students activities in science gallery showcase.*				

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2.2 Sudut dan ruang dalam bilik darjah The angle and space in the classroom					
No.	**Item**	**1** **STS**	**2** **TS**	**3** **S**	**4** **SS**
31.	Saya menyusun ruang bilik darjah mengikut keselesaan murid. *I organize the classroom space well with students comfort.*				
32.	Saya memaparkan dinding bilik darjah dengan hasil kerja murid. *I display classroom wall with rich array of students works and activities.*				
33.	Saya menyediakan sudut mini perpustakaan dalam bilik darjah dengan susunan buku dan sumber rujukan dari tahap senang hingga kompleks. *I create a mini library corner in classroom with books and reference books ranging from easy to complex level.*				

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No.	Item	1 STS	2 TS	3 S	4 SS
34.	Saya menyediakan sudut parking lot untuk murid meluahkan pertanyaan, idea serta rasa tidak puas hati. *I provide parking lot corner for students to ask questions, express their ideas and grievances.*				
35.	Saya membahagikan bilik darjah kepada kawasan senyap dan kawasan bising. *I divide classroom into silent and noisy areas.*				

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2.3 Kandungan papan kenyataan dalam bilik darjah Content of notice board in the classroom					
No.	**Item**	**1** **STS**	**2** **TS**	**3** **S**	**4** **SS**
36.	Saya memaparkan jadual waktu pada papan kenyataan. *I display time table on notice board.*				
37.	Saya memaparkan kalendar pada papan kenyataan. *I display calendar on notice board.*				
38.	Saya memaparkan jadual tugasan pada papan kenyataan. *I display daily routine task on notice board.*				
39.	Saya memaparkan pelan keselamatan pada papan kenyataan. *I display safety plan on notice board.*				

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2.4 Elemen-elemen penting dalam bilik darjah Key elements in the classroom					
No.	**Item**	**1** **STS**	**2** **TS**	**3** **S**	**4** **SS**
40.	Saya masukkan elemen-elemen lembut seperti tikar dan permaidani dalam bilik darjah. *I include soft elements such as rugs and lounge carpets in classroom.*				
41.	Saya masukkan sentuhan suasana rumah seperti bunga semulajadi atau buatan, langsir, tikar dan alas meja. *I include homelike touches such as natural or artificial flowers, curtains, welcome mat, table and desks clothes.*				
42.	Saya menghias bilik darjah dengan bahan semulajadi seperti pokok bunga serta membela ikan dalam akuarium kecil. *I decorate classroom with natural items such as flowers and rear fish in small aquarium.*				

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2.5 Pengudaraan dalam bilik darjah Ventilation in classroom					
No.	**Item**	**1 STS**	**2 TS**	**3 S**	**4 SS**
43.	Sekolah saya menyediakan kipas dan serta tingkap untuk mendapatkan udara segar. *My school provides fans and windows to get fresh air.*				

2.6 Pencahayaan dalam bilik darjah The lighting in classroom					
No.	**Item**	**1 STS**	**2 TS**	**3 S**	**4 SS**
44.	Sekolah saya menyediakan tingkap dan lampu yang mencukupi bagi memperoleh pencahayaan yang mencukupi dalam bilik darjah. *My school provides sufficient windows and lamps for adequate lighting in classroom.*				
45.	Saya sentiasa membuka pintu dan tingkap bagi pencahayaan dalam bilik darjah. *I always open doors and windows for lighting in classroom.*				

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BAHAGIAN D: Persekitaran fizikal dalam makmal sains

Sila tandakan (✓) pada ruang yang disediakan untuk menyatakan tahap persetujuan dengan kenyataan di bawah dalam kotak jawapan anda.

1. **Sangat Tidak Setuju (STS) / Strongly not agree**
2. **Tidak Setuju (TS) / Not agree**
3. **Setuju (S) / Agree**
4. **Sangat Setuju (SS) / Strongly agree**

3.1 Perabot sedia ada dalam makmal **The existing furniture in the laboratory**					
No.	**Item**	**1** **STS**	**2** **TS**	**3** **S**	**4** **SS**
46.	Sekolah saya menyediakan meja panjang dan kerusi sesuai dengan saiz murid. *My school provides long tables and chairs of student sized in laboratory.*				
47.	Sekolah saya menyediakan papan putih atau papan hitam yang bersaiz standard dalam makmal. *My school provides standard sized of white board or black board in laboratory.*				

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No.	Item	1 STS	2 TS	3 S	4 SS
48.	Sekolah saya menyediakan projektor atau LCD dan skrin putih dalam makmal. *My school provides projector or LCD and white screen in laboratory.*				
49.	Sekolah saya menyediakan sinki dan pili air mengikut ketinggian murid dalam makmal. *My school accomodates sinks and water faucets or taps mounted at students height in laboratory.*				
50.	Sekolah saya menyediakan kabinet atau almari mengikut ketinggian murid dalam makmal. *My school provides cabinets or cupboards at students height level in laboratory.*				
51.	Sekolah saya mewujudkan perabot dan lekapan dalam makmal yang mudah diakses oleh murid kurang upaya. *My school provides furnitures and fixtures for easily accessed by handicapped students.*				

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No.	Item	1 STS	2 TS	3 S	4 SS
52.	Sekolah saya menyediakan makmal tanpa tiang di dalam. *My school creates laboratory without pillars inside.*				
53.	Sekolah saya menyediakan papan kenyataan dalam makmal. *My school provides notice board in laboratory.*				

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Sila tandakan (✓) pada ruang yang disediakan untuk menyatakan tahap kekerapan anda dengan kenyataan di bawah dalam kotak jawapan anda.

