

## Effect of Redesigned Classroom on Secondary Students' Learning Behaviour

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### Abstract

The objective of this paper is to illustrate how the redesigned classroom has affected student learning behavior in terms of the learner centered environment, self-directed and independent learning, improved 21<sup>st</sup> century skills, and better peer interaction. Data were collected through questionnaires, observations and focus group discussions from four secondary schools in Selangor, Malaysia which had redesigned classrooms. The findings show that the classrooms allow students to enjoy more learner centered activities with easy access to technology and learning is more individualized. Having access to materials online allowed students to view them as many times as they wanted to help internalize their understanding. Students are also encouraged to be self-directed and practice self-learning by discussing and sharing ideas with one another which helped build their confidence. Students reported developing better information skills, communication skills, negotiation skills and other 21<sup>st</sup> century skills. The redesigned classrooms provide a safe environment for better peer interaction and participation in learning among students. It is clear that students are comfortable to engage in better learning and understanding in the redesigned classroom with improved levels of motivation and interest.

*Keywords:* ICT, learning behavior, learning outcome, redesigned classroom, VLE-FROG

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## Introduction

The redesigned classroom was initiated by the Malaysian Ministry of Education to provide students access to a wide range of content that is engaging and interactive through Information and Communication Technology (ICT) usage while learning in a classroom environment that is conducive and supportive toward academic engagement. The principles of the redesigned classroom are based on rethinking the teaching and learning environment as well as approaches that would allow students to develop 21<sup>st</sup> century learning skills such as collaboration, cooperation, problem solving, critical thinking, evaluation and presentation skills. Washor (2003, p.20) talks about the need to “translate pedagogical designs into facilities” as it is apparent that the traditional classroom design is no longer suited for current pedagogical needs and has to be modified. The traditional classrooms are unidirectional designed with a teacher-student dichotomy where rows of tables are oriented toward the teacher, who is the sole authority of knowledge (Brooks, 2012). In contrast, redesigned classrooms are modified physically to include flexible arrangement of tables and chairs, ample space for teachers to move about as well as the use of internet in learning and teaching in class. Vibrant colours which make up the classroom walls are stimulating and conducive to studying. Classrooms are also air conditioned and well lit. Through the use of ICT in teaching approaches and instructions, students have a wider access to content that is more engaging and interactive where students learn to manage and organize their work through projects assigned to them. Social disparities between students are reduced as they are encouraged to work in groups, sharing knowledge and discussing to complete a task given. These new designing learning spaces foster intentional as well as independent learning which focus on taking responsibility for learning, setting personally meaningful learning goals and self-assessing students’ own success in learning (Bennet, 2011; Bereiter & Scardamalia, 2014). However, Underwood (2009) stresses the importance of continuous training to new approaches to teaching and learning. If teachers are willing to experiment and apply these new approaches, then they are prepared to transform existing practices to support innovative pedagogies.

Although this initiative was undertaken in 2013, not much is known about the effect of the redesigned classroom on students’ learning behaviour and outcomes. Previous studies (Cheok, Wong & Ayub, 2017; Fatin, 2017) have investigated teachers’ readiness and perceptions toward redesigned classrooms while Kamalludeen, Hassan, and Ahmad Nasaruddin, (2016) have looked at the students’ usage patterns in the redesigned classroom. The objective of this paper is to investigate the students’ perceptions of the redesigned classrooms and to identify the factors that influence the use of the classroom among Malaysian secondary school students as well as the impact of the classroom on students’ learning behaviour and outcome. Findings from this study will allow policy makers, administrators as well as teachers to be aware of the impact of redesigned classroom on students’ understanding and learning.

