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# PROBLEM STRUCTURING FOR DECISION CONSENSUS AMONG STUDENTS

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#### ABSTRACT

Decision-problem structuring is conceptualized to be a process comprising activities characterized by the students. The activities are cognitive efforts of a group coming to an understanding and determining the representation of the decision-problem and of what knowledge is relevant to the decision-problem. Cognitive effort refers to the fraction of limited attention with respect to resources that are momentarily allocated to a process. The consensual representation of the decision-problem provides the basis for modeling those activities in some form and order. Knowing how a decision-problem is structured by students based on Management Information System domain will enable the modeling to be based on a simple descriptive behaviour in problem structuring. One such method would be a mathematical model to quantify the problem which ultimately becomes well-structured

*Keywords: decision-problem, problem structuring, modeling, decision consensus.* 

## INTRODUCTION

Building representations of a problem in a group involve a consultative and iterative process (White, Burger, & Yearworth, 2015). The process provides a succession of representations, each with different perspectives to the problem. Each subsequent perspective alludes to a deeper understanding of the problem as new insights add to the refinement of the representation.

This study is premised on the concept of collective decision-making as a means for understanding how students as a group behave. We introduce and explore the use of activity theory as a means to study the interactions of students in the context of decision-problem structuring. A case scenario was presented to create conditions for a collective behaviour towards decision-problem structuring.

# THEORETICAL FOUNDATION

The focus of operational research (OR) on problem structuring has primarily been on the process itself through the lens of critical realism, constructivism, and pragmatism. The social process, through which concepts and actions are negotiated, produces abstract models and representations of the problem. Requisite models were introduced as a form of representation (Phillips, 1984). A requisite model with information and knowledge is sufficient to serve as a guide to collective activities by the group. Additionally, a model represents a facilitative device where there is no clear agreement as to the exact situation (Ackermann, 2012). Ackermann in his role as Jury Duty used his knowledge of problem structuring methods to the messy situation. As he listened to his fellow jurors, he realized that his understanding of the case was different from theirs.

He believed that statements were clear assertions with little or no evidence, were taken as facts. Emotions were running high and 'facts' were embellished. He concluded there were a lot of different issues, facts, assertions, uncertainties, and contradictions. However, they all helped to develop a shared understanding towards an emergent problem structure thereby come to some consensus. PROBLEM STRUCTURING FOR DECISION CONSENSUS AMONG STUDENTS

The basic structure of any problem structuring methods comprises the captured representation of various points of view in a rich picture if using Soft Systems Methodology; a design graph if using Strategies Choice; a causal map if using Strategic Options Development and Analysis. This captured material is explored within the group to develop an enhanced understanding so as to negotiate towards a set of improvements and actions to resolve the situation. The exploration adopts a cyclical approach with the actions from one deliberation providing insights for the next iteration while possibly raising questions, demanding a return to a previous consideration.

Activity is the smallest unit of analysis. In OR, the settings for different activities are not determined by the objective features of the problem. Instead, the activities are emergent interactions by the participants who are engaged in the problem.

OR interventions are activities imposed on different situations by the participants themselves (Alberto Franco, 2009). Additionally, Activity Theory offers the concept of activity which emphasizes that people do not just think. They collectively act on the world (White et al., 2015). White and his researchers further explain the nature of activity systems. Mediating mechanisms comprise tools, models, language, social rules, and the division of labour that transform the relationship between individuals and communities in collective activity. These mechanisms are interwoven in a complex web of mutual interactions. Collective or social learning occurs in the community albeit contradictions and dilemma. Participants would construct new conceptions of their actions and develop new activity systems.

Additionally, OR is primarily a consultancy activity focusing on the tactical while providing a strategic advantage to some organisation (Ranyard, Fildes, & Hu, 2015). This was further emphasized with a search in the Web of Science for terms such as "strategy tools" and "problem structuring" yielded no articles from 2010 to 2014. OR interventions were mainly deployed in sectors such as logistic, production, and supply chain.

According to a survey conducted by Liberatore and Luo (2013), problem structuring comprises problem formulation and negotiation towards a set of improvements and actions to resolve the situation. The exploration adopts a cyclical approach with the actions from one deliberation providing

insights for the next iteration while possibly raising questions, demanding a return to a previous consideration.

Problem recognition were more important for the OR analyst. The development of problem structuring methods has been successfully embraced by the OR community. In contrast, problem structuring is more challenging as the problem has to be in the perspective and context of the decision-makers.

It is reasonable to expect students to provide their own structures to the decision-problem in this instance. This paper discusses decisionproblem structuring as a process to justify the qualitative approach. This paper presents a model of students' decision-problem structuring which is subsequently expressed mathematically.

# METHODOLOGY

The case study can be conceptualized as an activity system whereby the participants are active in the shaping and reshaping the problem representation assisted by auxiliary artefacts. Collaboration among the participants with varying expertise necessitates a dynamic, dialogic relationship between the multiple actors. The decision-problem was constructed out of case scenarios. For this study the knowledge domain of Management Information Systems (MIS) is contextualized through three case scenarios.

Each case scenario presents a complex problem for students to respond to in a fortnight. Structuring the decision-problem was a process by the students to transform an initial state (complex problem in MIS) to a goal state (structured problem). A virtual workspace was created to enable participants to interact and have a close dialogue. The virtual workspace is consistent with the characteristics of a study by von Winterfeldt and Fasolo (2009). In their study on structuring decision-problem, they found that structuring decision-problem is a task that requires close dialogue between participants. This dialogue should be highly interactive (with many exchanges) and iteratively converging towards a consensus (tracking exchanges for structuring the decision-problem). The dialogue would enable participants to participate in the process by providing important inputs. Besides, York and PROBLEM STRUCTURING FOR DECISION CONSENSUS AMONG STUDENTS

Richardson (2012) noted that the number of students in an online discussion can impact interpersonal interaction. As the class size increased, students wrote more but shorter discussion posts. This affected the group dynamics and gave rise to unequal participation (Palloff & Pratt, 2007).

The virtual workspace had the affordance of the Internet which enabled participants to explore and possibly to resolve concerns that arose during their reading of the case scenarios. The Internet may also have cued them to previously unrecognised issues. In a nutshell, the Internet affords information acquisition and interpretation for the participants while being engaged on a case scenario. Additionally, the virtual workspace was to function as a meeting room where students with different perspectives come to work on a common problem focus and a shared commitment to action.

The analysis commenced with the examination of the entries in the threaded discussion for each of the three case scenarios by a group of 15 students. Each entry was segmented based on the interpreted activity. An activity was taken as an action that the participant did or caused to happen.

It must be noted that entries that infringed on the decision-making process, such as analysis of factors to the decision-problem and generation of options, were not analyzed for this study.

Students may interact with the environment for information, expertise, experience, and advice while forming their strategies towards structuring the decision-problem. These elements (information, expertise, experience, and advice) are not part of the system. Instead these elements are constituents of other systems besides the students.

# **DEVELOPMENT AND ANALYSIS**

This captured material is explored within the group to develop an enhanced understanding so as to negotiate towards a set of improvements and actions to resolve the situation. The exploration adopts a cyclical approach with the actions from one deliberation providing insights for the next iteration while possibly raising questions, demanding a return of interactions by the participants who are engaged in the problem.

The decision-problem of each case scenario took shape after brainstorming by the students for two weeks, the time duration as determined in the study. The final state of the decision-problem was the representation brought about by the consensus of the group participants.



#### **EMERGENT MODEL**

Figure 1: Student Processes in DPS

Figure 1 shows the emergent model of the decision-problem structuring (DPS) of the students. Students expressed ignorance, doubts, fear, and to some extent, self-assuredness when they did not understand or realise the significance of the available information. Their ignorance and doubts led to the sharing of additional information while their fear reflected a perceived threat that relates to worsening of a situation or a situation that is unacceptable.

The sharing of information induced reciprocity and self-assuredness in forming a structure for the decision-problem. The sharing information in some instances required paraphrasing or summarising of facts and ideas. The condensation of the ideas at times elucidated some participants to express their points of views or question for more information. The constructs, "Expressing Points of Views", "Role-playing", and "Assuming a Situation" are iterative processes of students when facing an atypical decision-problem. Keywords were identified for each of the seven constructs. For example, "Questioning" would comprise keywords such as who, why, what, where, when, and how. "Sharing Information" would have keywords "according", "share", "information", and so forth.

# MODELLING THE DPS MATHEMATICALLY

In the text classifying systems vector space model (VSM) is used to transfer the unstructured text data to structured ones. There are two main aspects to construct a classifier based on vector space model. Firstly, an appropriate feature subset is selected along with a measure for evaluating it. Secondly, a classification paradigm is selected.

Vector space model (VSM) is an algebraic model for representing of texts in classification and retrieval. It maps an unstructured text data into structured vectors. In this model, text sample  $x_i$  is expressed as  $x_i$ =  $(w_{i1}, w_{i2}, ..., w_{ij}, ..., w_{im})$  where  $w_{ij}$  denotes the weight of the keyword  $T_j$ in text  $x_i$  and m is the total number of keywords. Every text is a point in m-dimensionality space. Similarity between two texts, x and y, is calculated by the following formula

$$SIM(x, y) = \cos(x, y) = \frac{\sum_{k=1}^{m} w_{xk} \cdot w_{yk}}{\sqrt{\sum_{k=1}^{m} w_{xk}^2} \cdot \sqrt{\sum_{k=1}^{m} w_{yk}^2}}$$

The weighting formula used is

 $w_{ij} = fT_{ij}$  where f is the frequency the term  $T_j$  occurs in text  $x_{i'}$ 

The early stage of DPS involves participatory visioning of the decisionproblem. The importance is for the participants to agree on a series of ways of knowing and understanding the context.

Let us assume there is a collection of i number of text categorized as Sharing Information in the exchanges between the students.

$$S = \{s_{1}, s_{2}, ..., s_{i}\}$$
(1)

However,  $s_i = (w_{il}, w_{i2}, ..., w_{ij}, ..., w_{im})$  where  $w_{ij}$  denotes the weight of the keyword  $T_i$  in text  $s_i$  and m is the total number of keywords. Also,  $w_{ij} = fT_{ij}$  where  $fT_{ij}$  is the frequency the keyword  $T_j$  occurs in text  $s_i$ .

Information sharing in the context,  $s_i$ , is initiated when there is Questioning. Let us assume there is a collection of j number of text categorized as Questioning.

$$Q = \{q_{1'}, q_{2'}, ..., q_{j}\}$$
(2)

As such, a collection of questions can be answered by a particular Sharing Information,  $s_i$ . Hence we have,

$$s_j \leftarrow q_j$$
 where  $n \le j$  (3)

Sharing Information may embed Expressing Emotions, E, which is a set of emotions.

$$E = \{e_{i}, e_{j}, ..., e_{i}\}$$
(4)

In one Sharing Information several emotions may be expressed to address  $q_i$ . Thus, we have

$$q_j \leftarrow \sum_{k=1}^m e_k$$
 where  $1 \le m \le j$  (5)

Expressing Emotions may invoke Sharing Information. For example, "I am confused. Excuse me if I sound ignorant. Can someone explain the meaning ...". In this instance, we can write,

$$e_m \leftarrow \sum_{i=1}^j S_i$$
 where  $1 \le m \le j$  (6)

Let us assume there is a set of Expressing Points of Views.

$$P = \{p_1, p_2, ..., p_i\}$$
(7)

For each Sharing Information there may or may not have Expressing Points of Views. We have

$$s_i \leftarrow \begin{cases} p_i = 0\\ \sum_{t=1}^j p_t \end{cases}, \ 0 < j \le i \tag{8}$$

Sharing Information may lead to Role-playing. Let us assume there is a set of Role-playing.

$$R = \{r_{1}, r_{2}, ..., r_{i}\}$$
(9)

We have,

$$s_i \leftarrow r_i$$
 (10)

Sharing Information may lead to Assuming a Situation. Let us assume there is a set of Assuming a Situation.

$$A = \{a_{1}, a_{2}, ..., a_{i}\}$$
 (11)  
We have,

(12)

C. Hence, we can write

 $s_i \leftarrow a_i$ 

$$C = A \bigcup R \tag{13}$$

A consensus towards the structure of the decision-problem is reached after all the situations were assumed and a fair amount of role-playing.

# FINDINGS AND DISCUSSION

A similar model of DPS of novices in decision-making as published in an earlier work (Cheong, 2014) differs in the iterative processes of students. In Cheong's study, the novices had attended a course in Management

Information Systems but had no work experience. They responded to isolated facts in an *ad hoc* fashion based on the information shared and were expressing points of views in their personal capacity as well as a team. The students in this study lacked knowledge about the complexity or difficult issues in the three case scenarios presented as complex decisionproblems. The students did not have deep knowledge of problem structuring. The seven activities detailed as follows were of no particular order except for the activity of reaching consensus which was evident in all three case scenarios. Nevertheless, the activity of expressing emotions would be the first to be addressed.

Students are likely to be subjective and too emotive in responding to a decision-problem without understanding or realising the importance of the available information. Some students expressed ignorance, possibly uninformed. Some may have followed the brainstorming for quite a while before expressing their failure to acquire the relevant information. Besides ignorance, there was doubt. Doubt may involve uncertainty or distrust over an alleged fact as seen in some students. Both instances of doubt bring into question some notion of a perceived representation of the decision-problem and may involve delaying or rejecting relevant action out of concerns for mistakes or faults or appropriateness. As a result, doubt sometimes required additional information. Hence reciprocity which was a correspondence between two participants was evident. It was expressed in the form of gratitude.

There were others who expressed self-assuredness. Self-assuredness relates to one's personal judgment to manage the decision-problem in a time frame. Self-assuredness also relates to the ability in forming a structure for the decision-problem. On the other hand, there was fear. Some students perceived a threat that relates to worsening of a situation, or continuation of a situation that is unacceptable. They expressed fear as an instant reaction to something presently happening to them at present.

Basic information was provided from Internet search. Some of the sharing contained information that could possibly be sourced from the textbook and other reading materials. The shared information required reviews by the students in order to effectively derive its value and meaning. Systems theory refers to this information in this sense as an input comprising something potentially perceived as a representation to the decision-problem. This was evident in some students that threw a perspective for the others to ponder on.

Sharing information required paraphrasing to keep the same meaning. Paraphrasing was useful when dealing with facts and definitions of the decision-problem. In paraphrasing, some students had aptly put the information in a context that was easily understood by the group. There were other students that took to summarising which was generally used to refer to ideas contained in a long text. Summarising enables such students to reduce all the ideas to key points in an outline of the brainstorming by omitting unnecessary details and examples. The summary was an overview of the information for the decision-problem. The important ideas were condensed. The condensation of the ideas may elucidate some participants to expressing their points of views.

Assuming a situation is a proposition to take a situation for real based upon presupposition without preponderance of the facts of the decisionproblem. There were students assuming a situation based on their knowledge with new technologies. Yet there were others assuming a situation where his team mates were not unanimous on a particular issue.

Students role-played by assuming a character role and collaboratively create circumstances. They determined the actions of their characters based on their characterization, and the actions succeed or fail according to a formal system of rules and guidelines. Role-playing may add diversity to the students' perception of the decision-problem. There was a consensus on the terminologies used. When most of the students had participated in building upon each other's concerns and suggestions to shape the decision-problem, there would be a position reached by the group. This position is known as reaching consensus on a representation of the decision-problem. The decision-problem was ultimately structured by the activity of reaching consensus towards a conceptual representation. In case scenario#1(see appendix), the group was contemplating on favoring the traditional use of technology.

In case scenario #2 the group was bent on employees' issues to represent the decision-problem while it was new technologies for business

in case scenario#3 (see appendix). Reaching consensus may happen before the brainstorming is at its peak (Case Scenario#3). In questioning a form of words were used to address the team in order to elicit information or evoke a response. It is also an expression of inquiry that invites or calls for a reply. Questioning might take place at the beginning of the brainstorming as in Case Scenario#2 (see appendix). Additionally, questioning from one student might elicit information of another to a search on the Internet. Students might seem eager to acquire further information on the decision-problem. They could have shared information with the team but were perplexed at not knowing more and they would like other participants to enlighten them (Case Scenario #3).

# CONCLUSION

We developed a model to describe students' decision-problem structuring. The content developed by students during a participatory process is iterated between "Expressing Points of Views", "Role-playing", and "Assuming a Situation". The model of students' DPS constituted seven activities that transform the actual decision-problem into one that is structured. The structured problem can be translated as an input model that triggers structured activities in problem structuring method.

## APPENDIX

#### Summary of CASE SCENARIO#1

An ethical issue here is what happens to the RFID tags. If they are not removed after you pay, it is theoretically possible for someone to track your whereabouts, which may be considered an invasion of privacy. But removing these tags costs money and takes time, an added burden to retailers.