1. **Tidak Pernah (TP) / Never**
2. **Jarang (J) / Seldom**
3. **Kadang-kadang (KK) / Sometimes**
4. **Kerap (K) / Often**

3.2 Susun atur perabot sedia ada dalam makmal **The layout of existing furniture in the laboratory**					
No.	**Item**	**1** **TP**	**2** **J**	**3** **KK**	**4** **K**
54.	Saya menyusun meja dan kerusi murid untuk mudah dilihat. *I arrange students desks and chairs in proper for easily visible.*				
55.	Saya meletakkan perabot yang sesuai dengan teratur bagi memudahkan pergerakan dan pemerhatian. *I place appropriate furnitures neatly as to facilitate easy movement and observation.*				

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3.3 Alatan sedia ada dalam makmal The existing instruments in the laboratory					
No.	**Item**	**1** **TP**	**2** **J**	**3** **KK**	**4** **K**
56.	Saya menyimpan kapur atau pen marker serta pemadam di tempat yang sesuai dalam makmal. *I place chalks or marker pens and duster at appropriate place in laboratory.*				
57.	Saya menyimpan dan mempamerkan peralatan mudah pecah di tempat yang selamat dalam makmal. *I store and display fragile or breakable items in safe places in laboratory.*				

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3.4 Sudut dan ruang dalam makmal The angle and space in the laboratory					
No.	**Item**	**1** **TP**	**2** **J**	**3** **KK**	**4** **K**
58.	Saya mewujudkan sudut untuk mempamerkan hasil kerja eksperimen murid dalam makmal. *I create corners to display students experimental works in laboratory.*				

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3.5 Kandungan papan kenyataan dalam makmal The content of notice board in the laboratory					
No.	**Item**	**1** **TP**	**2** **J**	**3** **KK**	**4** **K**
59.	Saya memaparkan jadual waktu kemasukan makmal pada papan kenyataan dalam makmal. *I display time table of entry laboratory on notice board in laboratory.*				
60.	Saya memaparkan kalendar pada papan kenyataan dalam makmal. *I display calendar on notice board in laboratory.*				

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No.	Item	1 TP	2 J	3 KK	4 K
61.	Saya memaparkan jadual tugasan pada papan kenyataan dalam makmal. *I display daily routine task on notice board in laboratory.*				
62.	Saya memaparkan pelan keselamatan pada papan kenyataan dalam makmal. *I display safety plan on notice board in laboratory.*				
63.	Saya memaparkan peraturan-peraturan makmal pada papan kenyataan dalam makmal. *I display rules and regulations of laboratory on notice board in laboratory.*				

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3.6 Sumber sedia ada dalam makmal The existing resources in the laboratory					
No.	**Item**	**1** **TP**	**2** **J**	**3** **KK**	**4** **K**
64.	Saya menyediakan buku rekod dalam makmal bagi menyenarai kejadian-kejadian dalam makmal. *I provide record book in laboratory for laboratory incidents.*				
65.	Saya menyediakan buku panduan makmal dalam makmal. *I prepare laboratory handbook for students in laboratory.*				

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3.7 Pencahayaan dalam makmal The lighting in the laboratory					
No.	**Item**	**1** **TP**	**2** **J**	**3** **KK**	**4** **K**
66.	Saya mewujudkan suasana cahaya matahari semulajadi daripada tingkap, lampu makmal dan cermin yang memantulkan cahaya semulajadi dalam makmal. *I create an atmosphere with natural sunlight from windows, laboratory lamps and mirrors reflecting natural light in laboratory.*				
67.	Sekolah saya menyediakan tingkap dan lampu yang mencukupi bagi memperoleh pencahayaan yang mencukupi dalam makmal. *My school provides sufficient windows and lamps for adequate lighting in laboratory.*				
68.	Saya sentiasa membuka pintu dan tingkap bagi pencahayaan dalam makmal. *I always open doors and windows for lighting in laboratory.*				

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3.8 Keselamatan dalam makmal Safety in the laboratory					
No.	**Item**	**1** **TP**	**2** **J**	**3** **KK**	**4** **K**
69.	Sekolah saya menyediakan peti kecemasan dalam makmal. *My school provides first aid kit box in laboratory.*				
70.	Sekolah saya menyediakan alat pemadam api dalam makmal. *My school provides fire extinguisher in laboratory.*				
71.	Sekolah saya menyediakan baldi dipenuhi dengan pasir dalam makmal. *My school provides sand bucket in laboratory.*				
72.	Sekolah saya memasang penggera sensor seperti sensor penindasan kebakaran dan sensor haba dalam makmal untuk tujuan keselamatan. *My school places alarms sensors such as fire suppression sensor and heat sensor laboratory for safety purpose.*				