## Related Literature

A learning management system (LMS) is a web based comprehensive and integrated software that supports delivery and management of learning, assessment, and administration of courses in face to face learning, blended or online learning environment (Canul, 2011; Wright, 2014). In addition to developing learning materials and instruction, it provides a platform for institutions to store, manage and share its academic resources and knowledge with other academic institutions (Kamalludeen et al. 2016). The Frog Virtual Learning Environment (VLE-Frog) implemented by

the Malaysian Ministry of Education (MOE) is one such system that is supported by 1BestariNet for the initial 10,000 schools that participated in 2013. One of the main objectives of the VLE-FROG is to create a borderless learning environment that will enhance students' experiences of engaging with the internet and technology to improve their learning process. Some benefits of the VLE-FROG include self paced learning support, enhancing self directed learning and interactive communication which allow students to learn anywhere and at anytime (Kumarawel, Yusop & Abdul Razak, 2015). However, an important point to consider when using such systems is that students will only be able to use this learning platform provided that the internet access is available (Johawati, 2014; Abdul Rani, Suradi & Yusoff, 2014).

Studies on student engagement have revealed that newer, well designed learning spaces do influence students' motivation and interest in learning (Grier-Reed, James Appleton, Rodriguez, Ganuza & Reschly, 2012; Miller, 2008; Barret, Zhang, Meffat, & Kobbacy, 2013) with an impact on students' progress such as providing increased opportunities for classroom interaction, discussions, consultations and better grades (Brooks, 2012; Van Horne, Murniati, Gaffney & Jesse, 2012; Walker, Brooks & Baepler, 2011). Redesigned spaces promote active experiential learning as students demonstrate qualitatively and quantitatively improvements in how they engage in class and how much information they retain (Dori, 2007; Brooks, 2011; Cotne, Loper, Walker & Brooks, 2013). In contrast, traditional classrooms inhibit students learning as they are not arranged well to cater to students learning needs. Most traditional classrooms showcase straight lined tables and chairs, facing the front part of the classroom which are not necessarily conducive for peer interaction (Obliner, 2006; Milne, 2006). In a study by Brooks (2012), who investigates the impact of space between an active learning classroom (redesigned) and traditional classroom in a university context reveals that the space affected both the students and the class instructor. The instructors lectured/talked less but walked about more in the redesigned class than in the traditional classroom. As Brooks points out, the walking about proved beneficial as instructors became aware of how students progressed on tasks given and would offer assistance or contribute suggestions if groups experienced difficulties completing the tasks. It also reveals that communication between students flowed easily when they were sitting facing each other in the classroom. Similar results are reported by Cotne et al. (2013), who investigates the effects of redesigned classroom use in a science course. It is revealed that the classroom offered flexibility and demonstrated explicit emphasis on small-group interaction. This practice increased the individual student's sense of accountability and lead to learning gains that resulted from peer interaction.

In the VLE-FROG classroom, activities emphasize on active learning where students are given opportunities for engagement so as to increase students' classroom participants. They work through problems, apply concepts, analyze results and draw on their own conclusions which lead to increased motivation. Students become committed in their learning so that they are able to transfer what they have learned into new situations, courses, and beyond (Reid, 2012; Oman & Sofkova, 2015). For example in Reid's (2012) study, Canadian college students were given a group project that required students to synthesize, analyse and make judgements. The objectives of the project was to promote deeper engagement in three main areas: (a) active and collaborative learning, (b) faculty-student interaction, and (c) level of academic challenge. Topics for projects covered students' interests in a pre-course survey that allowed an in-depth exploration of the topics selected. In addition, activities within the project included question asking in class, peer teaching

within groups and teaching other students. Findings reported high levels of engagement with students being comfortable with the new classroom design. In a similar vein, working with nine-year old Swedish school children, Oman & Sofkova (2015) introduce a project that explored students' redesigning of materials with available digital resources such as visual, auditory and spatial modes. Findings show that there were development of students' communicative skills in relation to the subject content and the application of the digital resources that students were exposed to. These activities demonstrate that it is essential to assist students in building learning skills that will prepare them for life and beyond the classroom.