Source: Turban et al. (2006). Information Technology for Management 5th ed. Chapters 1, 5 and 7. John Wiley & Sons, Inc.

#### Summary of CASE SCENARIO#2

Conducting a supply chain management project may result in the need to lay off, retrain, or transfer employees. Should management notify the employees in advance regarding such possibilities? What about those older employees who are difficult to retrain? Other ethical issues may involve sharing of personal information, which may be required for a collaborative organizational culture, which some employees may resist.

Finally, individuals may have to share computer programme that they designed for their personal use on the job. Such programme may be considered the intellectual property of the individuals. Should the employees be compensated for the programme if they are used by others?

Source: Turban et al. (2006). Information Technology for Management 5th ed. P. 309. John Wiley & Sons, Inc.

#### Summary of CASE SCENARIO#3

While Wi-Fi provides guests with Internet access to date it has had minimal impact on other sorts of hotel services (e.g., check in). However, a small number of hotels are testing use of the Bluetooth technology. Guests are provided with Bluetooth-enabled phones that can communicate with access points located throughout the hotel. This technology can be used for check-in and check-out, for making purchases from hotel vending machines and stores, for tracking loyalty points, and for opening room doors in place of keys.

Source: Turban et al. (2006). Information Technology for Management 5th ed. p. 215. John Wiley & Sons, Inc.

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# MISCONCEPTIONS AND ERRORS IN LEARNING INTEGRAL CALCULUS

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#### ABSTRACT

The paper presents the results of a case study examining students 'difficulties in the learning of integral calculus. It sought to address the misconceptions and errors that were encountered in the students' work solution. In quantitative study, the marks obtained by 147 students of Diploma in Computer Science in advanced calculus examinations were used as a measurement to evaluate the percentages of errors. Further, qualitative study examined the types of errors performed by 70 diploma students of the advanced calculus courses in their on-going assessments. The students encountered more difficulties in solving questions related to improper integrals for standard functions (63.1 percentages of errors). The three techniques of integration, namely by parts, trigonometric substitution and partial fraction with combined percentage errors of 42.8 also contributed to this. The types of conceptual errors discovered are symbolic, standard functions recognition, property of integral and technique determination. The procedural errors are due to the confusion between differentiation and integration process while the technical errors have foreseen the students struggling with poor mathematical skills and carelessness. The results will thus be useful to Mathematics educators who are keen in designing functional teaching and learning instruments to rectify the difficulties and misconceptions problems experienced by calculus students.

**Keywords:** misconceptions; errors; integral calculus; integration techniques; learning difficulties

#### INTRODUCTION

Integral calculus has been considered as a challenging topic by many students. Each level of difficulties in acquiring a good working knowledge of integral calculus varies across curriculums, institutions' educational practices, the students' accumulative mathematical skills and norm cultures of its countries. According to Tall (2012), it is impossible for university to deliver its programmes without calculus. Differentiation and integration are essential topics for many science and technology courses where solid knowledge on derivatives and integrals as well as its applications are foremost (Tall, 2011; Metaxas, 2007; Pepper, Stephanie, Steven & Katherine, 2012).

As mathematics learning contributed higher rates of school failure as compared to other discipline of learning at international and transcultural level (Coronado-Hijón, 2017), addressing the errors and misconceptions in mathematics learning is important for university students. There seems to be some consistency in the pattern of common mistakes found in every round of semester classes. These repetitive mistakes compounded by years of erroneous concepts on certain important basic mathematical skills can seemly be undaunting. When the students produce numerous similar mistakes again and again, this learning difficulty can cause them to give up on learning Mathematics. Poor understanding on the concepts of functions, limits and derivatives leads to difficulties in learning integral calculus (Dane, Cetin, Bas & Sagirli, 2016; Hashemi, Abu, Kashefi, Mokhtar & Rahimi, 2015; Tall, 2009; Orton, 1983).

Misconceptions and errors are inter-related, but they are also distinct. The Oxford dictionary defined a misconception as *a view or belief that is incorrect because of faulty thinking and understanding*. An error is *a mistake, slip, blunder or inaccuracy and a deviation from accuracy*. The misconception indicates a misunderstanding of an idea or concept whereas the error indicates incorrect applications or executions of the concepts, theories or formulas. The evidence of misconception is based on how many errors produced. According to Green, Piel and Flowers (2008) and Li (2006), the students' misconceptions produced systematic errors. Specifically, any misunderstandings occurred on either the students' procedural knowledge or conceptual knowledge, or both. Since errors produced were comparatively

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consistent, obvious and known, as it occurred throughout the many years of students' mathematics learning. The corrections using assisting expert knowledge and tools were often helpful (Li, 2006; Smith, DiSessa & Roschelle, 1993). When the errors were noticeable, the misconceptions were usually undetectable without detailed observation. Occasionally, the misconceptions could even be shrouded in accidentally correct answers (Smith et al., 1993). Riccomini (2005) theorised that unsystematic errors as unexpected, non-repeating wrong answers which could easily be corrected by the students themselves, with minimal instruction from facilitators.

Donaldson (1963) classified the students' mathematics errors into three types; namely structural, arbitrary and executive errors. In Donaldson's (1963) work, high school and college students managed to utilise basic integration techniques to solve mathematics problems, but unfortunately they misunderstood the principal concepts (Orton, 1983). Avital and Libeskind (1978) categorised three types of difficulties that the students faced in mathematical induction; namely conceptual, mathematical and technical difficulties. Seah (2005) classified the students' potential errors and misconceptions while solving integration problems into three categories: namely conceptual, procedural and technical errors. Seah (2005) described the conceptual errors as an inability to comprehend concepts and relationships in problems; the procedural errors as having conceptual understanding but failing to perform manipulations or algorithms; and the technical errors as Mathematics knowledge inadequacy and carelessness. At times, the multiple errors were expected and even seen in a single work solution.

A Mathematics error that is due to carelessness is less serious, but an error that results from misconception must be addressed and replaced. Some students might imagine, assume and conceive ideas incorrectly, which was beyond the expectation of a teacher, and it usually remained hidden. A good teaching by an experienced instructor must reveal this misconception or else, it will become a hindrance for the students to learn advance materials (Smith et al., 1993). Correcting the students' misconception improved achievement and ensured strong mathematical skills foundation. Askew and Wiliam (1995) postulated that effective learning took place when the students made mistakes first without realization of any possible misconceptions, but later they learnt the trick through open discussions. Even though the

misconception could not simply be avoided, strategies for reducing the misconceptions were important and they must also be implemented (Swan, 2001).

Sofronas (2011) had found that the mistakes are often made by the first-year calculus students. Students were either weak in the mastery of calculus concepts or calculus fundamental skills and they were not able to establish the links between concepts and skills. Therefore, these make students difficult to understand the topics of advanced calculus. Muzangwa and Chifamba (2012) reported that majority of the errors and misconceptions on the learning of calculus were due to knowledge gaps in basic algebra. Poor understanding on basic concepts affected students' choice of strategy in tackling mathematics problems (Shamsuddin, Mahlan, Umar & Alias, 2015). At times, teaching approach that over emphasises procedural aspects and neglects the solid theoretical side of calculus also lead to difficulties and misconceptions in calculus, as stated by Bezuidenhout (2001). Thus, the errors and misconceptions committed by students should be identified and rectified in order to enhance the students learning in higher education. With regard to this, documenting the students' misconceptions and errors in the learning of integration techniques is crucial for the understanding of students' cognitive in view of effective calculus learning.

# OBJECTIVE

The objective of the study was to determine the students' learning difficulties with regards to integral calculus. Essentially, it sought to address the misconceptions and errors that were encountered in the students' work solution.

#### METHODOLOGY

To answer the objective of the study, the research design was divided into two parts, namely quantitative and qualitative designs. The first part was a quantitative design which sought to study on the students' difficulties in solving integral calculus problems. It involved 147 students of Calculus II for six consecutive semesters and all students were taught by the same MISCONCEPTIONS AND ERROS IN LEARNING INTEGRAL CALCULUS

lecturer. The Calculus II was an advanced calculus course offered in the third semester of Diploma in Computer Science in a public university in Sarawak, Malaysia. In the consecutive six examinations, the five main important types of integral questions, namely improper standard integral, integration using completion of the square, integration by u-substitution, integration by parts and integration using partial fractions were selected for the study. These five main important types of integral questions contributed an average of 47 per cents in the final examination. All the selected questions in the six examinations were comparatively similar in function types and instructions. The marks obtained by the students in those questions were used as a measurement to evaluate the percentages of errors.

The second part was a qualitative design, which examined the types of errors performed by the students of advanced calculus course in their on-going assessments for the Semester November 2014 to April 2015. The Calculus II was undertaken by 12 students of Diploma in Computer Science. On the other hand, the Calculus II for Engineering students was undertaken by 12 students of Diploma in Electrical Engineering and 46 students of Diploma in Chemical Engineering. For Engineering students, Calculus II was undertaken in their third semester of study. The common errors performed in the solution steps of integral calculus questions were qualitatively analysed and categorised. A framework developed by Seah (2005) was used as a basis to classify and extend the different possible errors and the misconceptions that the students encountered in solving integration problems (refer Table 1). Tactic *noting patterns and themes* was used to determine what type of error goes with what type of question.

Types of Errors	Characteristics
Conceptual	Misunderstanding of concept. For example, failure to evaluate the total area of bounded region which is both above and below the x-axis.
Procedural	Improper conduct of algorithm. For example, failure to perform trigonometric rules for integration process.
Technical	Insufficient basic knowledge. For example, error in manipulating binomial expansion.

Table 1: Classification of Errors (Seah, 2005)

The first type of errors was *conceptual* errors. Due to failures to comprehend the concepts in problems or errors that arose from failures to appreciate the relationships involved in the problems. The second type of errors was *procedural*. The procedural errors were those which arose from failures to carry out manipulations or algorithms despite having understood the concepts behind the problems. The third type of errors was *technical* errors which were errors due to lack of mathematical knowledge and carelessness.

# FINDINGS AND DISCUSSIONS

The findings of the data analysis was carried out to determine the students' difficulties in learning integral calculus and some common errors were made by the diploma students in advanced calculus courses from a public university in Sarawak, Malaysia.

# STUDENTS' DIFFICULTIES ON INTEGRAL CALCULUS

The Calculus II course has a significant portion of integration questions, which ranges between 45-49 per cents. The students' performance on the questions related to standard functions, u-substitution and techniques such as by parts, trigonometric substitution, partial fractions and completion of the square in the examinations was recorded. The data analysis was conducted for the six consecutive semesters (June-September 2013, November 2013-March 2014, June-September 2014, November 2014-March 2015, June-September 2015 and November 2015-March 2016). The selected exam questions were of similar types and instruction throughout the six semesters. A total of 147 diploma students of Diploma in Computer Science were involved in the study. Firstly, the original marks obtained by the students for the selected type of questions were recorded. Secondly, the average marks ("0" = zero mark ... "5" = full marks) for each type of topical questions in every semester, were calculated (refer Table 2). Thirdly, both average errors ("0" = zero error ... "5" = full errors) and the percentage errors for the corresponding topical questions were computed (refer Table 3).

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Table 2: Comparison of Average Marks for Six Consecutive Semesters						
Semester	Sep-13	Mar-14	Sep-14	Mar-15	Sep-15	Mar-16
Number of Students	49	38	41	12	3	4
Technique						
Completing the square	4.09694	3.72368	3.73171	2.95833	5.00000	4.87500
u-substitution (with hint)		3.20395	3.60366			4.37500
u-substitution (without hint)	2.87500	2.84868	2.36585	3.00000	4.45833	3.50000
By part, trigonometric substitution, partial fraction	2.32568	2.21749	2.96494	2.13542	3.776042	3.73047
Standard function of Improper integral			2.40854	2.54167	0.25000	2.18750

For algebraic integrals which required the elementary process of completing the square, the percentage errors were 18.7. For proper integrals related to the u-substitution where a hint was given, the percentage errors were 25.4, and when there was no hint given, the percentage errors increased to 36.5. Integrals which apply u-substitution comprised algebraic, exponential, logarithmic and trigonometric functions. Integrals of the type by parts, trigonometric substitution, and partial fractions accounted for 42.8 percentage errors. Improper integrals involved standard functions, i.e. exponential and algebraic functions contributed about 63.1 per cent errors.

rechniques of integration					
Technique	Average mark	Average error	% error		
Completing the square	4.06428	0.93572	18.71447		
u-substitution (with hint)	3.72754	1.27246	25.44927		
u-substitution (without hint)	3.17464	1.82536	36.50712		
By part, trigonometric substitution, partial fraction	2.85834	2.14166	42.83320		
Standard function of Improper integral	1.84693	3.15307	63.06145		

#### Table 3: Comparison of Average Marks and Error Scores among the Techniques of Integration

The relative errors in the three categories of integral types are shown in *Figure 1*. Integrals for basic functions, whether it was proper or improper integral, contributed errors of 40.9 per cent. The first integration technique, i.e. u-substitution accounted for 31.0 percentage errors. Subsequently, there were three techniques of integration, i.e. by parts, trigonometric substitution and partial fractions, had a combined percentage errors of 42.8, which was actually above average.



Figure 1: Comparison of Percentage Errors on Integral Types

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# A BROAD VARIETY OF ERRORS

The various errors produced by the students were similar. The commonality of these mistakes could be because of several reasons such as misinterpretation of questions, misconceptions, wrong assumptions or carelessness. The errors were categorized using the framework errors developed by Seah (2005), i.e. conceptual, procedural and technical. Specifically, the conceptual errors were sub-categorised into four types: symbolic errors, standard functions recognition errors, property of integral errors and techniques determination errors. The mistakes occurred would be sub-categorised because of the confusion between differentiation and integration process as they belonged to the procedural errors. The mistakes occurred due to poor basic mathematical skills and carelessness thus contributed to the technical errors (Seah, 2005).

#### **Conceptual Errors: Symbolic**

For the equation formulae,  $\int f(x)dx = F(x) + c$ ; where f(x) acts as integrand function, and c acts as constant of integration, the symbol 'dx' is equally important. In Sample 1, the variable 'x' was taken lightly, and the symbol 'd $\theta$ ' was completely ignored in the 1<sup>st</sup>, 6<sup>th</sup>, and 7<sup>th</sup> solution steps. In the 8<sup>th</sup> step, 'dx' was used by default without considering the actual variables of the integrand function. The errors related to symbols and notations pertaining to integral calculus might seem trivial, but needless to say, they were very inaudible. These might arise due to lack of emphasis or understanding that every symbol or notation represents a specific, definite meaning of its own. The students did not realise that the structure of mathematical expression became void or invalid when they used the wrong symbols. The students' difficulties with symbols, notations and variables were identified, as one of the problems in calculus (Tall, 1985; White and Mitchelmore, 1996).

# Missing and incorrect usage of 'with respect to variables' symbol

Written Sample 1:

$$\int \frac{\sqrt{16-9x^2}}{x} dx$$
$$\int \frac{\sqrt{16-16\sin^2\theta}}{\frac{4\sin\theta}{3}} \frac{4\cos\theta}{3}$$

In first step:

$$4\int \frac{1}{\sin\theta} \left(1 - \sin^2\theta\right)$$

In sixth step:

In seven step: Let  $u = \sin\theta$   $du = \cos\theta$ 

In eight step:

$$4\int \frac{1}{u} (1-u^2) dx$$

#### **Conceptual Error: Standard Functions Recognition**

Integral comprises standard functions could be evaluated by applying the standard formulae of integration. It is a very straightforward process, and also generally introduced as fundamentals to basic calculus syllabus. In Samples 2a and 2b, the errors were caused by inability of students to produce the right kind of inverse functions for specific standard functions. In the  $2^{nd}$  steps, both students failed to use "cosh<sup>-1</sup>" and "tan<sup>-1</sup>" respectively. The students were unable to distinguish the patterns of several similar standard functions, and hence they failed to memorise and produce the correct results.

#### Errors due to failures to identify the correct standard formulae

Written Sample 2a:

$$\int \frac{du}{\sqrt{4u^2 - 25}}$$

In first step: a = 5, x = 2u, x' = 2

In second step:  $\frac{1}{2}\sin^{-1}\frac{2u}{5} + c$ 

Written Sample 2b:

$$\int \frac{1}{\left(x-2\right)^2+3} \, dx$$

In first step:  $x' = (x - 2)' = 1, \ a = \sqrt{3}$ 

In second step: 
$$\frac{1}{\sqrt{3}} \tanh^{-1} \frac{x-2}{\sqrt{3}} + c; f|x-2| < \sqrt{3}$$

The Samples of 3a and 3b were fragments of solutions for the problems that belonged to integration by partial fractions. The process of splitting the rational functions into sums of partial fraction was done correctly in Sample 3b, but not in Sample 3a. However, both students failed to write the correct standard function integrals for the distinctive rational functions. The power rule integration should be used instead of logarithmic rule integration (in bold). In Samples 3c and 3d, students encountered difficulties in rewriting improper integral into proper integral by applying the one-sided limit notation. It is noted that certain students had insufficient fundamental knowledge and understanding on the concepts of limit to tackle questions on improper integrals. The elementary topics of limit and continuity should be mastered by the students as they advanced to calculus of integration (Orton, 1983; Bezuidenhout, 2001). The 'division by zero error' produced in Sample 3d has showed a serious misconception problem.