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No.	Item	1 TP	2 J	3 KK	4 K
73.	Saya melabelkan semua bahan kimia dengan jelas untuk mudah dilihat oleh murid. *I label all chemicals clearly for students easy identification.*				
74.	Saya melabelkan nama peralatan dalam makmal dengan jelas. *I label the materials in laboratory clearly.*				
75.	Saya menyimpan semua bahan kimia dalam bekas asal. *I keep all chemicals in their original containers.*				
76.	Saya memastikan sambungan fleksibel untuk talian elektrik dan air dalam makmal. *I make sure on flexible connections of electric and water in laboratory.*				

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BAHAGIAN E: Kemudahan

Sila tandakan (✓) pada ruang yang disediakan untuk menyatakan tahap kekerapan anda dengan kenyataan di bawah dalam kotak jawapan anda.

1. Tidak Pernah (TP) / Never

2. Jarang (J) / Seldom

3. Kadang-kadang (KK) / Sometimes

4. Kerap (K) / Often

4.1 Bahan bantu mengajar dalam bilik darjah **Teaching aids in the classroom**					
No.	**Item**	**1** **TP**	**2** **J**	**3** **KK**	**4** **K**
77.	Saya menggantung poster dan carta di sekitar bilik darjah yang mudah dilihat. *I hang posters and charts around classroom at students eye level.*				
78.	Saya memaparkan carta menarik untuk mengumumkan keputusan pencapaian aktiviti dan peperiksaan mata pelajaran Sains. *I display attractive chart to announce students achievements in Science activities and examinations.*				

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No.	Item	1 TP	2 J	3 KK	4 K
79.	Saya melabelkan buku aktiviti, buku nota, buku rujukan dan buku teks dengan jelas. *I label activity books, note books, reference books and text books clearly.*				
80.	Saya menggunakan papan putih atau papan hitam semasa proses pengajaran dan pembelajaran. *I use white board or black board during process of teaching and learning.*				
81.	Saya menggunakan makmal sains bagi murid membuat eksperimen. *I use science laboratory for students do experiments.*				

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4.2 Kemudahan ICT dalam bilik darjah ICT facilities in the classroom					
No.	**Item**	**1** **TP**	**2** **J**	**3** **KK**	**4** **K**
82.	Sekolah saya menyediakan kemudahan komputer dalam bilik darjah. *My school provides computer facilities in classroom.*				
83.	Sekolah saya menyediakan radio dalam bilik darjah. *My school provides radio in classroom.*				
84.	Sekolah saya menyediakan ASTRO dalam bilik darjah. *My school provides ASTRO in classroom.*				

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4.3 Kemudahan di luar bilik darjah Facilities outside of the classroom					
No.	**Item**	**1** **TP**	**2** **J**	**3** **KK**	**4** **K**
85.	Sekolah saya mewujudkan pondok bagi proses pengajaran dan pembelajaran. *My school establishes cottage for process of teaching and learning.*				
86.	Sekolah saya menyediakan taman fauna untuk aktiviti pembelajaran murid. *My school provides fauna park for student learning process.*				

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APPENDIX H

LETTER OF AUTHORIZATION

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KEMENTERIAN PENDIDIKAN MALAYSIA
MINISTRY OF EDUCATION MALAYSIA
BAHAGIAN PERANCANGAN DAN PENYELIDIKAN DASAR PENDIDIKAN
EDUCATIONAL PLANNING AND RESEARCH DIVISION
ARAS 1-4, BLOK E8
KOMPLEKS KERAJAAN PARCEL E
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Telefon : 03-8884 6591
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Ruj. Kami : KPMSP.600-3/2/3 Jld 17 (33)
Tarikh : 14 April 2016

Kalpana Deepa Veni A/P Veloosamy
K.P.:821113125052

7, Jalan Azizul Rahman 2
34600 Kamunting
Perak

Tuan,

KELULUSAN UNTUK MENJALANKAN KAJIAN DI SEKOLAH, INSTITUT PENDIDIKAN GURU, JABATAN PENDIDIKAN NEGERI DAN BAHAGIAN DI BAWAH KEMENTERIAN PENDIDIKAN MALAYSIA

Perkara di atas adalah di rujuk.

2. Sukacita dimaklumkan bahawa permohonan tuan untuk menjalankan kajian seperti di bawah telah diluluskan.

" Identification of the Physical Factors That Contribute to the Implementation of Malaysian Lower Primary Science Curriculum "

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3. Kelulusan ini adalah berdasarkan kepada kertas cadangan penyelidikan dan instrumen kajian yang dikemukakan oleh tuan kepada Bahagian ini. Walau bagaimanapun kelulusan ini bergantung kepada kebenaran Jabatan Pendidikan Negeri dan Pengetua / Guru Besar yang berkenaan.