Creating proper redesigned classroom which meets students' needs and interests' provides students with opportunities that maximize learning and create meaningful experiences. Research findings from previous studies have revealed positive changes occurring in students' behaviour following a redesigned classroom (National Training Laboratories, 2005; Miller, 2008; Granito & Santana, 2016). The study by the National Training Laboratories (2005) found that information delivered through lecture was retained at 5%, discussion groups had 50% retention rates, practice by doing received a 70% retention rate while 80% of information was retained when students teach other students. In traditional classrooms, communication tends to flow in one direction with teachers giving most of the input or instructions where students feel excluded and become disengaged. In contrast, communication between teacher and student or student and student flows in the VLE-FROG classrooms which improves levels of interaction significantly (Miller, 2008). As he reinstates "Students who have interaction with their teachers are more likely to express satisfaction overall with their college experiences. The more student-faculty interaction occurs, the better the outcomes (p. 518)."

Although many studies have highlighted the benefits and contribution of ICT and new technology on students' learning, research on how new learning spaces or redesigned classrooms affect learning are sparse (Reis, 2012; Granito & Santana, 2016). Hence, the objective of this study is to investigate the students' perceptions of the redesigned or otherwise known as the VLE-Frog classrooms and to identify the factors that influence the use of VLE-Frog among Malaysian secondary school students as well as the impact of VLE-Frog on student behavior and learning outcomes.

### **Conceptual Framework**

The conceptual framework used in this study is based from the findings of the Innovative Learning Environments (ILE) project (2013), an Organisation for Economic Co-operation and Development (OECD) initiative. Based on the analysis of conditions to understand the impact of the new learning environment, the OECD's ILE proposed 7 design principles that centered on the physical layout of the teaching and learning environment, teaching and learning approaches and teaching and learning outcomes for effective learning environments in schools. They are:

- Make learning central, encourages engagement, and develops an understanding of their own activity as learners
- Ensure learning is social and often collaborative
- Be highly attuned to the learners' motivations and the key role of emotions

- Be acutely sensitive to the individual differences among the learners including their prior knowledge
- Be demanding for each learner but without excessive overload
- Use assessments that are consistent with its aims, with strong emphasis on formative feedback
- Promote horizontal connectedness across learning activities and subjects, in- and out-of-school

These principles were used in the designing of the instruments for the study as well as a guide in the data analysis.

### Methodology

A multiple case study research design was employed in this study for two main reasons. First, it gives a more holistic or complete picture of a phenomenon particularly when conclusions are drawn from data from varied sources. Second, it allows a more in-depth exploration into the phenomenon making it possible for researchers to capture the emergent and essential features of the phenomenon in different sites (Yin 2009).

Four secondary schools in Selangor were selected based on convenient sampling as case study sites. These schools were located not far from the institution that the researchers were attached to hence travelling time and cost were kept to a minimum. The redesigned classroom in each school has been operating between one to two years. The laptops or netbooks named 'Chromebook' are available in each redesigned classroom to allow students access to the VLE FROG. Below are further details of each school:

- i. SMK Puchong, Batu 14 Puchong.
- ii. SMK Assunta, PJ
- iii. SMK SalakTinggi
- iv. SMK TanjungSepat

SMK Tanjung Sepat is located near the coastal area in Sepang. Most of the students do not possess computer and internet access at home. The Redesigned Classroom has been in operation for two years.

SMK Puchong is located in a less affluent urban neighborhood of Puchong. About 60% of its students do not have a computer and internet access at home. It is one of the first schools to have the remodeled classroom. The room and the teaching and learning tools and facilities have been in use since 2015. The Chromebooks are already in its 2<sup>nd</sup> year of use.

SMK Assunta is strategically located in an affluent urban neighbourhood in Petaling Jaya. This school is very privileged as it has three Redesigned Classrooms – two of which are sponsored by the Parent Teacher Association of the school. Almost all the students in the school have computers and internet access in their homes.