Errors due to failures to recognise standard functions

Written Sample 3a:

$$\int \frac{4}{x} - \frac{6}{x^2} - \frac{4}{x+2} dx$$

In final step:  $4\ln|x| - 6\ln|x| - 4\ln(x+2)^2 + c$ 

Written Sample 3b:

$$\int \frac{-2}{x} + \frac{3}{x+2} + \frac{2}{(x+2)^2} dx$$

In final step:  $-2\ln|x| + 3\ln(x+2) + 2\ln|(x+2)^2| + c$ 

Written Sample 3c:

$$\int_{0}^{2} \frac{1}{2-x} dx$$

In first step:  $\lim_{a \to 2} \int_{0}^{a} \frac{1}{2-x} dx$ 

In third step: 
$$\lim_{a \to 2} \left[ \frac{(2-x)^{-2}}{2} \right]_0^a$$

Written Sample 3d:

$$\int_{0}^{2} \frac{1}{2-x} dx$$
  
In first step:  $\lim_{x \to 2^{+}} \int_{0}^{2} (2-x)^{-1} dx$   
In second step:  $\lim_{x \to 2^{+}} \left[ \frac{(2-x)^{0}}{0} \right]_{0}^{2}$ 

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In overall, these students had misconceptions about the derivatives of logarithmic functions. Apparently, the inability to perform standard integral problems indicated failures to grasp the relationship between differentiation and integration processes. It also indicates the students' difficulties in recognising standard functions formulae. The students did not seemly know how to identify whether the problem was a standard function, or otherwise; they did not know how to manipulate the problems in order to apply the standard formulae, and they did not even know when to use the standard formulae for standard functions. All these contributed to the students' difficulties in recognising the formulae.

#### **Conceptual Errors: Property of Integral**

Another misconception problem is the misunderstanding on the property of integral. In Samples 4a and 4b, the students were required to determine the solutions for both questions, without any hints. The students failed to evaluate the derivatives of exponential (in Sample 4a) and trigonometric (in Sample 4b) functions, due to carelessness or weak memory. In the 2<sup>nd</sup> step of Sample 4b, students failed to use (sec<sup>2</sup> x - 1). By utilising few so-called 'brilliant-creative-logical' twists and manipulation, the solutions in both samples eventually indicate poor mastery on the techniques of u-substitution.

#### Misconceptions on property of integral

Written Sample 4a:

$$\int \frac{3e^{3x}}{\sqrt{4e^{6x} - 25}} dx$$
  
In first step:  $3e^{3x} \int \frac{1}{\sqrt{(2e^{3x})^2 - 5^2}} dx$ 

In second step:  $x' = (2e^{3x})' \rightarrow \mathbf{a} e^{3x}, a = 5$ 

In final step: 12  $e^{3x} \cosh^{-1} \frac{2e^{3x}}{5} + c$ 

 $\int \tan^3 x \sec x dx$ 

In second step:  $\int \tan x (1 - \sec^2 x) \sec x \, dx$ 

In third step: Let  $u = \sec x$ ,  $\frac{du}{dx} = -\sec x \tan x$ 

In fifth step:  $\frac{1}{-\sec x} \int (1-u^2)u \, du$ 

In final step:  $\frac{1}{-\sec x} \left[ \frac{\sec^2 x}{2} - \frac{\sec^4 x}{4} \right] + c$ 

#### **Conceptual Errors: Techniques Determination**

In the following two samples, the students were required to evaluate the integrals by using suitable methods. Both samples show that the students decided to use by parts technique to find the integrals. In Sample 5a, since the integral function is a product of algebraic and exponential functions, the reason for choosing by parts technique might be seen as a good choice. However, it was unexplainable why by parts technique was chosen in Sample 5b. There were also numerous basic calculus errors in the giving solution steps. The failures to recognise u-substitution as an appropriate method to solve the integrals, indicates that the students had problems with techniques determination. This is a case of misidentification of methods in solving the integrals.

#### Misidentifications of integration techniques

Written Sample 5a:

 $\int x e^{x^2} dx$ In first step: Let u = x, du = dx;  $dv = e^{x^2} dx$ ,  $v = e^{x^2}$ In second step:  $uv - \int v du = x e^{x^2} - \int e^{x^2} dx$ 

Written Sample 5b:

 $\int \tan^3 x \sec x dx$ 

In first step: Let  $u = \tan^3 x$ ,  $du = 3\sec^2 x \, dx$ ,  $dv = \sec x \, dx$ ,  $v = \sec x \tan x$ In second step:  $uv - \int v du = (\tan^3 x)(\sec x \tan x) - \int (3\sec^2 x)(\sec x \tan x) \, dx$ 

The techniques of integration are essential and compulsory topics which must be mastered by any students of advanced calculus. Nevertheless, most students are easily overwhelmed by the diversity of techniques, and they are also at lost in identifying suitable methods to solve integral problems. This type of conceptual errors appeared as one of the hardest problems to rectify because it is concerned with the students' cognitive ability to visualise several types of integration methods, as a whole entity. Simultaneously, it is also involved mental aptitudes in recognising functions, choosing suitable methods and deciding the method that works best. The ability to determine and perform integration technique is vital in the understanding of integral calculus (Sofronas et al., 2011).

#### Procedural Errors: Confusion between Differentiation and Integration

In Samples 6a and 6b, the correct techniques of integration were used to evaluate the integrals. However, both samples exhibited confusions between differentiation and integration process of trigonometric and inverse trigonometric functions in the initial steps. The students did not realise the mistakes occurred since the subsequent steps and answer were properly

written. There was a lack of connections between their procedural and conceptual knowledge and failures in retaining what they learnt (Naidoo, 2007). The procedural errors usually deem as less serious than the conceptual errors. Unfortunately, they can also lead to unnecessary marks deduction therefore they should be avoided at all.

Confusions between differentiation and integration process

Written Sample 6a:

 $\int \sec^4 x \tan^3 x \, dx$ 

In second step:  $u = \sec^2 x$ ,  $\frac{du}{dx} = \tan x$ 

Written Sample 6b:

$$\int x \tan^{-1}(x^2) \, dx$$

In 1<sup>st</sup> step: u = x, du = dx;  $dv = \tan^{-1} x \, dx$ ,  $v = \frac{2x}{1 + x^4}$ 

# **Technical Errors: Basic Mathematical Skills**

Some of the basic mathematical skills errors discovered were additive, arithmetic operation and cancelling errors on rational functions; completion of the square error; radical and right angle errors on trigonometric functions; and, trigonometric identity and exponent errors (refer Samples 7-12c). These miscellaneous technical errors were spanned from basic algebraic skills to functions. These errors were contributed by several bad, impractical years of Mathematics learning process initially. Those who did not possess solid Mathematics knowledge saw themselves struggling to learn the integral calculus. The students' massive mistakes were found in algebra and its functions which led to poor performance in calculus exams (Tally, 2009).
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## Additive and arithmetic operation errors on rational functions

Written Sample 7:

$$\int \frac{dx}{\left(x+1\right)^2 + 5}$$

In first step:  $\int \frac{1}{(x+1)^2} + \frac{1}{5} dx$ 

# Cancelling errors on rational functions

Written Sample 8a:

$$\int x \tan^{-1}(x^2) dx$$
  
In third step:  $uv - \int v du = \frac{x^2 \tan^{-1}(x^2)}{2} - \int \frac{2x^3}{2 + 2x^4} dx$   
In fourth step:  $\frac{x^2 \tan^{-1}(x^2)}{2} - \int \frac{1}{2 + x} dx$   
Written Sample 8b:

Written Sample 8b:

$$4\int \frac{\cos^2 \theta}{\sin \theta} d\theta$$
  
In first step:  $4\int \frac{1-\sin^2 \theta}{\sin \theta} d\theta$ 

In second step:  $4\int 1 - \sin \theta \, d\theta$ 

Completion of the square errors

Written Sample 9:

$$\int \frac{dx}{x^2 - 2x + 4}$$

In first step: 
$$x^2 - 2x + 4 = \frac{-1}{2} \left( -2x^2 + 4x + 8 \right)$$
  
In second step:  $\frac{-1}{2} \left( -2x^2 + 4x + \left(\frac{4}{2}\right)^2 - \left(\frac{4}{2}\right)^2 + 8 \right)$ 

Written Sample 10:

$$\int \frac{12\sec\theta}{\sqrt{36\sec^2\theta - 36}} 6\sec\theta\tan\theta \,d\theta$$

In first step:  $\int \frac{1}{6\sec\theta - 6} \cdot 12\sec\theta \cdot 6\sec\theta\tan\theta$ 

## Right angle trigonometry errors

Written Sample 11a:

 $x = 6 \sec \theta$ 

In first step:  $\sin \theta = \sqrt{x^2 - 6^2}$ 

Written Sample 11b:

 $x = 6 \sec \theta$ 

In first step:  $\tan \theta = \frac{\sqrt{36 - x^2}}{6}$ 

Trigonometric identity and exponent errors

Written Sample 12a:

 $\int \sec^4 x \tan^3 x \, dx$ 

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In second step: 
$$\int \sec^2 x (1 - \tan^2 x) (\tan^2 x) (\tan x) dx$$

Written Sample 12b:

$$\int \sec^4 x \tan^3 x \, dx$$

In second step: 
$$\int \sec^2 x (1 - \tan^2 x) (\tan^2 x) (\tan x) dx$$

Written Sample 12c:

$$\int \sec^2 x (1+u^2) u^2(u) \frac{du}{\sec^2 x}$$

In first step:  $\int u^3 + u^6 du$ 

## **Technical Errors: Carelessness**

The technical errors can also be contributed by the students' carelessness. Some of the carelessness mistakes include substitution, arithmetic and missing brackets, as shown in Samples 13a, 13b and 13c, respectively. Generally, the students had no misconceptions or procedural errors, but the mistakes were made unwillingly, which might be affected by time-constraint factor or other personal reasons. Unless the students were more attentive and alert, these errors could actually be avoided.

### Errors due to carelessness

Written Sample 13a:

$$\int \frac{\sqrt{16-9x^2}}{x} dx$$

In second step:  $\int \frac{\sqrt{16 - (4\sin\theta)^2}}{\frac{4}{3}\sin\theta} \cdot \frac{d\theta}{\frac{4}{3}\cos\theta}$ 

Written Sample 13b:

2A = 5

In first step:  $A = \frac{2}{5}$ 

Written Sample 13c:

$$\int e^x \sin\left(\frac{x}{2}\right) dx$$

In fourth step:  $e^x \sin\left(\frac{x}{2}\right) - \frac{1}{2}e^x \cos\left(\frac{x}{2}\right) - \int -\frac{1}{4}e^x \sin\left(\frac{x}{2}\right)dx$ 

## CONCLUSION

Improving student's performance in the calculus is indeed a daunting task. High failure rates in integral calculus have been around for decades. The key element to any successful integral calculus achievement includes the ability to pinpoint what difficulties and errors the students are experiencing. The documentation of misconceptions and errors in the learning of integration techniques thus provides handy and useful resources to students and lecturers. This significant result is useful to Mathematics educators who are keen in designing functional teaching and learning instruments to rectify the difficulties and misconceptions problems experienced by calculus students. Future studies need to focus on relevant significant analysis, utilising the concept questions of integral calculus in classroom lectures, and include wider varieties of data related to erroneous concepts. Another suggestion is, to construct valid and reliable instruments, such as questionnaire or structured interview questions. The study should also be extended to the students studying integral calculus in local and international universities, and even into classrooms employing a diverse of pedagogical settings.

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### ABSTRACT

This article reports on a study of how L1 was used by Persian speaking Pre-university learners of English in their private speech while interacting as they were engaged in L2 reading. The study was conducted in a real classroom setting in an Iranian school with the objective of better understand the mediating and regulatory role of L1 private speech in L2 reading. The analysis reveals that learners produced L1 private speech while interacting collaboratively with peers in social context. It presents evidence that L1 was utilized in learners' self-talk as repetitions, affective utterances, pause fillers, self-directed questions and explanations, self-addressed negations, and self-addressed directives. This served learners cognitive and affective functions and assisted them to focus on the challenging part of the task and to maintain self-regulation. This study provided support for the theoretical orientation that views language not only as a means of communication but as a cognitive tool used to control one's mental activity. It is hoped to contribute to the body of knowledge on SLA and sociocultural perspective

of language learning by illustrating evidence for a shift from being othermediated or object mediated to guiding oneself and being self-mediated in the process of L2 classroom learning.

*Keywords:* private speech, sociocultural theory, L1 use, classroom research, cognitive tool

### INTRODUCTION

Studies on private speech have been done within the framework of a Vygotskyan sociocultural approach (e.g. Abadikhah & Khorshidi, 2013; de Guerrero, 2004; DiCamilla & Anton, 2004; Jimenez Jimenez, 2015). Sociocultural theory (SCT) assigns a main role to self-directed speech in the child's development and organization of mental functioning, and thus analysis of private speech plays a crucial role in understanding how the mind functions. It is argued that speech provides the mediational link between the social and mental worlds (DiCamilla & Anton, 2004). Private speech is social in form but cognitive in function. It is used by speakers to organize and regulate their own mental activities. Private speech has been studied in different contexts, i.e. while L2 learners were engaged solving problems individually (Anani Sarab & Gordani, 2014) in collaborative interaction of L2 learners (Alegría de la Colina & del Pilar García Mayo, 2009; Anton & DiCamilla, 1999; DiCamilla & Anton, 2004; Donato, 1994; Villamil & de Guerrero, 1996); private speech of bilingual speakers (Jimenez Jimenez, 2015; Sawyer, 2016); and in immersion programms (Swain & Lapkin, 2013). These studies all suggest an important mediating role for private speech when a learner needs to take control of own mental processes.

Research done so far notes the need to study L2 learners' private speech either in L1 or in L2 in a variety of language contexts and in more detail while performing different tasks. Previous research call for more studies to substantiate their findings. According to the SCT, one's L1 is the most powerful tool to mediate an individual's cognitively complex thinking. It is not very well known how EFL learners' L1 private speech assists them to organize and control their thinking in the process of L2 learning. Most studies cited above investigated L2 learners' private speech during problem solving or writing tasks, but not on reading. Studies reported the

existence of L1 self-talk in learners' speech; however, they do not further investigate learners' own comments and reflections on it, which this study intended to do.

## THE STUDY

Above mentioned studies highlight the crucial role of learners' private speech in different ways and how it provides support for them to think and self-regulate their learning in the specific context of each study. This study intends to investigate the Pre-university EFL learners' use of L1 to understand what functions L1 private speech serves during L2 collaborative reading task. It provides evidence of L1 intrapersonal communication while learners are engaged in reading L2 texts in the context of naturalistic classroom setting. It is an attempt to better understand why and how learners use the L1 self-talk and contribute to the body of knowledge on sociocultural view of L2 learning. It is our intention to contribute to the body of knowledge on L2 learning by arguing the relevance of L1 private speech for foreign language reading and how it might enhance L2 learning of Pre-university learners in a classroom.

## SOCIOCULTURAL THEORY AND PRIVATE SPEECH

According to Vygotsky sociocultural theory, just as humans rely on tools to act on the physical world, we also rely on semiotic tools (e.g., speech) to regulate (i.e., organize and control) our mental functions. As Appel and Lantolf (1994, p. 439) state, "speech has dual mediational macrofunctions - a primary function, to mediate our social activity, and a secondary function, to mediate our mental activity". This is an orientation that views speech as both a means of communication and a cognitive tool.

Within the framework of SCT, "humans are understood to utilize existing, and to create new, cultural artifacts that allow them to regulate, or more fully monitor and control, their behavior" (Lantolf, Thorne, and Poehner, 2015, p.1). Vygotsky observed that young children use speech in a self-regulatory manner to guide, plan, and monitor their behavior. This is labeled as private speech. Private speech as Lantolf (2000a, p.

88) states is "speech that is not directed at an interlocutor but is intended for the speaker himself or herself". In the process of privatizing speech, as Lantolf argues, individual gains control over his/her ability to think, remember, plan, evaluate, and learn. According to Lantolf (2000b, p. 15), private speech is a "speech that has social origins in the speech of others but that takes on a private or cognitive function". Private speech plays an important role in maintaining self-regulation. Cognitive, meta-cognitive and affective functions are reported for private speech (Appel & Lantolf, 1994; McCafferty , 1994).