4. Surat kelulusan ini sah digunakan bermula dari **14 April 2016 hingga 11 Disember 2016.**

5. Tuan juga mesti menyerahkan senaskhah laporan akhir kajian dalam bentuk *hardcopy* bersama salinan *softcopy* berformat Pdf di dalam CD kepada Bahagian ini. Tuan diingatkan supaya mendapat kebenaran terlebih dahulu daripada Bahagian ini sekiranya sebahagian atau sepenuhnya dapatan kajian tersebut hendak dibentangkan di mana-mana forum, seminar atau diumumkan kepada media massa.

Sekian untuk makluman dan tindakan tuan selanjutnya. Terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menurut perintah,

(DR MAIMUNAH BINTI MUDA)
Ketua Unit
Sektor Penyelidikan dan Penilaian
b.p. Pengarah
Bahagian Perancangan dan Penyelidikan Dasar Pendidikan
Kementerian Pendidikan Malaysia

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APPENDIX I

LETTER OF REQUEST PERMISSION TO CONDUCT INTERVIEW

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IDENTIFICATION OF THE PHYSICAL FACTORS THAT CONTRIBUTE TO THE IMPLEMENTATION OF MALAYSIAN LOWER PRIMARY SCIENCE CURRICULUM

Dear Sir/Madam,

Greetings. My name is Kalpana Deepa Veni D/O Veloosamy. Currently I am accomplishing my Master research study which as title stated above at University Pendidikan Sultan Idris. On purpose, I intend to conduct an interview with level one primary science teacher regarding collect information on contribution of physical factors that implemented in science teaching learning process. The interview will take about 30 to 50 minutes and this will be audio taped. This research is being conducted under the supervision of Professor Madya Dr. Hasimah Alimon, Biology Department, Faculty of Science and Mathematics, University Pendidikan Sultan Idris, Perak. All the data collected and accumulated are only restricted for the research purposes and will be kept utmost confidentiality. Any questions related to the research kindly can be directed to me through my mobile number: 016-2029435 or email: shakti1322@yahoo.com. In view of this, I would like to request your kind cooperation to allow me to conduct my research interview with your school teacher.

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Respectfully yours,

KALPANA DEEPA VENI D/O VELOOSAMY

Researcher

Noted by:

Dr. Hasimah Alimon

Supervisor

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APPENDIX J

INTERVIEW TRANSCRIPTION

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Interview with First Interviewee

Title:		Teacher's evaluation on identification of the physical factors that
		contribute to the implementation of science curriculum.
Venue:		Classroom
Time:		9.40am – 10.20am
Recording Tool:		Digital recorder
R:		Interviewer (Researcher)
I1:		Informant 1 (Science Teacher)
001	R:	Good morning teacher. Thank you for giving me permission to interview
002		you. As you know the interview substance will be used to evaluate the
003		physical factors that contribute to the science curriculum.
004		Teacher, how long have you been teaching science in school?
005	I1:	emm...for 12 years.
006	R:	Please discuss your understanding of infrastructure facilities in the
007		classroom.
008	I1:	Ermm.. as I know, physical infrastructures are desk, chair, cupboard,
009		bulletin board, ermm..white board and other materials that we use for our
010		daily teaching and learning session.
011	R:	Do the infrastructural facilities have any significant correlation on
012		students' academic performance?
013	I1:	In my experience, I understand that infrastructural facilities do correlate

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014		to students' academic performance. This also has support for their
015		self learning as well as for the informal group learning.
016	R:	aah..Tell me about the level of academic performance of students
017		in term of science subject?
018	I1:	Ermm.. my students are at medium and low level of academic achievement.
019	R:	Why do you think such situation happen so?
020	I1:	Maybe it's due to poor understanding of the concepts, less practice of
021		the science subject and also inavailability and ineffective of classroom
022		physical facilities. Actually availability of infrastructures still not yet meet
023		the needs of students. They lack of motivation and interest on the subject.
024	R:	Okey. Do the poor classroom infrastructures affect students' education?
025	I1:	Definitely. Most of my school pupils were subjected to the substandard
026		level of classroom facilities. This may cause the students fail in education
027		and also increase their poor behavioural performance during classroom
028		session.
029	R:	So, in your opinion, are there any differences in behavioural performance
030		among students who I mean study under good or poor condition of school
031		facilities?
032	I1:	Ermm..Yes of course. Here I found there are great differences in their
033		behavioural performance when they were seated in two different quality
034		conditions. Significantly, they show their poor behavioural performance
035		due to poor facilities accomodation. So I conclude that the
036		classroom facilities much contributed to their attitude performance.
037	R:	In what ways of classroom facilities can affect students' perceptions on