SMK Bandar Baru Salak Tinggi, is a secondary school located in Salak Tinggi Taman Dahlia, Bandar Baru Salak Tinggi, a semi-rural area in the Sepang district of Selangor. It is nominated as one of the best day schools in the category of ‘Malaysia’s Best Schools’. Besides, the school is under the 1Bestari Project, an initiative of the Ministry of Education in leading the transformation of education to provide the best learning technology to all schools in Malaysia. Most of the students have and use computers at home. They access their Frog website to check updates from their teachers and to submit assignments. The Chromebook is placed in the Redesigned Classroom.

### *Sample Study*

In total 37 students who volunteered to participate in the study were interviewed, in groups, on their opinion on the physical attributes of the redesigned classroom, internet use as well as learning and teaching approaches. The table below describes the sample study (Form Four students) from the four selected schools.

**Table 1. Sample Study**

NAME OF SCHOOL	MALE	FEMALE
SMK TG. SEPAT	3	5
SMK PUCHONG	4	10
SMK ASSUNTA	-	7
SMK SALAK TINGGI	4	4
TOTAL	11	26

From SMK Tg. Sepat, a total of eight Form Four students participated in the study. From the Math class, the students comprised of three females (one Chinese, one Indian, one Malay) and one male student (Chinese). From the English class, there were two females (one Malay & one Chinese) and two males (one Chinese and one Malay). Fourteen Form Four students from SMK PUCHONG responded to the focus group interview questions. There were about four male students and the remainder ten was females. Only seven female students from SMK Assunta students participated in the study and five were from the Maths class with only two from the English class. Eight Form Four students from SMK Salak Tinggi were interviewed on their opinion of the Redesigned Classroom. From the Math class, the students comprised two males (Malays) and two females (both Malays). From the English class, there were two females (one Malay & one Indian) and two males (one Chinese and one Malay).

### *Research Instruments*

#### *Observation*

Two types of data elicitation procedures were used: 1) class observation and 2) focus group discussion. The primary purpose of carrying out the class observation was to see how the students behaved in the FROG room. Due to time limitations, only two Form Four classes (one Math and one English) in each school were identified to be observed with the help of the FROG administrators of the school concerned. Observations were held between June to July 2016 and carried out by the researchers. An observation checklist was completed by the researchers during and after the observation. There were two main categories with a number of sub-categories that

had to be observed: 1) teaching approach and 2) student behaviour. At the end of the checklist, researcher also had to give their overall impression of the class.

The Form Fours were chosen because they are non-exam classes and therefore it was easier to obtain permission to observe these classes. The English lesson was chosen as the subject is close to the researchers' heart since they are English Language Studies lecturers. Mathematics, on the other hand, was suggested by the funder and this is a good choice as it is one of the STEM subjects (Science, Technology, Engineering and Mathematics). These subjects are deemed important to be mastered for the 21<sup>st</sup> century.

The original intention was to conduct two rounds of observations – at the early stage and later stage of room utilisation. However, it was difficult to arrange for the second round of observations towards the later part of the school year (September - October) as teachers were either preparing for examination or having examination, or involved in other school activities. Hence, the observation data were not as comprehensive as planned. Nevertheless, the observations provided the researchers a “peek” into a few lessons conducted in the room. They could also see the teachers in action and how students behaved in the room.

#### ***Student Focus Group Discussion***

Selected Form Four students whose English or Mathematic class had been observed took part in a focus group discussion guided by an interview protocol. Students' opinions were sought on the following themes:

- i. New Classroom Design
- ii. Learning & Teaching Approach & Class Activities
- iii. Student Behavior

Two focus groups (one each from the English and Mathematic classes) were conducted except for SMK Assunta where only one focus group was held with students from the Mathematics class. It was not possible to run the focus group with the English students (due to time constraints), instead they were asked to submit written responses to the questions. Only two students did so and despite repeated reminders the others did not respond. A total of seven focus groups were conducted and the number of students in a group ranged from three to eight. These were held after the class observation. The responses for the two students from SMK Assunta were also taken into account in the discussion of focus group data.

#### **Data Analysis**

All the interviews were audiotaped and transcribed verbatim. Combined with the notes from the observation sheet, the data were then read several times to determine the themes that emerged.