Vocate (1994, as cited in Lantolf & Yáñez, 2003) argues that as with social talk, self-talk is dialogic, but instead of an "I" talking to a "You", private speech entails an "I" that makes choices on what to talk about and a "Me" that interprets and critiques these choices. Vygotsky theorized that because private speech derived from social speech is the precursor to inner speech, mental development can be studied through analysis of private speech. Through the study of private speech, it is possible to observe human mental activity as it is being formed in situated practical activity. Lantolf (2006) states that in L2 learning, self-directed speech acts as not only a means to mediate mental functioning in complex cognitive tasks, but it also serves to facilitate the internalization of mental functions. He further argues that language learning will probably not occur without private speech.

## LITERATURE REVIEW

In classroom settings, according to Lantolf and Thorne (2006), language mediates not only learner's relationship with peers or the teacher but also her/his mental activity. Vygotsky-inspired theory offers a framework through which cognition can be analyzed and examined in a social context. Investigating private speech contributes to our understanding of learner's mental activity. The relationship between cognitive performance and private speech is documented in previous studies (Diaz, Winsler, Atencio, & Harbers, 1992; DiCamilla & Antón, 2004).

DiCamilla and Antón, (2004) analyzed the speech of English speaking Spanish learners while they were collaboratively producing compositions in Spanish. Researchers audio recorded 14 dyads of university level leaners

of Spanish from three different proficiency levels. Participants received no instruction on what language (L1 or L2) to use to perform the task. The authors argued that in a social setting, private speech can be distinguished from social speech and hence private speech produced in such setting can be identified and analyzed. Their study revealed two fundamental cognitive operations for private speech, i.e. focusing of attention and the creation of psychological distance. Researchers argued that participants' private speech enabled them to concentrate on the task and also to distance themselves from the encountered problems. As a result of this, learners gained control in the performance of the assigned task.

Abadikhah and Khorshidi (2013) employed Vygotsky sociocultural theory as the framework to investigate the Persian speaking adult EFL learners' private speech produced during collaborative interactions. The purpose of their study was to find out if the participants externalize private speech in L1 or in L2 and also to examine whether there is a relationship between the amount of private speech and successful task completion. Six advanced and six beginner learners of English were participants in this study and were asked to do a picture description task in pair work. They identified the occurrences of private speech in participants' interaction. Researchers reported that both groups produced private speech for task completion; however, the advanced learners' predominantly produced L2 private speech. They argued that while the use of private speech helped learners get control over the task, no relationship was found between the amount of private speech and successful task completion.

Anani Sarab and Gordani (2014) investigated L2 private speech of Iranian EFL learners. Participants in their study were 30 intermediate adult Persian speaking learners of English in a university in Iran. Participants were asked to solve 10 challenging English riddles while their voices were being recorded. They were instructed to use English in dealing with the task while trying to comprehend and come up with the answer. The researchers found frequent use of reading aloud, repetition, self-explanations, and metalanguage as private speech. They reported different functions for private speech such as managing the thought, planning, controlling anxiety, and self-orientation.

Centeno-Cortés and Jiménez Jiménez (2004) investigated the private verbal thinking of three different groups of speakers in the process of their reasoning during problem solving activities. They randomly selected 18 university students and instructors of Spanish in an American university. The participants were asked to answer 15 cognitively challenging questions in Spanish. The researchers compared the private verbal thinking produced by native speakers of Spanish, intermediate level L2 learners of Spanish, and advanced level L2 learners of Spanish. They reported that use of L2 private verbal thinking differed according to participants' proficiency level of L2. They also found that each of this group made use of their L1 in the process of problem solving. They reported participants' L1 as a key factor in the process of reasoning and argued that L1 played an important role in cognitive regulation and learning. Their findings revealed that some speakers were usually unable to solve the problem when their verbal thinking was in L2. However, it was found that when speakers switched to the L1, they were more often successful. The researchers conclude that native language act as a key cognitive and metacognitive tool for L2 learners and should not be banned in L2 classes. Authors highlight the need for more research to further define the precise role of the L1 in learners' language development.

### METHODOLOGY

This study adopts a qualitative case study approach which covers both the phenomenon of interest, i.e. use of L1 private speech, and its context. The study was carried out in an Iranian EFL school located in the ESL context of Kuala Lumpur, Malaysia. It involved the participation of all 15 Preuniversity students. It should be noted that this was the only Pre-university class in the school and no specific criterion was involved for selection of the participants. English is a compulsory subject for all Pre-university learners. Participants' age ranges between 17 to 18. Their native language is Persian and they have been studying English at school for six years since they were in Grade 6. The school follows the same curriculum as the schools in Iran do and the same textbooks -published in Iran and used in national schools-are used in overseas schools as well. Classroom data was collected in a naturalistic environment during normal class times and conditions. The data for the study involved four reading lessons from learners' English textbook *'Learning to Read English for Pre-University Students'*, covered in one

semester. It should be noted the participants would go on to university in the following year. Hence, the main purpose of this textbook is to prepare students for reading skills needed for university, where they would inevitably be required to read articles, books, journals and texts in English, each in their own field.

Qualitative data of real-time production of private speech obtained from audio-recordings of classroom interactions and interviews with the learners were used for the analysis. In order to have additional insights into the phenomenon of private speech, follow up interview with the learners were conducted. Interview data provided the researchers more insights on learners' use of L1 which was not captured through recordings. Qualitative case study guided the researchers in the process of collecting, analyzing, and interpreting the data. However, some quantifications were carried out in order to find out more frequently used L1 utterances as private speech and their functions. This helped to identify the contexts in which utilizing L1 private speech proved more beneficial. When reporting examples of classroom interactions, participants are given pseudonyms to achieve anonymity.

## DATA ANALYSIS AND FINDINGS

Using the framework of SCT-L2 which maintains that learners' speech has the ability to function as a "mediational artifact to control thinking" (Lantolf & Thorne, 2006, p. 60), the study focused on the L1 private speech use of the participants and how it functioned in their cognitive regulation during reading L2 texts. Analysis of data revealed instances where learners used L1 not for a communicative function, but as a means for self-regulation. In other words, L1 was used intrapersonally in the learners' private speech to regulate their own cognitive processes. These were audible utterances in the learners' speech which were neither intended for nor directed at others, but to the self. L1 utterances which learner's tone of voice indicated being directed to self or ones which were ignored by peers, and the questions immediately answered by self, were counted as private speech.

Learners' L1 as an intramental tool in vocalized private speech directed to oneself were identified and coded for the content and functions they served

based on the earlier literature on private speech (Centeno-Cortés & Jiménez Jiménez, 2004; DiCamilla & Anton, 2004; McCafferty, 1994). Data was obtained from learners' speech during pair work, group work, or wholeclass interaction while interacting with the teacher. When learners' speech was coded in terms of content, analysis revealed that the L1 utterances were used in repetitions, affective expressions, self-addressed explanations, pause fillers, self-addressed questions, self-addressed negation, and selfaddressed directives. Then, these utterances were coded for the functions they served. There was a total of 119 instances of intramental use of L1, i.e. use of L1 utterances in learners' private speech, during the L2 reading. In what follows, segments of learners' interactions are used to discuss and illustrate the findings. To provide context, Romanization of the Persian utterances are given in *italics*. These are followed by the English translations for learners' L1, which are given in brackets []. Words or phrases which are in **Bold** signify L2 utterances within a learners' L1 speech. Sentences which the learners read out from the textbook are underlined. Pauses are shown by + sign and researchers' comments are added in ().

## L1 REPETITION AS PRIVATE SPEECH

It was found that the most frequent use of L1 in learners' utterances in their private speech was for repetition (n=43). Analysis showed that most often, repetition occurred after the mediating role of the teacher or a more proficient peer in the group. Excerpts 1 and 2 are examples from data illustrating use of L1 by learners for repetitions which served them cognitive functions. By repeating to himself, the learner was taking over the regulating role played by others earlier.

In Excerpt 1, which is a segment of pair work interaction data, learners were engaged in reading a text about 'Earthquakes and how to survive them'. Mahdi, after reading a sentence about the main layers of the Earth, provides the wrong translation for 'plates' in the context of earthquakes. His more proficient peer, Salar, knows that Mahdi's translation was not the proper one as evident from his utterance in line 10. However, Salar does not know the meaning too. While Salar is thinking, Mahdi calls the teacher for help.

### Excerpt 1

1.	Mahdi:	It is broken into many (reads slowly word by word)
2.	Salar:	It is broken into many pieces.
3.	Mahdi:	pieces. Pieces yani chi? yani bakhsh.=
4.	[piec	es. What does <b>Pieces</b> mean? Means part.=]
5.	Salar:	=ghet'ee ha
6.		[=pieces]
7.	Mahdi:	called plates. Plates yani boshghab.
8.		[called plates. Plates means plates (a dish).]
9.	Salar:	called plates. Plates Yani, +yaani
10.		[called plates. Plates means + means]
11.	Mahdi:	Teacher? What's the meaning of plates?
12.	Teacher:	safhe, too zaminshenasi.
13.		[layers (of lithosphere), in geology]
14.	Salar:	Aha. Safhe, are. Safhe, safhe. farsish yadam rafte bood.
15.		Boshghab mishe vali inja be maani e safhas.
16.		[Oh, plates, yes. Plates, plates. I'd forgotten the Persian.
17.		It can also mean a dish, but here it means plates (of the
		earth).]
18.	Mahdi:	Plates, boshghab, safhe
19.		[Plates, the flat dish, plates of earth]

(Pair work, Reading a text on earthquakes, December 2013)

Mahdi, who finds out another meaning for 'plates', repeats the two different meanings (lines 18-19), the one he already knew, the flat dish, and the one just provided by the teacher, layers (of Earth's lithosphere). This repetition of L1 equivalents might assist Mahdi to organize his L2 and make the newly encountered vocabulary stick in his mind. In this way he is reminding himself of the two different meanings of the L2 word 'plate', the one he knew previously and the one just learned. In other words, repeating the L1 utterances in his self-talk acts as a regulation strategy and might have helped Mahdi be more successful in remembering the words later, and can also be an indication of a shift from being other-regulated to being selfregulated. It is seen that a low proficient learner such as Mahdi is not able to realize that 'plate' as a dish is not relevant in this context when he reads by himself. During interaction with the partner and with the teacher, Mahdi

noticed that 'plate' in the context of the lesson is very different from his previously known meaning. However, noticing alone seems not sufficient to him at this point and he utilizes L1 for repeating and reminding himself of the two meanings. The use of L1 in this way might enhance Mahdi's mental functioning and promote his L2 development by incorporating newly learned meaning in the old ones. It can be argued that in this way he is utilizing existing L1 in order to create new artifact, i.e. L2. This is an evidence illustrating a transition from socially interacting with others to interacting to oneself which from the sociocultural perspective eventually leads to the formation of silent inner speech and verbal thought. This excerpt also provides one more evidence of the use of L1 as repetition in Salar's intramental speech. As seen in line 14, he repeats the L1 equivalent provided by the teacher three times, followed by an L1 utterance meaning "I'd forgotten the Persian". This indicates that by repeating to himself he tries not to forget the word again.

Further support for repetition in L1 as learner's private speech is visible in Excerpt 2 in which Salar is utilizing L1 to focus his attention and make sense of the L2 text. The part of the text being discussed in Excerpt 2 was as follows: "Since a large number of the world's earthquakes each year occur along the Pacific Ocean, this is the most probable area for today's earthquakes". In this example, Salar, in a quiet voice, repeated an L1 translation for a part of the L2 text so that he might avoid distraction.

### Excerpt 2

1.	Salar:	az an jayi ke har sale tedad e ziadi az zamin larzeha, +
		(quietly repeats)
2.		az an jayi ke har sale tedad e ziadi az zamin larzeha,
3.		etefagh miofte dar oghyanoos e aram , in mahal be onvane +
4.		[Since each year a large number of earthquakes, +
		(quietly repeats)
5.		since each year a large number of earthquakes,
6.		occur in Pacific Ocean, this area is +]
7.	Mahdi:	most probable
8.	Salar:	Por ehtemal tarin mantaghe baraye zamin larze
9.		[The most probable area for an earthquake.]

(Pair work, Reading a text on earthquakes, December 2013)

## L1 AFFECTIVE UTTERANCES AS PRIVATE SPEECH

Another use of L1 by learners as private speech was in utterances produced as affective utterances. This group of utterances included the utterances indicating affective expressions of the learners either regarding the task or their own performance. Utterances of self-criticizing, self-encouraging comments, any motivational utterances, those which were signs of discovery or indicators of learners' notice of an error are categorized as affective expressions. In fact, this group of intramental utterances was the second most frequent one (n=29). The most frequent L1 utterance as affective expressions observed in data was "Aha" [Oh]. "khob" [So], "Ah" [Ugh] and "Are" [Yeah] were other examples. These utterances sometimes were followed by an L1 explanation or repetition. Excerpt 3 is an example for an L1 affective utterance as private speech. Salar is reading and translating. The sentences he is reading are as follows: "The world is getting warmer. It has warmed by half a degree centigrade over the past 100 years". One of the words in the sentence he is reading is 'centigrade'; however, Mani, the less proficient learner in the group, did not realize this at first and had difficulty pronouncing it. He asks the other two partners to provide him with the L1 equivalent, while pronouncing the word wrong. When they point out to him that the word is the same in both Persian and English, Mani gets angry at himself for not having recognized it, as can be indicated by him uttering "[Ugh!, ok, ok, ok, ok!]"(lines 9-10). Mani's "ugh" is a selfcriticizing remark, followed by him repeating the word "OK" over and over to himself, trying to recognize his mistake and prevent making it another time. By doing this, he seemed to be trying to focus on other important parts of the task, as opposed to the unnecessary mistake he had made.

## Excerpt 3

1.	Mani:	kenti, kentigrad (wrong pronunciation) chi mishe?
2.		[What does kenti, kentigrad (wrong pronunciation) mean?]
3.	Foad:	Chi?
4.		[What?]
5.	Mani:	Centigrade (pronounced /Sentigrad/) chi mishe?
6.		[Centigrade, (pronounced /Sentigrad/) what does it mean?]
7.	Foad:	hamoon sanigrad e khodemoon
8.		[It's the same for us (in Persian)]

9. Mani: *Aaah! Khob, khob, khob, khob.*10. [Ugh! Ok, Ok, Ok, Ok.]

(Group work, Reading a text on global warming, December 2013)

Data analysis revealed that learners used self-talk in their speech as a means of 'mediating mental functioning' in complex cognitive tasks (Lantolf & Thorne, 2006). In many instances, they used L1 to serve them cognitive, metacognitive or affective functions. For example, Mani, when reading the English texts, sometimes evaluated the L2 text and produced L1 utterances such as "*in ke hichi*" meaning [this is nothing] or [it's easy], and "*inam ke fahmidam* [got this too]" in his private speech. When interviewed later, he reported that doing this helped him focus his attention and direct his thinking to more complex parts of the L2 text. He stated that "*injoori havasam bishtar jam e ghesmat haye sakhtesh mishe* [in this way, I can focus better on the more difficult parts]". It could be inferred that Mani's evaluative statements in L1 had an affective function too, ["I don't have to worry about this"]. L1 motivational statements such as the ones uttered by Mani were used by other learners and it might have helped them focus their attention on more difficult parts of the text.

"Learners use language for strategic purposes, one of which is to mediate their own activity through private speech" (DiCamilla & Antón, 2004). Mani used L1 for self-talk at points where he faced comprehension difficulty during reading. Sometimes, when he faced a problem, he asked for help from other learners. After being provided with help, he used L1 and produced the utterance "*Aha gereftam*", [Oh, got it.]. Later, in the informal follow up interview, he commented that in this way, he gained control over his ability to think, remember, and learn. Mediational function of his private speech was further supported by his comments in the follow up interview data. He reported that,

### Excerpt 4

shakam bartaraf mishe. ... Chizi ro ke midoonam rahat tar minevisam ya anjam midam. ... Motmaen misham miram ghesmat e ba'adi. [It removed any doubts I had, ... and so I wouldn't get stuck on a task. ... I'm sure, so I can continue on to the next part.] (Interview with Mani, October 2013)

## L1 UTTERANCES IN PAUSE FILLERS

One way in which learners used L1 private speech was as pause fillers. Pause fillers consist of meaningless sounds such as "um, er, uh," etc. as well as random utterances which learners use to buy time. They are often used by learners to help focus their attention or to plan their next utterance. These are followed by a pause and indicate a thinking process. For this study, pause fillers such as "um, er, uh" were not counted or included for the analysis, and only L1 pause fillers were taken into account. Examples of L1 pause fillers from the data include "Masalaaaan" (drawn out) [for example], "chiz" [the, like], "migeeee" (drawn out) [it says], and "misheeee" (drawn out) [it means]. These L1 utterances usually functioned as a search process for the learners, in order to avoid distractions and to gain sufficient time for thinking up an answer. In order to judge the effectiveness of the pause fillers, they were coded for a second time as 'effective' or 'ineffective'. If the pause-fillers were accompanied by correct answers from the learners, they were coded as 'effective', and if they were not, they were coded as 'ineffective'. Analysis revealed that the number of instances of effective searches were much more than the ineffective ones. This indicates the positive role of L1 on learners' cognitive processes. Such L1 utterances assisted learners to avoid distraction and focus on the specific problem.