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038		teaching and learning session?
039	I1:	Aah..okey. Deteriorating facilities have affect the students perceptions.
040		Examples poor ventilation, dim lighting, inadequate desks and chairs even
041		unattractive class may bring high chance to affect their perceptions on the
042		classroom. This cause them demotivate towards their education.
043	R:	Can you please let me know what are the actual needs of physical facilities
044		in the classroom?
045	I1:	I think the most important one should be a good condition of desk and chair
046		not only for students but for teachers as well. Other than that
047		movable furniture so that you can move the furniture such as cupboards,
048		white board, projector and a big space of classroom for teachers to handle
049		science class in a better way and easy to access the technology devices.
050	R:	Aah okay. So do you have any suggestions or recommendations for your
051		school in improving the physical facilities in science classroom as for
052		enhancement of students academic achievement and their behavioral
053		performance as well?
054	I1:	Okay let me share a bit.Yes I do. Actually physical environment is very
055		crucial very important for teaching and learning as daily basis activity
056		as you know.
057		The facilities help teacher in accomplishing their daily tasks and at the
058		same time the learners able to learn effectively. I believe you agree with me.
059		Thus to ensure the quality of education, the school must always concerns in
060		providing good quality of instructional materials such as text books,
061		reference books and other sufficient infrastructures in the classroom. The

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062		adequate facilities may provide significant positive results on teachers and
063		students in a long term to motivate the students, to have an interest on the
064		subject and things will definitely bring them a success towards their
065		education.
066	R:	Thank you very much teacher for your cooperation.
067	I1:	You are welcome.

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Interview with Second Interviewee

Title:		Teacher's evaluation on identification of the physical factors that
		contribute to the implementation of science curriculum.
Venue:		Classroom
Time:		9.00am – 9.40am
Recording Tool:		Digital recorder
R:		Interviewer (Researcher)
I2:		Informant 2 (Science Teacher)
001		Hi good morning teacher. Thank you for giving me permission to interview
002		You. As you know that the interview substance will be used to evaluate
003		the physical factors that contribute to the science curriculum.
004	R:	Well teacher good morning.
005	I2:	Good morning.
006	R:	How long have you been teaching science in school?
007	I2:	emm...for 8 years.
008	R:	Please discuss your understanding of infrastructure facilities in the
009		classroom.
010	I2:	Ahhh..infrastructures are like white board, projector, ICT, table, chair, fan,
011		light and other tools that can see around the class which are always used
012		in the classroom by teachers and students.
013	R:	So do the infrastructural facilities have any significant correlation on

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014		students' academic performance?
015	I2:	Yes. Availability of classroom resources are much significantly correlate
016		students' academic performance. Consider facilities is one of the best
017		aspirations for their education. Ermm...indeed facilities also create a good
018		and creative environment of teaching and learning.
019	R:	So what is the level of academic performance of students in science subject?
020	I2:	For my science students they are still picking up. They are under
021		low and medium ranking group.
022	R:	Why do you think such situation happen so?
023	I2:	Well from my view, I came to know that most of them feel science
024		subject is the toughest and boring. Secondly, poor accomodation of
025		infrastructures in classroom, much theory works and no field works.
026	R:	So do the poor classroom infrastructures affect students' education?
027	I2:	I guess so. Ahhh...in the abscence of appropriate classroom facilities may
028		distort the students from accessing facilities properly to pursue their science
029		class. Possibly less accomodation of physical infrastructures in science
030		classroom may affect adversely their motivation and personal attitude.
031	R:	So in your opinion, are there any differences in behavioral performance
032		among students, I mean who study under good and poor condition of
033		school facilities?
034	I2:	Yes much differences can be seen. Different quality condition of class
035		facilities would give strong impact to their wellbeing. Apparently, nowadays
036		the students face lots of problems in developing positive study attitudes and
037		behaviours due to improper and inadequate facilitation of equipments in

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038		classroom. Then, it also depends on good and poor quality facilities. For
039		sure poor quality facilities raise up irrespective and low motivated students.
040		That is what happening in my classroom nowadays.
041	R:	In what ways of classroom facilities can affect students' perceptions on the
042		teaching and learning session?
043	I2:	Errgg..as I know their perceptions affected when the classroom size small
044		and become hot crowded, inadequate and less usage of instructional
045		materials and facilities during class session.
046	R:	So, does the classroom size affect the students academic performance?
047	I2:	Actually class size has high effect on test scores. The big size class
048		positively affect students from achieving high scores. So teachers should
049		always assigned to different size classes as for a change based on the
050		quantity of students on purpose to improve their academic performance.
051	R:	Can you please let me know what are the actual needs of physical facilities
052		in the classroom?
053	I2:	My opinions...errmmm..attractive charts and teaching aids, display rack and
054		bookshelves, proper size of desk and chair for students, easily accessible
055		internet connection and good condition of furnitures and also spacious class
056		for the students.
057	R:	Finally teacher do you have any suggestions or recommendations for your
058		school on your opinion in improving the physical facilities in science
059		classroom for enhancement of students academic achievement as well as
060		behavioral performance?
061	I2:	Ok. Only my kind suggestion, the school should make effort in broad up and

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062		standardized the quality and proper facilities to achieve the school aims and
063		objectives. Besides high attention should be paid on determine the
064		improvement. Then maintenance on dim lights, broken furnitures, improper
065		size of desks and chairs, classroom spacious, shelves for kids and so on need
066		to be observed and checked from time to time.
067	R:	Well thank you very much for spending time for the interview.
068	I2:	Welcome.

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APPENDIX K

FIELD NOTES

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School 1

Date : 6th June 2016

Venue : School 1

Time : 7.40 – 8.40 a.m.