#### **Findings of Study**

##### ***Reactions toward Redesigned Classroom***

The analysis of the students' interviews discover that students find the redesigned classrooms comfortable mainly due to the design/layout and the air-conditioning. They like the vibrant colour of the furniture, the decorations on the wall, the curtains, and the books on the shelves. Many adjectives like 'creative', 'beautiful', 'colourful', 'nice', 'comfortable' are used by the students to

describe the room. This is clearly an indication that they are pleased and satisfied with the ambience of the room. Students declared that they liked the beautiful decorations in the room, as in the following excerpts:

*I can sit on a playful chair with colour. (Student from English class- Assunta)*

*The learning is more intimate so you'll get better understanding towards everything because you can fully pay attention to the teacher and teacher can pay full attention to all the students. (Student from Math class- Assunta)*

*This is the first time learning in FROG classroom. It is fun; I don't have to face the books solely. The colour in here is very colorful, fun and creative. So, it is not boring. (Student from Math class- Salak Tinggi)*

*And the colour is much more creative and it feels much more vibrant instead of in the class like 6 hours straight like that, very tiring. (Student from English class- Salak Tinggi)*

Students are in favour of the arrangement of furniture in the redesigned classroom that allowed interaction with their peers and sharing of information as in the following extracts (students from SMK Assunta):

*"It feels more comfortable than the last design".*

*"The FROG room is colourful and a great place to study...the seating position is appropriate and interactive. Yes, it allows the students to be more interactive with one another and communication between the students improves".*

*"Yes, since the tables are curve-shaped, I can be more focus during lesson. During groupwork we can exchange our ideas. It encourages me to pay more attention in class and think outside the box".*

The arrangement of the chairs and desks give them the flexibility and ease to walk about, to talk and discuss with their friends and the class teacher. An interesting issue that is raised was on how easily the room can accommodate students and how effortless it is to rearrange the furniture for varied class activities. First, because of the wooden flooring and the fact that students take off their shoes before coming into the room, students can sit and work on the floor. This means although all of them would not have a seat they could at least sit on the floor. They also mentioned the aesthetic value of the desks and chairs. The female students commented they could sit in one line unlike in the normal class. They prefer sitting this way because they can "share-share" with their friends. This probably refers to the fact that they enjoy being able to consult their friends when they had doubts. In terms of communication, they like having the teacher facing them and since they did not have to look left and right they felt they got full attention from the teacher. It is also easier to communicate with friends and they felt comfortable after sitting long hours in labs or classroom.

*"This place is more interactive and much more communication with the teachers and students instead of just listening to the teachers is saying and writing it down. And the using of laptop itself, it is much more fun and holistic and it helps us to interact with each other instead of just listening to the teacher." (student from English class- Puchong)*



The main attraction of the classroom is the air conditioning in the room (all schools). This is especially welcomed by the teachers who teach at midday and in the afternoon as they say students are more attentive and not as sleepy as they are in the traditional classrooms. Undoubtedly air quality is an important consideration in classrooms and will enhance both teaching and learning.

The students singled out the doodles on the desks and the knobs for hanging their bag found behind the class as features that they found appealing and inspiring (all schools). They feel that this was better than using and bringing textbooks to the class. They especially highlighted the fact that their school bags were not heavy and could be hung on the special hooks provided at the back of the classroom.

It is observed that there were two boxes with games in the classroom (Tg Sepat). The students wanted more games to be put in the boxes so that they could spend their time playing the games. One of the girls said that she sometimes read the books located on the shelves while waiting for the teacher to check on her friends' work. Another girl said that sometimes she and her friends would sit on the floor to do their work. One girl said that she enjoyed reading the words written on the walls and on the desks as she felt motivated.

A plus point to note is that students in this classroom were able to better focus as there were minimal distractions. Curtains covered most of the windows thus minimizing outside disturbances with fewer problems of students not paying attention and gazing out of the windows (all schools). Furthermore, there seem to be a positive impact on the students in terms of classroom management. Their students are more disciplined; they are more attentive and show more interest in learning.