### Excerpt 5

- 1. Mani: *in chi mishod? Mishod (drawn out). Gofti ha, madeye ghazayi dige?*
- 2.

[What was this again? It was (*drawn out*). You just told me, nutrients, right?]

(Pair work, Reading a text on why exercise is important, October 2013)

Excerpt 5 exemplifies an effective use of L1 as a pause filler in learners' private speech. Mani, a low proficient learner, while thinking about the word 'nutrient', whose meaning he had been told before, uses the drawn out utterance "mishod" as a pause filler, following a self-addressed question "in chi mishod" [What was this again?]". His question is obviously rhetorical, as he goes on to say that he had been given the answer to it before, and then answers his own question followed by an L1 utterance "dige" for seeking confirmation. The pause filler 'mishod' in this instance could have functioned as a way for Mani to organize his thoughts, and search for the correct L2 word. The pause filler gave him enough time to be more focused and gather his thoughts, and finally come up with the correct answer. Hence, the pause filler proved effective in this instance. Doing this, Mani is trying to internalize what he had been told previously. So, it can be argued that L1 private speech is a transition phase for Mani to make social speech become inner speech and it is part of his internalization process. His private speech acts as a tool to mediate both his thinking as well as his learning.

## L1 SELF-ADDRESSED QUESTIONS

Another group of L1 utterances used in learners' private speech was selfaddressed questions (n=12). These included questions directed to the self and not intermentally to others. These kinds of questions, even in a social setting, are ignored by other participants and might be answered immediately by the individual himself. These utterances have regulatory functions. Functions such as self-regulation, managing thought process, task orientation, and lexical search are reported in previous studies for these questions. These L1 utterances mainly functioned as a search process for the learners in this study. Learners used them to direct their thoughts towards a specific item and be more focused on a problem.

Excerpt 7 is an example for the use of L1 which is taken from Matin and Arash's pair work. It exemplifies the metacognitive function of private speech as a "problem solving tool" (Centeno-Cortés & Jiménez Jiménez, 2004, p. 11).

### Excerpt 7

1.	Matin:	when a lot of water covers an area that is usually (dry),
		Aha flood ham
2.		mishe + bala payin shodan e ab masalan too darya+
3.		[when a lot of water covers an area that is usually (dry)
		Oh, and <b>flood</b>
4.		means + the rising and falling of water, like in the sea+]
5.	Arash:	<i>Na</i> , <b>flood</b> <i>misheee</i> (drawn out) +++ <i>baroon mishe</i> ? +++
		Seil, seil.
6.		[No, <b>flood</b> means (drawn out) +++ does it mean rain?
		+++flood, flood]
7.		
8.	Matin:	Seil?
9.		[flood?]
10.	Arash:	Are flood mishe seil.
11.		[Yes, <b>flood</b> means flood]

(Pair work, Reading a text on earthquakes, December 2013)

In the excerpt above, when the learners were engaged in reading the L2 text, Matin had a lexical problem. He did not know the meaning of the word 'flood'. Matin referred to the glossary beside the text and read the definition aloud (line 1-4) but did not finish the sentence. However, he got the wrong meaning from the glossary definition. Arash realized that the meaning was not correct, but he himself could not recall the correct one immediately. Arash used L1 in two utterances which seemed to help him remember the L1 equivalent for the word 'flood' (line 5). His tone of voice and the way he uttered 'mishe' indicate that he was thinking and wanted to take his time. After a pause, he produced a self-directed question "baroon mishe?" [Does it mean rain?]. He was not seeking a response from Matin and this was not intended at his partner because it was Matin who had started the query in the first place. From the context, it is evident this is a self-addressed question to regulate his own thinking and gain control over his abilities to retrieve from memory the L1 equivalent. Here, private speech is the site where a lexical search took place. Finally, the question was answered not by the listener but by the speaker when he remembers the L1 equivalent for 'flood' and utters "seil, seil" [flood, flood] in line 5.

Similar to pause fillers, the L1 self-directed questions were coded for a second time as 'effective' or 'ineffective'. That is based on the search results, if they were followed by correct answers from the learners, they were coded as 'effective', and if the search was not successful, they were coded as 'ineffective'. In Excerpt 8, Mahdi produced two self-addressed questions in his private speech. The paragraph the learners were reading at the time was about how exercising makes one flexible. The first L1 selfaddressed utterance assisted him in remembering what he was looking for, as indicated by his utterance "*Aha*! [Oh!]". However, the second one was an ineffective search, as indicated by his L2 utterance "I don't know", which came after a long pause. He used self-addressed questions in order to direct his thoughts towards a specific objective so that he could retrieve information from memory. However, this instant may have been ineffective because he might have had any relevant prior knowledge about the topic and thus a transfer of function from the social to the cognitive domain may not occur.

### Excerpt 8

1.	Mahdi:	And not flexible. And + <i>dige chi bood</i> ? +++ <i>Aha</i> ! In young
2.		younger, for example 18,
3.		[And not flexible. And + what else? +++ Oh! In young,
4.		younger, for example 18,]
5.	Mahdi:	<i>chera mige ke injoori mishe</i> ? +++ I don't know.
6.		[It asks why this happens? +++ I don't know.]

(Group Work, Reading a text on why exercise is important, October 2013)

Functions served by self-addressed questions were not limited only to the L1 lexical searches or to looking for meanings. In a few instances it was seen that learners utilized L1 in their self-addressed questions in search for correct L2 pronunciation. These self-addressed questions were followed by a few attempts at properly pronouncing an L2 word. They would usually utter both the wrong and the right pronunciation, and then decide which one was right.

It was observed that in a few instances in the data where learners used self-addressed questions for L2 correct pronunciations, they proved effective. For example, in one instance when Salar was asked on how

this repetition helped him, he answered with "*Injoori mifahmim kodum ghashangtare*. [It lets me know which sounds better.]" By this, he is indicating that one pronunciation is more familiar to him than the other.

## L1 SELF-ADDRESSED EXPLANATION

Moreover, learners used L1 in their self-addressed explanations (n=15). Excerpt 9 is an example of use of L1 for self-addressed explanations where Mahdi used L1 in his private speech to make sense of a part of the reading text which was challenging for him. Mahdi and his partner were reading a text about earthquakes, and the sentence under question in Excerpt 9 was "This is because several million earthquakes occur each year."

### Excerpt 9

1.	Mahdi:	(quietly) tedad e maadood e milionha! +++ (Can't make
		sense)
2.		(quietly) [A small number of millions!] +++ (Can't make
		sense)

(Pair work, Reading a text on earthquakes, December 2013)

At first, Mahdi did not know the meaning of the word 'several', and asked his peer, Salar, for the meaning. After being provided with a meaning by Salar, he tried to substitute it into the sentence. In this way, he tried to resolve the conflict between words whose meaning he already knew and the meaning for the word 'several' offered by Salar, through explaining and translating to himself. However, the sentence as a whole did not make sense. As a result of this, the meaning provided by Salar was rejected by Mahdi and then he called the teacher for help. Mahdi's behavior in resolving his problem using L1 indicates the role of his L1 in making sense of the L2 text. He used L1 as a cognitive tool to assist him to regulate his mental function and maintain self-regulation.

Excerpt 10 is an evidence of Matin's use of L1 self-addressed explanation in his private speech. It is taken from Matin and Hasan's interaction data, and illustrates an evidence of learner's use of L1 in reading

L2 for making more meaning out of the text. Matin, at one point, appears to be attempting to make an explanation and ignores his peer's input, but he stops soon to explicitly state that he is explaining for his own sake, and not for the peer. In the excerpt, Matin reflects on what he was doing during reading a challenging part of the L2 text, and that it served metacognitive function for him. The two learners were engaged in reading a text on global warming. Matin, after reading a sentence, which was a definition for 'climate change', tried to make sense of the sentence. He did not know the meaning of 'pattern' and looked it up in a bilingual dictionary, and then read the meaning out loud (line 1-3). Matin was trying to make sense of the challenging part of the text, and ignored Hasan's offer of help and input (line 5), and reread the sentence again (line 7). He then produced the utterance 'Aha' [Oh] which indicates he finally made sense of the sentence. This is further supported by his attempt to go ahead and explain the sentence when produced the L1 utterances "dare mige" and "vaghti mige" [It's saying that]. He attempts to intramentally clarify his understanding of the text; however, as we see, he did not finish his translation of the sentence and instead had a social speech with his partner. What Matin said to his partner (lines 13-18) is further evidence of L1 use in his private speech to make more sense of L2 text. And that at that point, he preferred his own self-talk to regulate his learning and not the peer's other mediation.

### Excerpt 10

1.	Matin:	general patterns, ++ patterns mean (looks up dictionary)
		+++
2.		patterns means <i>tarh, olgoo.</i>
3.		[general patterns, ++ patterns mean (looks up dictionary) +++
4.		pattern means pattern, design]
5.	Hasan:	khob az khodam miporsidi dige.
6.		[You could have just asked me]
7.	Matin:	climate change is a change in these general weather, aha,
		dare
8.		mige bar hasb e, vaghti mige ye
9.		[climate change is a change in these general weather,
10.		oh, it's saying that, based on, when it says a]
11.	Hasan:	ye olgoo

12.		[a pattern]
13.	Matin:	na! vaghti mige (did not finish his sentence). Agha, man
		ke
14.		daram tozih midam manzooram in nist ke to nafahmidi.
		Vase
15.		khodam chiz mikonam, tozih midam.
16.		[No! When it says (did not finish his sentence). Dude,
		I'm not
17.		explaining because I think you don't understand, I'm
18.		explaining it for myself]
19.	Hasan:	midoonam. Begoo.
20.		[I know. Go on.]

(Pair work, Reading a text on global warming, December 2013)

Matin explicitly verbalizes that his use of L1 when attempting to translate and explain the L2 text is for his own understanding and his own thinking process. As evident in lines 13 to 18, he emphasizes that it was not socially directed at his partner, but meant for himself. In line 16, when Matin said "No", he meant it as "don't talk, I'm thinking". He then realized that his tone of voice was harsh, and so explained that he was thinking out loud to himself. Matin's L1 speech (lines 7-10) seemed to be communicative; however, this was also directed to self. This indicates his use of L1 as a cognitive tool to control his own cognitive process.

## L1 SELF-ADDRESSED NEGATION

In few instances learners used L1 in self-addressed negation (n. 6). This was an indication of noticing their mistake and a possible change in their behavior. Excerpts 11 and 12 exemplify learners' L1 in their vocalized private speech negation which functioned as noticing a mistake and attempting to correct it. In Excerpt 11, Matin and Arash are reading a text about earthquakes. Matin had just learned the word 'though' in the paragraph previous to this excerpt. The sentence he is attempting to read below is as follows: 'It is thought that about 700 shocks each year have this power'. While reading, he says "though" instead of 'thought'. But he immediately notices his mistake and produces an L1 self-addressed negation "*Na*! [No!],

followed by a self-addressed explanation to further remind himself of the correct term. However, we do not get to see how useful this private speech was for Matin as Arash had already jumped in and read out the term correctly while Matin was still attempting to continue reading. Matin realized it was Arash's turn to read, and stopped reading.

### Excerpt 11

1.	Matin:	khob, <u>It is though</u> , Na! inja <b>though</b> nist dige, are,
		=(overlapping) Aha! toyi.
2.		[Well, it is though, No, it's not 'though' here, yeah,
		=(overlapping) Oh! it's
3.		your turn (to read).
4.	Arash:	=(overlapping) It is thought that about 700 shocks each
		year

(Pair work, Reading a text on earthquakes, December 2013)

Another example, taken from whole class interaction data, illustrating self-addressed negation is in excerpt 12. The sentence learners had just read was 'With this in mind we have to think of the costs of action and weigh them against the risks of inaction'. In the excerpt, the teacher is asking the learner about the referent of the word 'this'. Iman gives a wrong answer at first, but he quickly produces a self-addressed negation as he notices his mistake, [No], makes a short pause, and then comes up with the correct answer.

## Excerpt 12

- 1. Teacher: <u>With this in mind</u>, with what in mind? 'this' refers to?
- 2. Iman: Global warming, *na*! [no] + effects of global warming
- 3. Teacher: possible effects of global warming

(Whole class, Reading a text on global warming, November 2013)

## L1 SELF-ADDRESSED DIRECTIVE

In only 2 of 119 L1 private speech utterances did self-addressed directives occur. Excerpt 13 is taken from a group interaction of three peers, Mahdi, Hadi, and Foad. They are reading a text on why exercise is important. Mahdi, the lower proficient learner, is reading aloud from the text, and does not know the meaning of the word "function", and his rising intonation implies that he needs help. Hadi does not know the meaning either. Foad answers wrongly, notices his mistake and immediately produces an L1 self-directed negation, followed by an L1 self-addressed directive "*Vaista*! (wait!)]. He gives a short pause, and then when he is unable to provide L1 equivalent for 'function' he uses L1 intermentally directed to peers and asks to see the part of the text as reference.

### Excerpt 13

1.	Mahdi:	You need callories for all your body's func, function,
		function?
2.	Hadi:	function chi mishe?
3.		[What does <b>function</b> mean?]
4.	Foad:	harekat. Na! vaista. + matn ro bebinam. Kojast?
5.		[Movement. No! Wait. + let me see the text. Where is it?]

(Group work, Reading a text on why exercise is important, October 2013)

## DISCUSSION, IMPLICATIONS AND CONCLUSION

The main aim of the present study was to explore the functions served by learners' L1 (Persian) private speech in reading L2 (English) texts within the framework of Vygotskian sociocultural theory. This study analyzed Pre-university learners' L1 private speech utterances in reading L2 texts. Data analysis in this study provided support for the theoretical orientation that views dialogue as both a means of communication and a cognitive tool. According to Vygotskian sociocultural theory, speech has dual mediational macrofunctions - a primary function, to mediate our social activity, and a secondary function, to mediate our mental activity (Appel & Lantolf, 1994). L1 Private speech observed in the data displayed a variety of regulatory

functions. In some instances, it was used to reduce anxiety and the affective load. In other instances, it functioned to retrieve information and knowledge from memory or confirm own comprehension or to make sense of L2.

It can be concluded that as learners' L2 was not fully developed to mediate their thinking processes, L1 was used in a self-regulatory manner to do so. The texts in the learners' textbooks were challenging and required learners to integrate their L2 knowledge with their knowledge of the world acquired through their L1. The SCT view that self-regulation occurs more frequently in cognitively demanding contexts was supported. When the text became difficult to understand, learners utilized L1 to assist them in different ways, affectively to decrease anxiety and motivate themselves, and cognitively to deal with the cognitive challenges. Use of L1, for example when repeating vocabularies and explaining meanings of difficult parts of the L2 text confirms the use of language as a cognitive tool and indicates learners' active participation in their own process of learning. This is consistent with Dicamilla and Anton (2004) argument that in collaborative context too learners mediate their own activity through private speech.

DiCamilla and Antón (2004, p. 41) argue that "language use is not restricted to the exchange of information. Learners also use language for the strategic purposes, one of which is to mediate their own activity through private speech." According to SCT, private speech plays an important role in the movement from interpersonal mediation to independent problem solving. Swain and Lapkin (2013, p.113) state that language mediates cognitively complex thinking, and that the first language is the most powerful tool for doing so. They further argue that "emotion and cognition together drive learning" (p. 114). Analysis of functions revealed that learners used L1 private speech as a tool to mediate and direct their thinking. For example, Self-questioning, repetition, and producing utterances such as "Mige ke", [it says that], and "Aha, gereftam!" [Oh, got it] were observed in data and served the function of focusing learners' attention on the task or the linguistic problem they were trying to solve. In some instances, it helped them to retrieve knowledge from the memory and make meaning of L2 text in their own minds as well. L1 affective utterances were used by learners to relieve their tension and anxiety and as it was evident from their reflections during the follow-up interviews, L1 private speech played an important role in their verbal thinking which eventually contributed to their self-regulation and problem solving and allowed learners to "control both themselves and the problem" (DiCamilla & Anton, 2004).