Detail	Reflection
Classroom Settings	
1) The science classroom is equipped with a white board.	Unable to explore much information regarding the lesson.
2) The desks and chairs are arranged in verb shape path.	Neat arrangement lead smooth interaction among the students.
3) Bright colour display on the classroom wall.	None of science subject related or students work displayed on the wall.
4) Furniture are arranged neatly in the classroom.	These avoid distraction from natural sunlight and fresh air come in and give good atmosphere for process of teaching and learning in the classroom. - Provide broad space for teaching and learning purpose.
5) Fans and lights are provided.	Few fans and lamps need to be replaced.

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School 1

Date : 6th June 2016

Venue : School 1

Time : 7.40 – 8.40 a.m.

Detail	Reflection
Class Session	
1) The science teacher carried out the class by using text book and activity book.	- Only few students gave good response to the teacher's questions and received enough attention. - Teacher and students did not access lesson related information via video, reference books, internet or any other searching tools.
2) Teacher explained in detail about the lesson and organized well the white board.	Advanced materials include ICT facilities such as smart board, computer, projector and LCD are not provided to the students.
3) Teacher did not utilize any other resources, ICT facilities except white board to show the pictures for the lesson.	- The teacher unable to engage the students with technology facilities. - This idea is not creative and innovative.
4) During class activities, teacher did not arrange the desks and chairs based on the groups. They were seated at the same place and instructed to complete the task given.	- The teacher did not create a suitable environment for the students to conduct their group tasks. - Classroom management is less to be controlled.
5) During class session, doors and windows are closed to avoid natural sunlight distraction.	Poor conducive learning environment.

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School 2

Date : 24th August 2016

Venue : School 2

Time : 8.00 – 9.00 a.m.

Detail	Reflection
Classroom Settings	
1) The science classroom is equipped with a white board.	Unable to explore much information regarding the lesson.
2) Class size small.	Less flexibility of space in doing activities.
3) The desks and chairs are arranged in theatre style.	Easy for teacher move and look around the students.
4) Bright colour display on the classroom wall.	Classroom wall was not displayed with students' works and activities.
5) Furniture are well organized in the classroom.	This creates enough space for students to do their activities in the classroom.
6) The classroom lack of ICT facilities include projector, LCD and computer.	This could lead lack of innovative teaching methods.
7) Adequate fans and lights are provided.	- Provide comfort teaching and learning environment. - Few fans and lamps need replacement.

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School 2

Date : 24th August 2016

Venue : School 2

Time : 8.00 – 9.00 a.m.

Detail	Reflection
Class Session	
1) The science teacher carried out the class by using text book, manila card and activity book.	These teaching methods are less encourage the students in promoting learning process.
2) Teacher drew lesson related the objects on a manila card.	Teacher had not use the real objects that available in the environment for teaching purpose
3) Teacher only utilized the existing of white board and manila card.	Insufficient teaching resources and materials to deliver the lesson.
4) Teacher did not encourage for the seating arrangement for individual and group tasks.	Lack of motivation for the students.
5) During class session, doors are closed to avoid natural light distraction.	Poor conducive learning environment.

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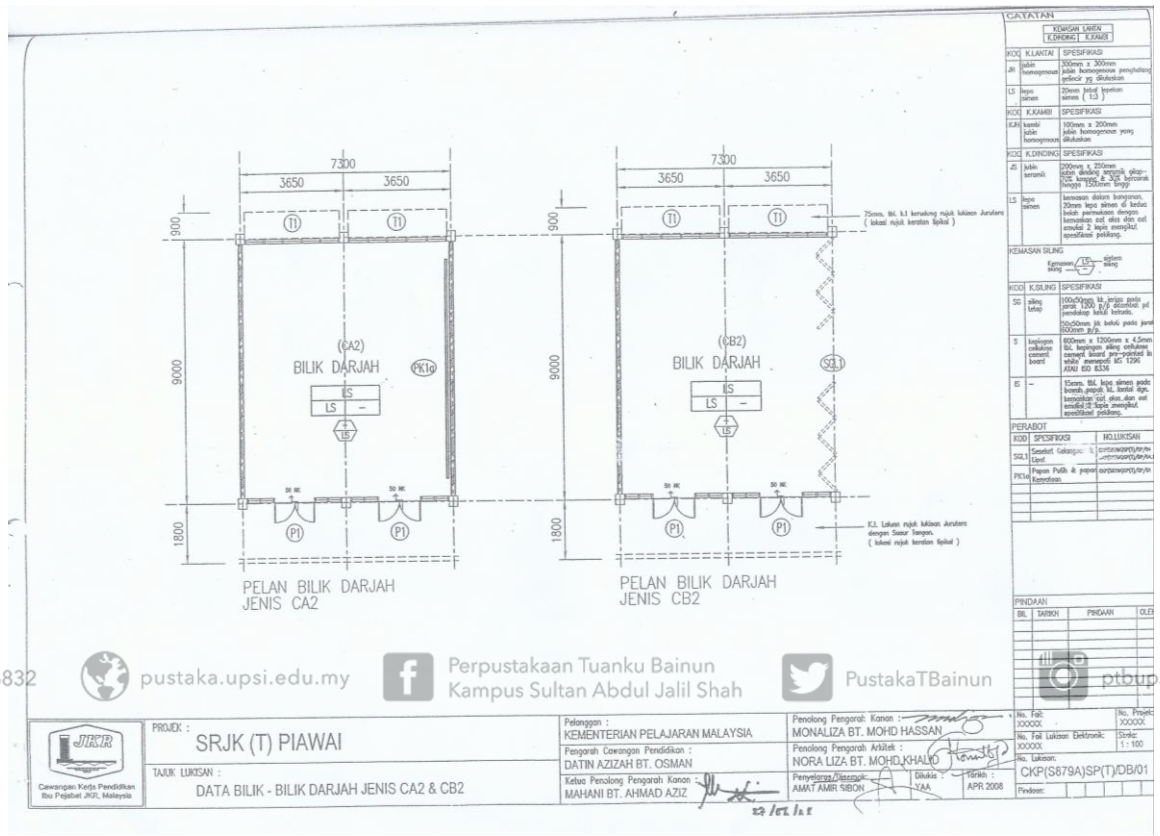
APPENDIX L