Aside from teaching, the Redesigned Classroom has been used for other activities such as PIBG meetings, staff meetings, extra classes, religious activities and aerobic classes (all schools). With reference to the use of technology, the schools encountered frequent connectivity problems making it difficult for teachers and students to use the Chromebook, especially when it came to uploading of pictures or videos. Due to this factor, most of the English and Math teachers instead opted for LCD projectors and their own laptops to teach in the classroom.

### ***Learning and pedagogy in the Redesigned Classroom***

The design of the Redesigned Classroom made it possible for learning to be enjoyable and focused. In reference to learning approaches, students in general were given the opportunity to use the Redesigned Classroom where technology was integrated in their lessons. Students could discuss with their friends (as students worked in their own 'stations'), walk about easily and could even sit on the wooden floors to work on tasks given. For example, students from SMK Assunta mentioned that they could have better group discussions in these classrooms while learning from each other's ideas. This was an improved way of learning from them, as the following extract exemplifies:

*The environment does change how I think because during group work, the classmates share their ideas and opinions. (Student from English class- Assunta).*

Students generally opined that the redesigned classroom was better for certain learning approaches like presentations, group work, activity stations and not so for pop quizzes or assessments as it was easy to copy from the person sitting next to or in front of them.

At times, students were unable to complete their tasks in school, hence teachers would find alternatives to enable students to complete the tasks given. For example in SMK Puchong, teachers took the initiative to upload materials online so that students who could not finish what they were supposed to do in class could access them and work on them at home. According to one teacher, the lessons were interactive, with music and multimedia features that appealed to the students. Students were also sometimes asked to search for information online. For example, students were asked to locate certain landmarks online and find out how to get to these places. They worked in groups for the task. Results of internet search and answers to tasks assigned were also shared online. Another activity (direction-giving) involved students to share what they found on the internet and then make a presentation in class. At the end of the session, other students participated in an answer question session.

Another task involved students writing their responses to a discussion question that the teacher has posted on the online discussion forum. They could view each other responses and shared their writing with their classmates by using a document sharing application. The sharing was not confined to the students' class. The better compositions were shared with the weaker classes so that they could see what a good answer is like. This is evidenced of collaborative learning which is routinely carried out and appeared to be a success among the students. At the lower forms, students often work in groups to solve problem and present the results of their work online. Better students from the Form Four and Five could also be asked to present orally.

Students in SMK Salak Tinggi also enjoyed using the Redesigned Classroom as they stated it meant they were able to try out different activities.

*Just now the teacher taught us, she just upload a video and ask us to listen to the song and answer the question. Same like goes to other subjects like bio. If we are just studying, we won't understand. So we just have to look for it, the videos, or something like, it is much easier for the students (Student from English class- Salak Tinggi).*

However, students from SMK Tg. Sepat did not have access to the Chromebook (as it was placed in the ICT room) and were not given enough opportunities to use the Chromebook. Thus they did not have sufficient knowledge of how to use the Chromebook. Instead, they were either given tasks (photocopied), placed in groups to complete their work and present via PowerPoint or on mahjong paper (supplied by the teachers).

Class activities were centered on chromebook and group presentations, as the following excerpts exemplify:

*"Yes, I use it (chromebook) whenever we have lesson in FROG room to do the exercises that shared while another student added "Yes, we use the chrome book most of the time in frog room to look at presentations or slides prepared by the teacher or students, to search information and to carry out group activities".*

*"Because teacher upload many files. They collect the material and put it there.*

*“It is portable, it is easier for us without having lots of books and textbooks and all that. So, it is much more easier when everything is in the laptop. You can access it here and at home. Ya.”*

*“In the classroom yes they have group discussion. But here is more computer centered..*

*“It is actually quite fun when you access to the internet, but when the internet gets so we get frustrated”.*