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# COMMUNICATION SKILLS AMONG DIFFERENT CLASSROOM MANAGEMENT STYLES TEACHERS

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### ABSTRACT

The significance put in refining communication skills among teachers plays a central role in connecting students' various knowledge. With that, classroom management styles with good communication skills become a major focus in achieving fundamental educational aims. Unfortunately, communication skills and management styles for classroom learning are always seen as isolated components. Hence, this study aims to investigate the communication skills used among teachers with different classroom management styles in Malaysia primary schools. This study attempts to achieve four objectives; namely, to examine the teachers' level of communication skills in listening, ability to get message across, emotional management in the communication process, insight to the communication process and assertive communication; to investigate level of communication skills between male teacher and female teacher; to describe the percentages of the teachers with different classroom management styles; and to investigate the level of communication skills between different classroom management styles. This study employed the survey causal comparative research design that focuses on the quantitative

approach. The respondents of this study were 70 primary school teachers who were randomly selected in the area of Perak, Malaysia. A questionnaire was administered in this survey with results showing that the teachers have their personal set of communication skills with different classroom management styles. Nevertheless, the analysis showed that there is no strong evidence that there is a significant difference in the communication skills based on gender. Results also revealed that there is a significant difference in communication skills between the two different categories of classroom management styles.

Keywords: Communication skills, classroom management styles

## BACKGROUND OF THE STUDY

Classroom management styles are observed based on teachers' actions. Proper management style is essential to create a supportive environment in the teaching and learning process topped up with considerable amount of efforts in effective classroom management to engage students in learning (Evertson & Weinstein, 2006). The actions performed by teachers in efforts to engage students in conducive learning environment usually involve organizing the physical environment, establishing rules and procedures to maintain students attention, and importantly; engaging students in the planned activities (Brophy, 2006). It was also emphasized by Evertson and Weinstein (2006), and Brophy (2006) that actions taken by teachers are imperative to facilitate learning among students in classroom management in terms of maintaining not only positive but also productive learning environment that is relatively free of behavioural exertions. It is also fundamental that to be a teaching expert, teachers need to acquire the necessary knowledge and expertise in classroom management (Emmer & Stough, 2001). The teachers' actions are usually demonstrated in their accomplishment with the development of students' social skills and selfregulation. Essentially, classroom management is the variable that gives the largest impact to students' achievement (Marzano & Marzano, 2003).

It needs to be cautioned that ineffective classroom management skills would also at the expense of wasted instructional hours, exhausted time-ontask, and interrupted learning environments (Boynton & Boynton, 2005).
Adding on to the concern, with inappropriate classroom management, disruptive students' behaviour could have negative effects towards teachers' instructions causing the teachers' ability to be questionable (Braden & Smith, 2006; Rogers & Freiberg, 1994). A much earlier study has been performed which aimed at identifying specific teachers' behaviour while promoting appropriate behaviour while suggesting strategies to reduce inappropriate behaviour (Anderson, Evertson & Brophy, 1979; Anderson, Evertson & Emmer, 1989). Meanwhile, more extensive studies in classroom management performed would involve observing teachers' behaviour during the teaching and learning activities. On a common ground, most research analyses would identify the influences of teachers' behaviour have towards students' interactions. This calls for further investigations on specific factors which contribute towards classroom management behaviour. Importantly, teachers need to have fitting communication characteristics in creating effective student-teacher interactions. In addition, teachers' concerns of students' management strategies in blended learning environment are needed so that they are more guided (Teoh, Kor & NurShaminah, 2017).

Effective communication skills and strategies hold the essence of quality classroom management and it would virtually pervades through all aspects of school life. However, this does not mean that it would provide the conclusive answers to the problems encountered by the educational administrators. Communication involves the sharing of information, ideas, and attitudes in ways that produce a degree of understanding between two or more people as informed by Lewis (1979, 1983). Communication is a relational process during which messages are transmited using symbols, signs, and contextual cues to express meanings while having receivers construct similar understanding which subsequently influences behaviour. Essentially, it is undeniable that the success of classroom activities and students' learning are influenced by classroom management and communication skills.

To a large extent, communication skills could be another weighing factor for teachers' personal growth and career success. A survey performed by corporate recruiters revealed that good communication skills and ability to work with others are major influencers for a successful career (Morreale, Osborn, & Pearson, 2000). Teachers with interpersonal skills will not only benefit personal growth or career success but also positively affect students'

learning motivation. Importantly, teachers need to realize the magnitude of good communication skills have on teaching and learning. It believed that teaching is generally considered as only fifty percent knowledge and fifty percent interpersonal or communication skills. Communication skills for teachers are thus as important as their in-depth knowledge of the particular subject which they teach. Therefore, it is essential that teachers recognize that all students have different levels of strengths and weaknesses.

Communication is both receptive and expressive. Teachers need to be concerned with their students' receptive ability by identifying whether students are able to comprehend what they listened to and be able to lucidly articulate and demonstrate their knowledge while teaching through their expressive ability. The clarity of thoughts can be observed in the teachers' ability to transmit complex ideas into simpler parts and smaller steps for the students. This is a valuable skill to make learning more appealing for students topped with effective communication skills which are not isolated from good classroom management practices.

# PROBLEM STATEMENT

It is essential for teachers to not only organize their classrooms but also be able to manage students' behaviour to accomplish positive learning outcomes (Emmer & Stough, 2011). It needs to be cautioned though that sound behaviour management is not a guarantee to effective instructions. However, it would establish an environmental context that would possibly lead to good instructions. Another caution that needs to be considered is that highly effective instruction is not a warranty that can eliminate classroom behavioural issues; therefore, it is critical for teachers to establish the environmental context in planning and initiating lessons. Perhaps, teachers may initiate a lesson from active questioning and answering warming up session to get some ideas of students' background knowledge. Nevertheless, teachers will need to continuously develop the skills in probing since it is an essential attribute to get initial measures of students' background knowledge and comprehension level.

Prior researches have illuminated that organized teaching methods have been an important element in the educational goals. However, it is essential for teachers to be able to communicate the intent of teaching goals with effective skills and strategies to facilitate learning (Mortimer & Scottt, 2002). The ability to communicate is not the only factor or attribute that is necessary for an instructor to meet success in delivering knowledge but it could be argued that it is a critical factor or attribute in classroom management. Therefore, if teachers can communicate effectively, the likelihood of being a successful teacher in classroom management is high.

Caution needs to be considered that lack of or impaired interaction between teachers and students may lead to misbehaviour in the classroom. Sufficient planning, clear communication, and adequate guidance are necessary for student' success to occur. Moreno (2009) stated that teachers with good communication skills manage to deliver lesson in an attractive way. This way, teachers can manage the class to the level best indicating that communication skills can be properly discussed and connected to management styles in order to have a positive impact on students' behaviour. However, little is known regarding how outcomes of communication might differ with teachers' classroom management style. Essentially, this needs to be properly addressed since communication skills and management styles for classroom learning are always seen as isolated components.

Hence, this study aimed to investigate the practices of communication and management styles based on the following research objectives (RO):

**RO1:** To examine the teachers' level of communication skills (listening, ability to get message across, emotional management in the communication process, insight to the communication process and assertive communication). **RO2:** To investigate level of communication skills between male teachers and female teachers.

**RO3:** To describe the percentages of the teachers with different categories of classroom management styles.

**RO4:** To investigate level of communication skills between/among different categories of classroom management styles.

## METHODOLOGY

This study employed the survey causal comparative research design with a total of 70 teachers randomly selected from all the primary schools in the state of Perak, Malaysia. Hence, findings of this study may be generalized to the population of teachers in Perak and perhaps may give some overall overview for teachers in Malaysia schools. The instruments used were questionnaires adopted and adapted from the survey done by Martin and Sass (2010), and Loy (2006). A total of 55 items on management styles and communication skills were included in the questionnaire. For the questionnaire in management styles, Martin and Sass (2010) have categorized management styles into 'noninterventionist', 'interactionalist', and 'interventionist' based on their justification of ranges in the mean score from the six Likert Scales. A five Likert Scale was used in this study for the justification of 'noninterventionist', 'interactionalist', and 'interventionist' based on the schema from Brannon (2010). The ranges were adjusted in accordance to the following ranges within the five scales namely; scores between 1.0 and 2.3 were coded as 'noninterventionist'; scores between 2.4 and 3.7 were coded as 'interactionalist'; and scores between 3.8 and 5.00 were coded as 'interventionist'.

For the questionnaire in communication category, Loy (2006) used a five point Likert scale measurement for all items in the questionnaire namelys; almost never, rarely, sometimes, guite often and most of the times. The skills of communication consist of 'ability to get the message across', 'emotional management in the communication process', 'insight to the communication process' and 'assertive communication'. Since the scale ranges from '1' to '5', the mean score of 2.5 indicates the middle score of the indicator to differentiate of showing positive sign (if the mean score > 2.5) in the specific communication skills; and showing as negative sign (if the mean score < 2.5). However, justification of the mean indicator of communication skills was determined based on the five point Likert Scale ranges. The indicators are 'Low Communication skill', 'Medium Communication skill', and 'High Communication skill'. For achieving the interpretation in communication skills, items which carry negative value were converted to a particular value. For example, in item 'I find it hard to express my feeling', the score '5' was converted to '1' and for the rest. A reliability test had been conducted for the instrument. The results showed that the reliability for classroom management styles is 0.840 while the reliability for communication skills is 0.891.

# FINDINGS

The following analyses were presented as required to fulfil the research questions. RQ1 attempts to identify the teachers' level of communication skills (listening, ability to get the message across, emotional management in the communication process, insight to the communication process and assertive communication). Table 1 illustrates the level of communication skills in terms of overall mean score (M=3.41, SD=0.32). The mean scores for each skill in the communication scales demonstrated that the values do not fall far from each other. The mean scores ranged from 3.15 to 3.67. Comparatively, 'ability to get message across' has shown relatively high among the teachers. The result obtained have indicated that the 'ability to get messages across' among the respondents is relatively high and does not fall far from the other sub-skills analysed.

	Mean	Std. Deviation
Overall Communication Skills	3.41	.32
listening	3.40	.69
ability to get message across	3.67	.76
emotional management in the communication process	3.38	.71
insight to the communication process	3.44	.84
assertive communication	3.15	.81

Table 1: The Teacher's Communication Skills

The next analysis aimed to investigate the level of communication skills between male teachers and female teachers. Results for RQ2 is set to light for any differences in communication skills between the two genders. Results in Table 2 disclosed that male teachers' and female teachers' overall communication skills are at the mean value of 3.51 (with standard deviation 0.24) and 3.35 (with standard deviation 0.35) respectively illustrating that the male and female teachers projected positive sign in communication. Based

on these indicators, the teachers are good in communication. Nevertheless, the descriptive results show that the male teachers obtained a comparatively higher score of mean than the female teachers in the statistics test, but it is noteworthy to mention that the t-test analysis for comparing the two means shows that the p-value is 0.05 which is close to the significant level of 0.05. Nevertheless, there is no strong evidence to conclude that there is a difference in the mean scores between male teachers and female teachers with t = 1.999 at 0.05 level.

 Table 2: Independent Sample t-test between Male Teachers

 and Female Teachers

	Gender	Ν	Mean	Std. Deviation	t	df	Ρ
Communication	Male	25	3.51	.24	1.999	68	.050
	Female	45	3.35	.35			

In the next analysis, results were presented for answering RO3 which is to describe the percentages of the teachers with different categories of classroom management styles between male and female teachers. Table 3 aimed to describe the frequencies and percentages of respondents towards the styles of classroom management. In this study, the teachers were found to have two types of management styles, namely 'interactionalist' (with 42.9% or 30 teachers) and 'interventionist' (with 57.1% or 40 students).

	Frequency	Percent
Interactionalist	30	42.9
Interventionist	40	57.1
Total	70	100.0

**Table 3: Classroom Management Styles Score** 

The following analysis aimed to investigate the communication skills between or among different classroom management styles teachers. The research question is referred as below: In the next analysis, results obtained will respond to RQ4 in which it seeks to identify for differences in communication skills involved between the different classroom management styles practised. COMMUNICATION SKILLS AMONG DIFFERENT CLASSROOM MANAGEMENT STYLES TEACHERS

An independent sample t-test was used to analyse the differences in the communication skills between different classroom management styles since there are only two categories of management styles even though the interpretation of classroom management styles includes three different categories. Table 4 shows that the mean score of communication skill for interactionalist style is 3.33 (SD=0.33). While for interventionist style, the mean score of communication skill is 3.49 (SD=0.29). The descriptive results show that the interventionist style comparatively obtained a higher score of mean in communication skill than the interactionalist style. Besides that, the t-test analysis shows the p-value is 0.01 which is less than the significant level of 0.05. Hence, there is enough evidence to conclude that there is a significant difference in means scores in the communication skills (with t= -2.637, p=0.010) between interactionalist style and interventionist style.

Mean Std Ν (communication t df Ρ Deviation skills) Interactionalist 30 3.33 .33 - 2.637 68 .010 40 3.49 .29 Interventionist

Table 4: Independent Sample t-test to Test on Communication Skills between Different Classroom Management Styles

# **DISCUSSION AND CONCLUSION**

The overall results gathered for this study have illustrated that the teachers practised good communication skills with positive sign (with overall mean=3.41, standard deviation=0.32) in communicating their intentions and meanings. The findings indicated that teachers perceived that they are showing high indicator for the dimensions of communication skills. Their average mean scores in communication are higher than the middle score (middle score = 2.5) which is in high category of communication rating. However, the results indicated that the male teachers (with mean=3.51, standard deviation=0.24) obtained relatively higher mean score than the female teachers (with mean=3.35, standard deviation=0.35) when engaged with their preferred types of communication skills. This in line with the study by Andrews (2013) who discussed that one of area of distinction between

men and women is the way they talk in the workplace. The men are more inclined to pick up verbal cues, while the women are better at picking up non-verbal cues. In another early research, Merchant (2012) also found that gender differences in communication between men and women at the workplace was significant.

The results also revealed that characteristics of teachers fall in categories of 'interventionists' and 'interactionalist'. Teachers who are interventionalists become proactive in providing consequences for students' behaviour in studying as well as any other actions in school (Rahimi & Asadollahi, 2012). Hence, teachers who are 'interventionalist' practise more of face to face communication. Nevertheless, teachers who are 'interactionalists' always believe that students learn from interacting with peers (Ritter & Hancock, 2007; Glasser, 1997) suggesting that students communicate with their peers and not only with their teachers. This way, teachers could focus on guiding the students to act among their peers. Although it is essential for teachers to communicate within the teaching-learning environment, allowance and opportunities for students to communicate with their peers are still significantly important. It is also worthy to highlight that the findings of this study have also brought to light that male teachers have a higher mean of communication skills compared to the female teachers. The comparison reflected that male teachers are proactive enough in guiding students on how to act in school. The signs of proactive in communication is made visible from the statistics obtained among teachers who are 'interventionalists'.

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# PHYSICAL ACTIVITY LEVEL AMONG WOMEN: PROMOTING SPORTS AND EXERCISES ACROSS DEMOGRAPHIC DETERMINANTS

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### ABSTRACT

The top ten killer diseases in Malaysia are largely associated with inactivity. In relation to that, Malaysia has come out with policies on prevention, control and management of non-communicable diseases (NCD) into the social, economic and environmental systems through various stakeholders. Thus, this study examined the level of physical activity (PA) among women with regards to demographic profiles, namely marital status, occupation, academic qualification and BMI. A sample of 390 women in Selangor was randomly selected. This research employed a quantitative method using a set of questionnaire adapted from International Physical Activity Questionnaire (IPAQ) in order to obtain information from the respondents. Then, descriptive analysis was employed to obtain the frequency and percentage of PA level. ANOVA was also used to find out the difference in PA with regards to demographic profiles. This study revealed that women in Selangor were generally at low level of PA. In terms of marital status, single women were moderately participated in PA as compared to married and divorced women who participated in low PA. In terms of occupation, home maker, self-employed, white-collar and students participated moderately in PA. On the other hand, professionals and unemployed women participated

in low PA. It was also found that school leavers and women with certificate participated at moderate level of PA, yet, women with degree and above as well as diploma were doing low PA. Women with extra body weight, normal body weight and less body weight were found to participate at high, moderate and low level of PA respectively. Besides, findings proved that academic qualification and BMI were highly associated with PA participation. However, marital status and occupation did not associate with PA participation.

**Keywords:** physical activity level, demographic determinants, sports, exercise

## INTRODUCTION

Health and wellness has become the main concern among all developing countries as it ensures quality life of nation, leading to stable economy. Referring to that, the tenth Malaysia Plan 2011-2015 stated that the Ministry of Health Malaysia is dedicated in shifting towards wellness and disease prevention (National Strategic Plan for Non-Communicable Disease, 2010). The policy also states that prevention, control and management of cardiovascular disease and diabetes will be made accessible for all partnership with various stakeholders and into the social, economic and environmental systems can help establish a strong platform for effective reduction of these diseases.