PRIMARY SCHOOL CLASSROOM PLAN

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Source: Jabatan Kerja Raya, (2016).

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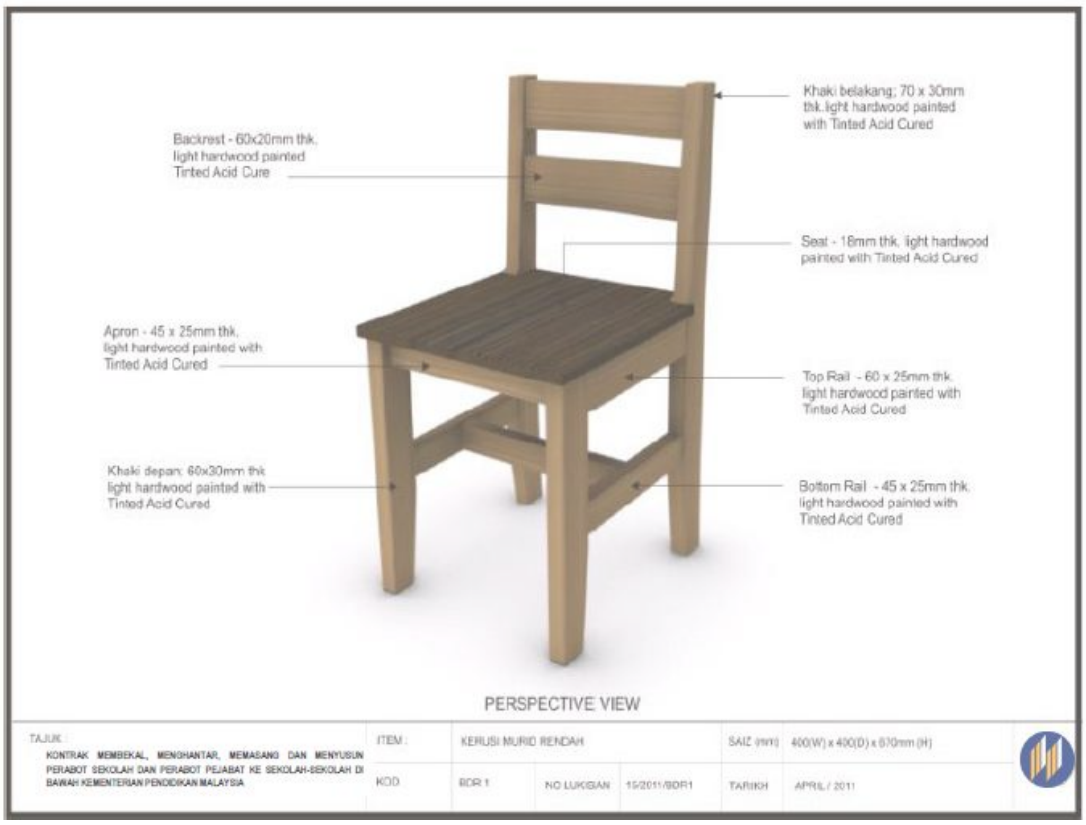
APPENDIX M