Students unanimously believed that teaching and learning is more “effective” because of the availability of the Chromebook and internet access which enabled them to check up on anything that they do not know instantly. Chromebook and Wi Fi access were the two top items mentioned by students as things they liked about the room. They remarked that they could use the Chromebook as their personal device when they came into the room. Students were observed “becoming excited” when they used the Chromebook and when they worked on it by themselves. Students also mentioned that they “very enjoy” learning in the room because they were using technology to learn. They claimed it was ‘more fun’, ‘easy to understand’ and ‘feel cheery, easy to learn and easy to understand’. However, students agreed that the internet network was problematic as one student mentioned “The internet...sometimes, we can't connect to the internet at all. Other times when the internet does connect, it works very slowly and is very time consuming”. Another student added “It is better than the internet connection everywhere else but still pretty slow. Setting the Chromebook up doesn’t take very long around 5 minutes. But it is like when you need to go to FROG or to log in, it will take a while.

### ***Student behaviors***

A well organized classroom permits positive reactions between teachers and students, increases students’ motivation, engagement and interest in learning as well as reduces challenging behaviours that might occur (Guardino & Fullerton, 2010; Granito & Santana, 2016). From the data, students were observed to pay attention, focused and participated actively in class. The following excerpts exemplified this point:

*“ I feel more focus and feel happier”*

*“the environment is more interactive and centered on both students and teachers rather than teachers alone. Hence, the learning process becomes more interesting and fun so I am able to absorb the subject matter better”.*

*“The learning is more intimate so you’ll get better understanding towards everything because you can fully pay attention to the teacher and teacher can pay full attention to all the students.”*

*“..a noticeable difference is on the students psychological matters. Like in normal classes, we just look down at the table and write. But here, we come here because we want to learn. Because it is more entertaining”.*

The data above provide evidence to show how redesigned classrooms can support active learning which create more effective classroom learning and higher student engagement. Students are more focused as they get the attention from teachers as well as are able to discuss with their peers. According to Cheryan (2014), the importance of enviromental features in a classroom (e.g. physical layout of chairs & tables) influence performance and engagement of students, hence

improving learning outcomes. In terms of work, some students preferred working on their own while some in groups, as exemplified in the following extracts:

*“Because for example, sometimes I can ask the others and they can help me and I can help them.”*

*We like grouping..We used to, if we don’t understand, then only we will ask friends... Strengthen the bond”*

*“Teacher gives the topic and then we look up for the information...Presentation in group, in front of the class...We explain the topic we learnt one by one”.*

Getting students engaged and maintaining the interest to learn is not an easy goal to achieve. The adoption of collaborative learning approaches in the classroom may provide students opportunities to enhance, expand and enrich their learning experiences through the sharing of ideas, opinions and knowledge. As Miller (2008) expounds, when students work in groups, they talk about what they are learning and are open to share information, write about it, relate it to past experiences, and most importantly, apply it to their daily lives. The data also show that there is a shift in the teaching and learning paradigm where the concern of the teacher is more on student involvement in learning rather than instruction. Students are placed to work in groups or pairs which strengthens interpersonal, communication and personal skills. This form of peer-to-peer support enables students to achieve a sense of belonging which is essential for successful learning outcomes (Miller, 2008; Warwick et al., 2010).

## Discussion

This paper presents the results from observation and the student focus group discussions to investigate the impact of the redesigned classroom on student learning behavior and learning outcome in four schools: SMK Tanjung Sepat, SMK Puchong, SMK Bandar Baru Salak Tinggi and SMK Assunta.

The results of this study demonstrate that classrooms and the conditions within the rooms can have an impact on teaching and learning. These findings are consistent with past research (Grier-Reed et al., 2012; Miller, 2008; Barret et al., 2013; Brooks, 2012; Van Horne et al., 2012; Walker, Brooks & Baepler, 2011) which reveal that most students are positively affected by the classroom design, appearance and arrangement. The colorful, spacious, well equipped room with its cool environment made the room very appealing, conducive and supportive for learning. The available floor space also provided extra seating for the students. It is evident that students are learning differently and practicing more collaborative learning and depending on peer support and tutoring.