Frequent participation in physical activity could reduce the likelihood of acquiring non-communicable disease (NCD). Therefore, promoting regular PA has been a public health priority in many developed and developing countries including United States of America, United Kingdom, New Zealand, and Malaysia (WHO, 2010). It protects the body from cardiovascular diseases, preventing obesity, reduce effect of acquire aging, improve appearance, preventing posture defects, enhance mental health and improving quality of life (Biddle & Mutrie, 2001; WHO, 2010). Because of the many benefits for health of physical activity, recent analysis has suggested that reaching the recommended minimum level of physical activity is appropriate to maintain a healthy lifestyle.

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However, many studies including international and local setting have indicated that people are not active enough to achieve the health benefits of PA. A study done among 233 Malay youth found that that almost 65% of the respondents were categorized as sedentary and approximately 50.2% of the respondents were overweight or obese (Hazizi, Aina, Mohd, Zaitun, Hamid & Tabata, 2012). It is supported by a study done by Ibrahim, Karim, Oon, & Ngah (2013) in which the results showed that among 730 respondents from Klang Valley, most of them (53.2%) presented a low level of physical activity, only 37.2% were active, whereas 9.6% of the subjects were sedentary. Furthermore, physical activity was found to be diverse based on gender. A study by Salamudin and Harun (2013) has also found that women were significantly less active than men.

Thus, it is important to understand the needs for physical activity involvement, considering active leisure time activity has not been a practice among many Malaysians specifically when the involvement is largely determined by the religious values (Aman, Fauzee & Mohamed, 2007). Hence, an adequate study of women's background will help health practitioners to provide individuals with suitable programs to engage in appropriate activities. Therefore, in order to come out with strategic implementation, this study aimed to examine the levels of physical activity among women in Selangor with regards to marital status, occupation, academic qualification and BMI.

# **REVIEW OF LITERATURE**

## **Physical Activity (PA)**

Physical activity refers to movement produced by the skeletal muscles that uses energy beyond resting levels. It involves work-related activities (walking, sweeping, lifting, etc.), transportation activities (walking to work, cycling to school, etc.), recreational activities (skating, rowing, gardening, etc.), and workout (Ward, Saunders & Pate, 2007). PA plays an important role in public health as it protects the body from cardiovascular diseases, preventing obesity, reduces effect of acquire aging, improves appearance, preventing posture defects, enhances mental health and improving quality of life (Biddle et al., 2001; WHO, 2010). Hence, it is recommended by the

American Heart Association (AHA) that adults age 18-65 should perform moderate-intensity of physical activity for a minimum of 30 minutes on five days each week or vigorous-intensity aerobic activity for a minimum of 20 minutes on three days each week (Haskell, Lee, Pate, Powell, Blair, Franklin, Macera, Health, Thompson & Bauman, 2007).

However, it was found in most previous studies that women had a lower likelihood of participating in physical activity compared to men (Cheah & Poh, 2014). This is likely due to the traditional role of gender. This is because women possess the natural characteristic as a family caretaker, they tend to allocate more time for home activity than leisure time physical activity (Wicker, Breuer, & Pawlowski, 2009).

#### Physical Activity (PA) and Demographic Profile

The level of PA participation is different across various demographic profiles. Other than age, ethnicity, marital status, body composition, occupation, education and substance use were also found to predict PA (Beverly & Wray, 2010; Dlugonski & Motl, 2013; Hawkins, Hornsby & Schorling, 2001; Kirk & Rhodes, 2011; Wang, DesMeules, Luo, Dai, Lagace, Morrison, 2011). For example, single people are more likely to be physically active than married (Beverly et al., 2010) and divorced (Dlugonski et al., 2013; Wang et al., 2011). While married people are less active due to family responsibility and spending time with kids.

Moreover, previous study revealed that BMI is significantly associated with sports and PA. Obviously, inactive people were more likely to be among the obese (Kirk et al., 2011). Besides that, other study also found that people with extra body weight are more concerned with their current health status, appearance, what friends think about weight, body mass index, thus, they may be classified in Action Stage based on The Trans Theoretical Model (TTM) (Hawkins et al., 2001). Since demographic profiles are largely related to PA participation among women, thus, it is important to study on the influence of demographic profile towards PA involvement among women.

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# METHOD

This study adopted a descriptive survey method of quantitative approach to investigate levels of physical activity and its differences based on demographic profiles among 390 adult women in Selangor.

A set of questionnaire was used as an instrument to investigate the levels of physical activity among women, adapted from "International Physical Activity Questionnaire (IPAQ)". IPAQ investigates time spent for three types of physical activities, namely vigorous activity, moderate activity and walking indicating low activity.

Validity and reliability tests were conducted, and experts confirmed that the questions measured the intended content area. A pilot study was also conducted to 30 women in Selangor. The Cronbach Coefficient Alpha Reliability test showed that all of the items were reliable as they have a high alpha factor of 0.906. Thus, the instrument is deemed reliable to be used to the population.

Data was collected in person using online survey of Google Document. Since the link of online survey was shared via mobile phone, email and social media, everyone has an equal opportunity to be selected as a sample.

The data from the questionnaire was analyzed using SPSS program. For levels of physical activity, descriptive statistics such as frequency and percentage were used to identify the low, moderate and high level of PA. Besides that, ANOVA test was used to find out the difference in total PA with regards to marital status, occupation, academic qualification and BMI.

## **RESULTS AND DISCUSSION**

Respondents came from various demographic profiles (see Table 1). All respondents were women (N=390). A total of 92.1% (N=359) of them were young adults (18 to 40 years old) and 7.9% (N=31) were of adulthood (41 to 65 years old).

The respondents were single [72.1% (n=281)], married [27.2% (N=107)] and divorced [0.5% (N=2)] respectively.

In terms of occupation, 55.6% (N=217) of the women were students, 27.4% (N=107) were professionals, 5.6% (N=22) were self-employed, 4.9% (N=19) were white-collars, 4.4% (N=17) were home makers, while another 2.1% (N=8) were unemployed women.

Respondents were from various academic qualification, including degree and above, diploma, school leavers and certificate indicated by 70.3% (N=274), 13.8% (54), 8.7% (N=34) and 7.2% (N=28) respectively as in Table 1.

Lastly, respondents were also diverse in BMI. In Table 1 74.1% (N=289) of the respondents were categorized as less weight, 21.8% (N=85) were normal weight and 4.1% (N=16) were extra weight.

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	Table 1. De	mograp	nic Prome	
Demographic P	rofile		Frequency	Percentage (%)
Marital Status	Single		281	72.1
	Married		107	27.2
	Widowed		0	0
	Divorced		2	0.5
	Separated		0	0
		Total	390	100
Occupation	Professional		107	27.4
	White-collar		19	4.9
	Blue-collar		0	0
	Self-employed		22	5.6
	Unemployed		8	2.1
	Homemaker		17	4.4
	Student		217	55.6
	Retiree		0	0
		Total	390	100.0
Academic Qualification	School leavers		34	8.7
	Certificate		28	7.2
	Diploma		54	13.8
	Degree & above		274	70.3
		Total	390	100.0
BMI	Less weight		289	74.1
	Normal		85	21.8
	Extra weight		16	4.1
		Total	390	100

Table 1: Demographic Profile

Table 2 indicates the descriptive statistics of PA level among women in Selangor. The result shows that 74.1% (N=289) of women were at low level of PA participation. It was then followed by a moderate PA participation from 21.8% (N=85) of the respondents. Only 4.1% (16) of the women were at high level of PA participation. This may be due to women tend to focus more on natural characteristic as a family caretaker and hence they tend to allocate more time for home activity than leisure time physical activity (Wicker et al., 2009).

Table 2: Levels of PA participation						
Levels of Physical Activity	Percentage (%)					
Low	289	74.1				
Moderate	85	21.8				
High	16	4.1				
Total	390	100.0				

Table 3 shows the level of PA participation among women in Selangor with regards to various demographic profiles. Firstly, single women participated the highest in PA (M= 608.94, SD= 1176.76). It was followed by married women (M= 555.75, SD= 1041.80) and divorced women (M= 135.00, SD= 190.92).

Secondly, for occupation items, home makers show the highest in PA participation (M= 886.76, SD= 1870.70). It was followed by self-employed women (M= 716.14, SD= 1131.35), white-collar women (M= 686.84, SD= 1278.76) and students (M= 607.70, SD= 1130.25). The second lowest in PA participation was professional women (M= 491.42, SD= 1020.53) and the lowest was unemployed women (M= 314.38, SD= 393.91).

Thirdly, for academic qualification items, school leavers seemed to participate in PA most frequently (M= 1079.09, SD= 1991.35). It was followed by women with certificate qualification (M= 887.64, SD= 1593.04), degree holders and above (M= 520.22, SD= 965.45) and diploma holders (M= 495.67, SD= 837.66).

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Lastly, for BMI items, women with extra body weight participated in PA most frequently (M=4930.69, SD=2075.98). It was followed by women with normal weight (M=1262.39, SD=665.46) and women with less body weight (M=154.51, SD=154.92).

Demogra	phic Profile	Ν	Mean	Std. Deviation
	Single	281	608.94	1176.76
Marital Status	Married	107	555.75	1041.80
	Divorced	2	135.00	190.92
	Total	390	591.92	1137.65
	Professional	107	491.42	1020.53
	White-collar	19	686.84	1278.76
Occupation	Self-employed	22	716.14	1131.35
	Unemployed	8	314.38	393.91
	Homemaker	17	886.76	1870.70
	Student	217	607.70	1130.25
	Total	390	591.92	1137.65
Academic	School leavers	34	1079.09	1991.35
Qualification	Certificate	28	887.64	1593.04
	Diploma	54	495.67	837.66
	Degree & above	274	520.22	965.45
	Total	390	591.92	1137.65
	Less weight	289	154.51	154.92
BMI	Normal	85	1262.39	665.46
	Extra weight	16	4930.69	2075.98
	Total	390	591.92	1137.65

 Table 3: PA Participation with Regards to Marital Status, Occupation,

 Academic Qualification and BMI

Mean indicator: <599=Low, 600-2999=Moderate, 3000>=High.

Table 4 shows result of post-hoc multiple comparison test conducted to identify any significant differences of PA participation within each group based on demographic profile, namely marital status, occupation, academic qualification and BMI.

First, for marital status items, post-hoc multiple comparison test revealed that no marital status was significantly different from one to another. Single women was not significantly higher in PA participation (M=608.94) than married women (M=555.75) and divorced women (M=135.00). This may be due to women tend to take care of their health and body more carefully regardless any other factors (Bauman, Reis, Sallis, Wells, Loos, Martin, 2012). This is different from earlier study that found single women are more likely to be physically active than married women (Beverly et al., 2010) and divorced women (Dlugonski et al., 2013; Wang et al., 2011).

Second, for occupation items, post-hoc multiple comparison test revealed that no occupation was significantly different from one to another. Home makers participation in PA showed not significantly higher (M= 886.76) than women of self-employed (M= 716.14), white-collars (M= 686.84) and students (M= 607.70). This is probably due to working women face rapid changes to the labour force, such as advances in technology and overtime hours have decreased physical activity behaviours and increase sedentariness (Kirk et al., 2011). The finding of this study supported the study done by Cheah et al. (2014) among Malaysians, which identified that job characteristics are significantly associated with participation in physical activity.

Third, for academic qualification items, post-hoc multiple comparison test revealed only one academic qualification was significantly different from another. School leavers participation in PA (M= 1079.09, SD= 1991.35) showed significantly higher than degree holder and above (M= 520.22), and diploma holders (M= 495.67, SD= 837.66). This may be due to the types of occupation, in which school leavers work at less-technology oriented department, hence, they tend to have increased physical activity behaviours compared to educated women whom work generally at desk (Kirk et al., 2011). The finding of this study is contrasted with previous study stated that education are significantly associated with participation in physical activity, in which well-educated women are less likely to be physically active than others (Cheah et al., 2014).

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Fourth, for BMI items, post-hoc multiple comparison test revealed all types of BMI was significantly different from another. Women with extra body weight (M= 4930.69, SD= 2075.99) showed significantly higher in PA participation than women with normal weight (M= 1262.39, SD= 665.46), and women with less weight (M= 4154.51, SD= 154.92). This is probably due to women with extra body weight concerned more on their current health status, appearance, what friends think about weight, body mass index, thus, they may be classified into action stage based on The Trans Theoretical Model (TTM) (Hawkins et al., 2001). This is contradicting with most studies done in local and abroad that people who were inactive were also more likely among obese (Kirk et al., 2011).

	Dependent Variable: Physical Activity LSD				
	(I) Demographic Profile	(J) Demographic Profile	Mean Difference (I-J)	Std. Error	Sig
Marital Status	Single	Married	53.20	129.49	.68
		Divorced	473.94	808.86	.55
Occupation	Professional	White-collar	-195.42	284.00	.49
		Self-employed	-224.72	267.05	.40
		Unemployed	177.05	418.13	.67
		Homemaker	-395.34	297.85	.18
		Student	-116.28	134.76	.38
Academic	School leavers	Certificate	191.45	287.83	.50
Qualification		Diploma	583.42 <sup>*</sup>	246.93	.01
		Degree & above	558.87 <sup>*</sup>	205.08	.00
BMI	Less weight	Normal	-1107.88*	65.41	.00
		Extra weight	-4776.18*	136.14	.00

 Table 4: Post Hoc Tests of Multiple Comparison of PA Participation with

 Regards to Marital Status, Occupation, Academic Qualification and BMI

Mean indicator: <599=Low, 600-2999=Moderate, 3000>=High.

# CONCLUSION AND SUGGESTION

In short, most women in Selangor were at low level of physical activity. However, the result was diverse based on demographic variables. In terms of marital status, single women were categorized at moderate level of PA, different from married and divorced women who were categorized at low level in PA.

In terms of occupation, home maker, self-employed, white-collars and students have participated moderately in physical activity. However, professionals and unemployed women have participated at low level in PA.

In addition, with regards to academic qualification, school leavers and women with certificate were doing exercise moderately. Yet, women with degree holder, and above as well as diploma holders were rarely exercising.

Lastly, women with extra body weight were found to participate at high level of PA. Women with normal body weight have participated in PA moderately, while women with less body weight have participated in PA infrequently.

Besides, findings proved that academic qualification and BMI were associated with PA participation. However, marital status and occupation did not associate with PA participation.

Based on the findings, this study recommended public health authorities and policy makers to develop suitable activities based on women's demographic profile. Exercise program should also be organized among unemployed women and it should be convenient with their financial capability. In addition, activities for women who worked professionally should match their leisure time and availability of PA. Besides, women with diploma, degree and above are prevalent to work as professional; consequently, exercise program should also apt with their leisure time. Other than that, women regardless of BMI should constantly be encouraged to be active in keeping an ideal body weight to prevent them from getting any other non-communicable diseases.

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# RELATIONSHIP BETWEEN LIFE SATISFACTION AND ACADEMIC ACHIEVEMENT AMONG TRAINEE TEACHERS

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## ABSTRACT

Life satisfaction is a way a person evaluates his or her life and how he or she feels about where it is going in the future. This study was conducted to investigate the level of high achievers' life satisfaction, the domains of their life satisfaction and its relationship to their academic achievement. Based on the literature review, academic achievement is predicted to contribute significantly to high level of life satisfaction compared to other domains in life. Forty-five (45) high-achieving (those who obtained a CGPA of 3.50 to 3.99) students have participated in this study. This study is adapted from a research of Diener et al. (1985) on Extended Satisfaction with Life Scale (ESWLS). Four domain factors, namely social, self, physical and family were studied. Both descriptive and inferential statistics were used in this study. The results showed that the high-achieving students showed a high level of life satisfaction in terms of family supports domains but moderate level of satisfaction on their appearance. Nevertheless, for various reasons, academic satisfaction is not a strong determinant of their life satisfaction.

*Keywords*: Life satisfaction, academic satisfaction, family support, social supports, physical appearances and self-awareness

#### INTRODUCTION

A good quality of living contributes to various positive outcomes of life. In modern years, individuals place values on healthy relationship, affordable houses, and good security system (Civitci & Civitci, 2015; Gamble & Garling, 2012; Veenhoven, 1996). Across time, the importance of subjective wellbeing is examined. Initiated in the early 1940, Maslow has proposed self-actualization theory which refers to basic individual needs that describes human needs as being relatively fluid - with many needs being present in a person simultaneously (Santrock, 2012). The physiological as well as the psychological needs, expectations and motivation in life were researched for the past 30 years. The fundamental trend of human needs changes to betterment of living. In fresh atmosphere, Inglehart (1990) proposed that when basic material needs are met, the individual will move to post-materialistic phase which is concerned with self-fulfilment. The transformation and the change of human ways of living contribute to the more advanced definition of self- fulfilment. Recent research found that high life satisfaction is associated with positive outcome such as good psychological well-being, socialization relationship and academic achievement (Park, 2004).