PRIMARY SCHOOL FACILITIES MEASUREMENT

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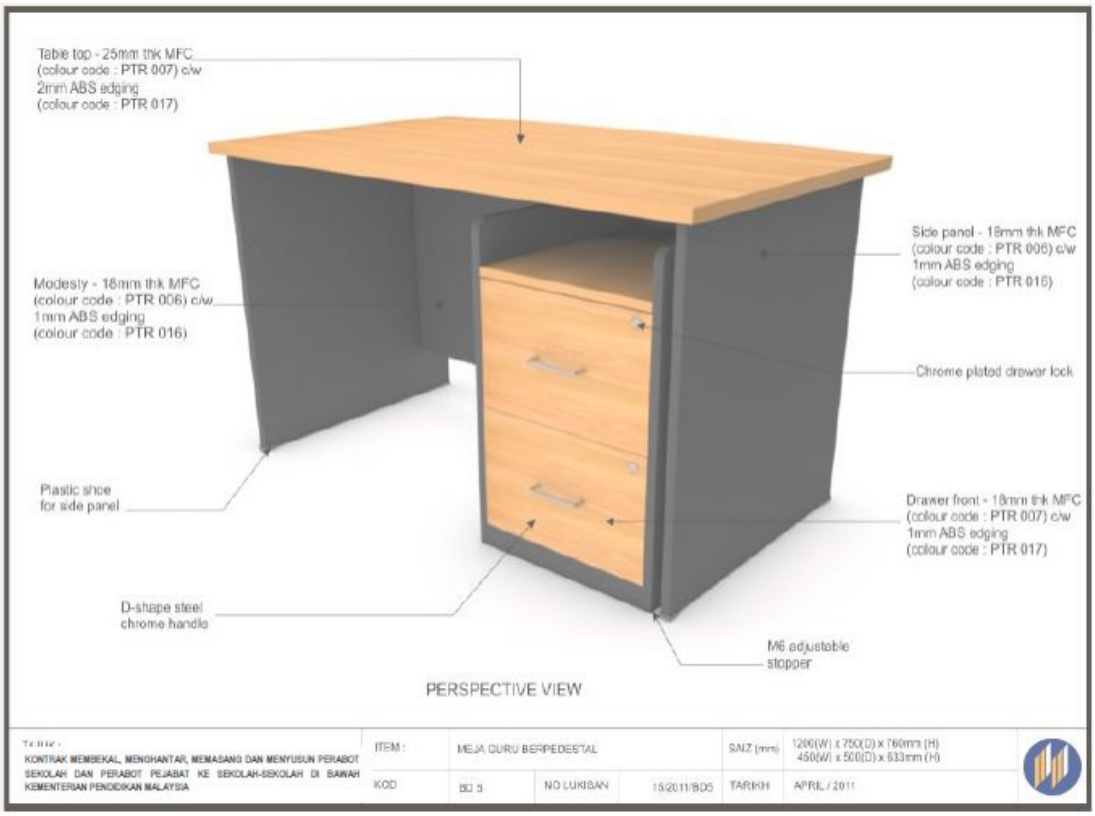
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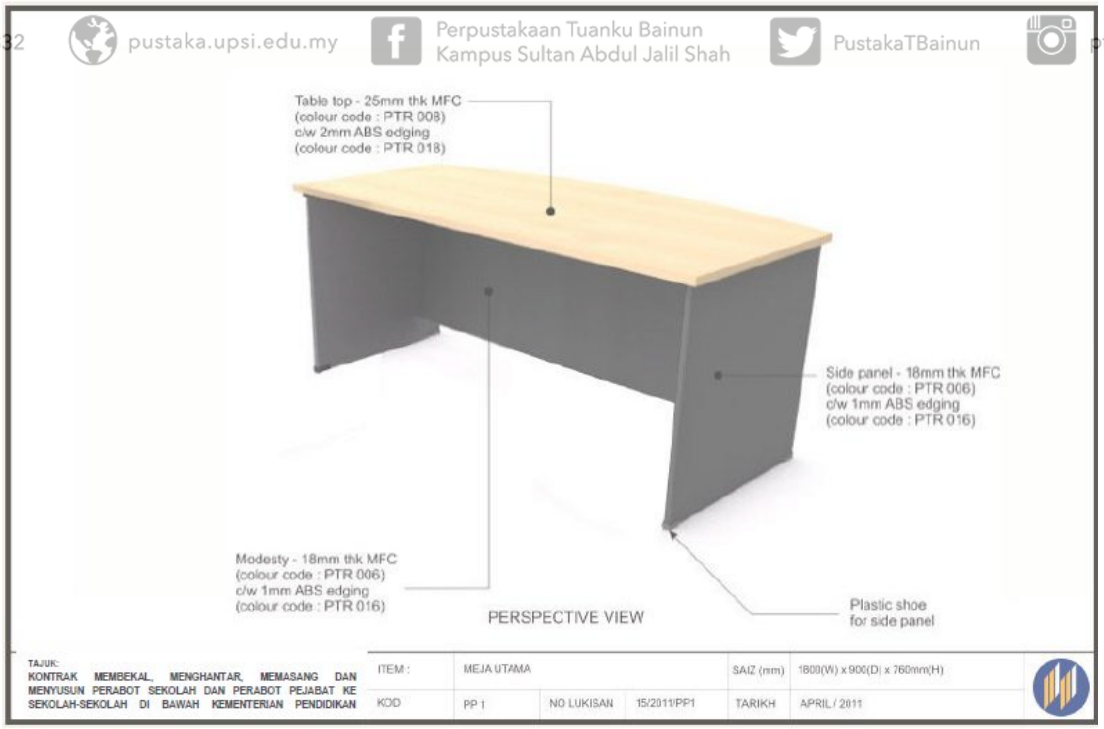
Source: Ministry Education Malaysia (2013).

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Source: Ministry Education Malaysia (2013).

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