With reference to learning approaches and activities, students are exposed to various forms of learning materials such as listening to songs, watching videos, and searching for information using Chromebooks. Many of the activities involved collaborative learning where students worked in groups through paired and group discussions, activity stations and presentation (power point/mahjong paper/manila card). This finding resonates with previous researchers who discovered that activities conducted through VLE-FROG showed positive impact on students learning process as they acquire better understanding of topics learned, positive development of

IT skills as well as an increase in awareness and contentment of what learning methods would benefit them (Nair, Patil, & Mertova, 2012; Kumarawel, Yusop, & Abdul Razak, 2015).

When considering student learning, behaviours such as increased motivation, excitement, interactive, independent learning, peer-learning, self-assessment and being focused are observed in the Redesigned Classroom. All the students have positive comments about the redesigned room as they reported paying attention, being focused and participating actively in class as the learning was more interactive and they were able to discuss with teachers and friends to achieve better understanding of the subject matter taught. Furthermore, learning became more intimate as they worked in groups to discuss, communicate and share knowledge which created an overall positive learning environment which induces better learning. They also mentioned about having good 'siratullahim' (good relationship) with all their friends in the FROG class, unlike the normal class, where they rarely knew one another and did not even talk to the other students. The findings are in agreement with past studies (Miller, 2008; Granito & Santana, 2016) that claim that student learning and achievement is greatly influenced by the environment in which the learning occurs. Through these experiences, student learn to develop essential learning skills such as communication skills, critical thinking and problem solving, interpersonal skills including teamwork, relationship management, learning to learn and personal responsibility (Miller, 2008). The finding is also supported by Guardino and Fullerton (2010) who observe that redesigned classrooms increase academic engagement and improve students' behavior. They further emphasize that although classroom modifications are essential to enhance learning, many teachers are unaware of how to implement such changes. Teachers will need to assess their own students' learning environment and choose suitable modifications that would positively impact students' learning. It is observed in some of the schools that the teacher was always moving around in the classroom either attending to students' questions or monitoring their work. Impacted by the attention given by the teacher, students become motivated and positive toward learning.

Despite the positive outcomes, there are some issues raised with regard to the redesigned classroom. The major concern is internet connectivity as most of the schools complained of the poor connection. However, this setback did not prevent students from enjoying the use of technology in learning. For example, the teachers from SMK Puchong took the initiative to prepare lessons and materials earlier, then downloading them so that they could be played in class or encouraged students to access the materials and work on them at home. This type of teaching approach is evident in an active learning environment where students are able to experience interactive lessons with music and multimedia features which are the norm for these digital natives. Most importantly, is the teacher's role in designing the task which requires knowledge and awareness of multimodal teaching and design. As Walker et al. (2011) stresses, this teaching approach will enable a collaborative dialogic learning where both teachers and students contribute to common knowledge building.

## Conclusion

The objective of this study is to investigate the Malaysian secondary school students' perceptions of the VLE-Frog classrooms and to explore how these redesigned classrooms impact students' behavior and learning outcomes. Although the results of this study complement the relevance of redesigned classrooms on student learning, additional research such as including more schools

and students of different age groups and race are warranted to better understand the factors that affect learning and teaching in the redesigned classroom. Past researches have provided evidence of positive connections between learning and new classrooms, yet little is being done to implement the changes that would possibly impact teaching and learning in classrooms. As Granito and Santana (2016) highlight schools should consider reevaluating their current classrooms and plan for the development of rooms that contribute to student success. As each school or institution are influenced by various elements such as number of students and classrooms, type of modifications needed and teachers' commitment, further research will need to be conducted on understanding the needs of the teachers, students and administrators. Through a collaborative effort from all the parties involved, such implementation of new learning spaces or redesigned classrooms will create an engaging, active and more positive classroom environment.

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