Education is one of the intriguing aspects in life satisfaction that is worth studying. As revealed in the variance in satisfaction between nation resources, generally, more highly educated countries experience higher levels of satisfaction, but with this education comes opportunity for aversive consequences: loss of previous opportunities that comes along with achieving such education, job competition, or even lack of jobs. That being said, those more highly educated ones tend to experience more favourable events compared to adverse events (Irvin, 2015). Life satisfaction was measured with two types of measurement, one-dimensional (global) and multidimensional (domain specific). According to Huebner, Laughlin, Ash and Gilman (1998), multidimensional life satisfaction measures provide a better viewpoint of adolescents' life satisfaction. As suggested by Huebner (2002) which meets the purpose of this study, he proposed 5 specific domains of life satisfaction which are family, school, self, friends and living environment. Alfonso et al., (1996) have re-examined the SWLS domains by Diener et al., (1985) and concluded with Extended Satisfaction with Life Scale (ESWLS). The main domains examined were social life satisfaction, self-satisfaction, physical appearance satisfaction and family satisfaction.

The concept of subjective well-being is close to Bentham's classic definition of happiness, which he defined as "the sum of pleasure and pain" (Veenhoven, 2008). From a classic interpretation then, the concept of well-being was studied. According to the early theories, happiness resulted most directly from objective circumstances of their lives. In regards to life satisfaction, Veenhoven (1984) claimed that:

"high satisfaction level suggests that the quality of life, in the population concerned, is good. Though conditions may not be ideal, it is apparently acceptable for most of the population and vice versa low satisfaction marks serious shortcomings of some kind. An example is the assessment of life-satisfaction among single people. In all modern nations, single persons express less pleasure with life than married persons, and the divorced and widowed frequently express the lowest levels of satisfaction with life".

Diener (2000) and Veenhoven (1996) suggested life satisfaction as subjective well-being. Subjective well-being is defined as one's evaluation of his or her life; an evaluation that is both affective and cognitive. Subjective well-being is also defined as a global judgment of one's life. It is deemed that human beings, in general, experience an abundance of subjective wellbeing. We experience both pleasant and unpleasant emotions. For instance, when we are engaged in exciting activities; pleasure experiences; painful experiences and challenges which all of these later, contribute to a certain degree of life satisfaction.

One of the researchers that have studied on this significant relationship is Durayyapah (2010). It is said that, significant research on life satisfaction around the world played a vital role in Durayyapah's studies in which he proposed a 3P model on life satisfaction. In this study, he focused on subjective well-being. Since the way people perceive their happiness is relatively differently, happiness should be assessed based on the human development process. Thus, individuals would experience a significant shift in temporal attention of satisfaction throughout their life. The 3P Model holds on to the notion that subjective well-being is a temporal component, for individuals do not desire to only pursue happiness (Prospect), but also to experience it (Present), as well as protect acquired happiness (Past).

On the other hand, Diener et al., (2013) envisioned life satisfaction to complement existing indicators by reflecting the influences of diverse facets of quality of life and allowing respondents to freely weight different aspects based on people's values and preferences into account as well as the outcomes of their choices. Some recent studies focus on age differences in forecasts of life satisfaction, the accuracy of anticipated future life satisfaction across adulthood and age differential effects of educational and health resources (Lang et al., 2012; Gamble & Garling, 2012; FitzRoy, Nolan & Steinhardt, 2011; Civitci & Civitci, 2015).

Nowadays Malaysia is experiencing significant adjustments and demands in the way of living. Indirectly, all demands and social changes are characterized by certain life expectations. Empirical studies conducted in the context of Malaysia and outside Malaysia postulated that individuals with higher level of life satisfaction are highly involved in substance abuse, delinquent misbehaviour and suicidal tendencies (Salleh & Zuria, 2009; Huebner et al., 2004). One of the important studies conducted by Gilman et al., (2006) disclosed that Malaysian students either attending public or private universities have higher *alexithymia* (difficulty in understanding, processing and expressing emotions and *alexithymia* can be a catalyst to various psychiatric disorders) compared to university students outside Malaysia. Nonetheless, research conducted in recent years indicates that factors that lead to lower scores on the subjective well-being in Malaysia are similar to abroad countries. Malaysians from highly urbanized cities are exposed to more educational and job opportunities which could probably contribute to higher life satisfaction. This finding is aligned with Veenhoven's studies (1984 & 2008). Malaysian students are generally close to their family members and friends and therefore, in certain circumstances, family and friends contribute significantly to students' success (Durrayapah, 2010; Salleh & Zuria, 2009; Park, 2004).

As claimed by Gilman et al., (ibid), Malaysian students experienced relatively high level of *alexithymia*. This could be attributed to the fact that college years is one of the life cycles which could likely lead to stressful experiences; it is a life cycle where young adults are responsible for their own health, school life, financial condition and they have to manage their own life. In this life cycle that appears to be stressful for college students, their life satisfaction is an important aspect worth examining. As discussed,

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research findings of Diener et al. (1999 & 1985) showed that goals are significantly related to life satisfaction. According to Arias (2004), students' goals are usually divided into 2 categories, namely, academic goals and social goals. Asian countries, including Malaysia, appreciate institution of family, friends and individual perceptions on oneself. Thus, this appreciation could be made into a simple hypothesis- "Do family, social interaction, perception of oneself and physical appearance contribute to students' life satisfaction?" Students defined life satisfaction as a "perception that one is progressing towards important life goals" (Arias, 2004 p.6). Thus, would students, while being young and lack of exposure to the society outside, find it satisfying if their goals are assigned to them instead of them setting their own goals? Are the students satisfied with their lives when they are pursuing goals assigned to them? It is known that high achievers are considered better self-regulators in terms of learning (Santrock, 2012). Salmela and Tuominen (2009) found that students with higher academic performance experienced a higher level of life satisfaction. Irvine (2015) also suggested that students with higher self-efficacy reported higher levels of life satisfaction. However, earlier studies done by Rode, Arthaud, Mooney, Near, Baldwin, Bommer and Rubin (2005) reported that "less likely that a student whose identity and energy is wholly consumed in academic performance will maximize life satisfaction".

Thus, these studies found contradicting points from 2 different studies. Alfonso, Allison, Rader & Gormon (1996) argued that life satisfaction can be measured in various domains, and academic satisfaction can be one of the domains. Dienar & Chan (2011) also showed certain degree of agreement to Alfonso's studies. They stated that, the level of importance of different domains could affect life satisfaction as a whole and rest under individual's judgment. To reiterate, four important domains which characterized students' goals are social, self, physical appearances and family. Thus, this study is aimed to explore students' level of life satisfaction and the four domains that contribute to students' life satisfaction.

# **RESEARCH OBJECTIVES**

This study aimed to investigate level of life satisfaction among students of Faculty of Education and to identify the domain(s) that contributes the

most to students' life satisfaction. Faculty of Education was conveniently chosen due to the high percentage of excellent students (high achiever – who achieve a CGPA of 3.50 and above) in a local university in Malaysia. These students are enrolled as undergraduate students in the Faculty of Education in four-year programme to become school teachers.

## **RESEARCH METHODOLOGY**

## Respondents

The respondents involved in this study were comprised of 45 high achieving trainee teachers with the CGPA of 3.50 to 4.00 from the Faculty of Education. Faculty of Education offers several fields of specializations: Teaching English as a Second Language (TESL), Biology, Mathematics, Physics, Art Education and Physical Health Education. A total of 950 undergraduate students were registered in this faculty. This faculty was chosen due to students' academic excellence. In 2013 and 2014, Faculty of Education had the highest number of Dean's List recipients in this university (Laporan Peperiksaan Fakulti Pendidikan, 2013/2014). Majority of the excellent students were from the programme of TESL, Mathematics and Biology. These were the courses with highest number of recipient of Dean's List. These trainee teachers are enrolled in four-year programme and in this study, majority of the students are third year trainee teachers. As a means of obtaining data, a set of questionnaire was developed and subsequently sent to the respondents via electronic mail (e-mail). A total of 60 questionnaires were sent to all recipients of Dean's List. A total of 45 questionnaires were answered and returned to the researcher.

#### **Research Instrument**

The Extended Satisfaction with Life Scale (ESWLS) constructed by Alfonso et al., (1996) is adapted for this study. In making judgment related to life satisfaction, ESWLS emphasizes on the person's own standard of evaluation. This instrument was chosen as it has been widely used in research (Civitci & Civitci, 2015; Rhijin & Lero, 2014; Gamble & Garling, 2012; Sirgy & Wu, 2009; Gregg & Salisbury, 2001) which infers that it possesses a high reliability level (0.546). Besides, ESWLS is also shown to have favourable psychometric properties (Gregg & Salisbury, 2001). Relationship between Life Satisfaction and Academic Achievement among Trainee Teachers

These domains were among the important domains relevant to college life (Yui-hui, 2006; Hodge & Mellin, 2010). Among the included variables in this questionnaire were socio-demographic background and 20 items of ESWLS that measured the respondents' satisfaction within four (4) domains, namely, Social Satisfaction, Self – Satisfaction, Physical Satisfaction and Family Satisfaction. Each domain consists of 5 items with 5- point Likert scale; one (1) with low satisfaction and five (5) with high satisfaction.

#### **Statistical Analysis**

The data was tabulated according to the research objectives of this study. For the first objective, descriptive statistical analyses were utilized. For the second objective, inferential statistical analyses were employed.

# FINDINGS

#### A) Analysis of Overall Life Satisfaction Level

Table 1: Overall Life Satisfaction					
Overall Life Satisfaction	f	%			
Moderately low	4	8.9			
Moderately high	30	66.7			
High	11	24.4			
Total	45	100.0			

As shown in Table 1, 30 high-achieving students (66.7%) were reported to have moderately high level of life satisfaction. The responses were calculated from Section B of the questionnaire. The total of frequency was calculated from 5 items in Section B and the scale of these items ranged from scale 1 (strongly disagree) to scale 5 (strongly agree). Analysis of the data yielded a result indicated of majority of high achievers are satisfied with life. Eleven students were reported to achieve high level of life satisfaction. Four respondents reported a moderate lower life satisfaction (8.9%).

## B) Analysis of the Contributing Domains towards Overall Life Satisfaction

Domains of Life Satisfaction	Mean	SD	
Family Satisfaction	4.01	0.64	
Social Life Satisfaction	3.76	0.41	
Self - Satisfaction	3.47	0.45	
Physical Appearance Satisfaction	3.12	0.76	

Table 2: Don	nains of	Life S	Satisf	action
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\*highly satisfied (m=4.00 – 5.00), moderately satisfied (m=3.00 – 3.59), satisfied (m=2.00 – 2.99) and least satisfied (m=1.00 – 1.99)

Table 2 shows the distribution means of the domains of life satisfaction. The finding reveals that family satisfaction scored as the highest mean value (M=4.01, SD=0.64). Social life satisfaction domain recorded the second highest mean value (M=3.76, SD=0.41). Another domain that was considered to attain a high score was self – satisfaction (M= 3.47, SD=0. 45). The least satisfied domain reported by the high achievers was physical appearance (M=3.12, SD=0.76). Thus, it is deemed that parents and family play a significant role and have an impact on the high achievers. Nevertheless, most of the high achievers were moderately satisfied with their physical appearance.

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# C) Analysis of the Contributing Domains towards Overall Life Satisfaction

#### i) Social Life Satisfaction level

Item	(Social Satisfaction)	Mean	SD
1.	In most ways my social life is close to my ideal.	3.80	0.63
2.	The conditions of my social life are excellent.	3.53	0.69
3.	I am satisfied with my social life	3.96	0.47
4.	So far I have got the important things I want from my social life	3.67	0.67
5.	I am generally pleased with my social life I lead.	3.84	0.63
*highly	satisfied ( $m$ =4.00 – 5.00), moderately satisfied ( $m$ =3.00 – 3.5	9), satisfied	( <i>m</i> =2.00 –

**Table 3: Social Satisfaction Level** 

2.99) and least satisfied (m=1.00 - 1.99)

Table 3 illustrates the distribution of mean scores for the first domain of life satisfaction, social satisfaction. As portrayed in Table 2, social satisfaction was in the category of 'moderately satisfied' among other domains (M=3.76, SD=0.41). As for Table 3, it shows the highest mean score of item 3 (*I am satisfied with my social life*) M =3.96, SD=0.47. This score was followed by item 5 (*I am generally pleased with my social life I lead*) M=3.84, SD=0.63. Item 2 (*The conditions of my social life are excellent*) was the item with the lowest mean score among high achievers M=3.53, SD=0.69. The mean scores indicate that, the respondents were contented with their social life.

### ii) Self – Satisfaction Level

Item	(Self-Satisfaction)	Mean	SD
6.	In most ways my actual self is close to my ideals.	3.75	0.65
7.	As an individual I consider myself excellent.	3.24	0.68
8.	I am satisfied with my person or self as an individual.	3.67	0.56
9.	So far I have got the important things I want from myself.	3.17	0.80
10.	I am generally pleased with myself as an individual.	3.51	0.66
hiahly	satisfied $(m=4.00, 5.00)$ moderately satisfied $(m=3.00, 3.5)$	0) entirefied	(m-2.00)

#### Table 4: Self - Satisfaction level

\*highly satisfied (m=4.00 – 5.00), moderately satisfied (m=3.00 – 3.59), satisfied (m=2.00 – 2.99) and least satisfied (m=1.00 – 1.99)

Table 4 displays the distribution of mean score for self-satisfaction domain. From the mean score of Item 6, (*In most ways my actual self is closed to my ideals*); M=3.75, SD=0.65, it could be said that, the respondents were moderately satisfied with themselves. Item 8 also reflects respondents' moderate level of satisfaction (*I am satisfied with my person or self as an individual*) M=3. 67, SD=0. 56. This is followed by item 10 (I am generally pleased with myself as an individual) M=3.51, SD=0.66 while Item 9 records the least moderately satisfied level of respondents (*So far I have got the important things I want from myself*) M=3.17, SD=0.80. The results from this table suggested that, the students were moderately satisfied with themselves.

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#### iii) Physical Appearance Satisfaction level

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Item (Physical Appearance)			SD
11.	In most ways my actual physical appearance is close to my ideal physical appearance	3.06	0.96
12.	I consider my physical appearance excellent	2.95	0.85
13.	I am satisfied with my physical appearance	3.31	0.90
14.	There is nothing about my physical appearance that I would like to change	2.89	0.98
15.	I am generally pleased with my physical appearance	3.38	0.86

#### **Table 5: Physical Appearance Satisfaction Level**

\*highly satisfied (m=4.00 – 5.00), moderately satisfied (m=3.00 – 3.59), satisfied (m=2.00 – 2.99) and least satisfied (m=1.00 – 1.99)

Table 5 presents the distribution of mean scores for the physical appearances domain. Item 15 shows a moderately satisfied score of respondents towards their physical appearances (*I am generally pleased with my physical appearance*) M=3.38, SD=0.86. This is followed closely by item 13 (*I am satisfied with my physical appearance*) M=3.31, SD=0.90). Item 14 (*There is nothing about my physical appearance that I would like to change*) reflects the respondents' satisfaction level with the mean score of M=2.89, SD=0.98. Overall, the respondents were moderately satisfied with their physical appearance.

#### iv) Family Satisfaction Level

#### **Table 6: Family Satisfaction Level**

Item (Family Satisfaction)		Mean	SD
16.	In most ways my family is close to my ideal	4.11	0.61
17.	The conditions of my family life are excellent	3.91	0.73
18.	I am satisfied with my family life	4.24	0.68
19.	So far I have got the important things I want from my family	3.93	0.96
20.	I am generally pleased with the quality of my family life	3.89	0.96

\*highly satisfied (m=4.00 – 5.00), moderately satisfied (m=3.00 – 3.59), satisfied (m=2.00 – 2.99) and least satisfied (m=1.00 – 1.99)

Table 6 describes the overall mean scores for family satisfaction. Item 18 (*I am satisfied with my family life*) has the highest mean score (M=4.24, SD=0.68). This is followed by item 16 (*In most ways my family is close to my ideal*) which scored (M=4.11, SD=0.61) and Item 19 (*So far I got the important things I want from my family*) with at (M=3.93, SD=0.96). In item 17, high achievers showed a high level of satisfaction (M=3.91, SD=0.73). Of the 5 items examined in this study, item 20 recorded the lowest mean score (I am generally pleased with the quality of my family life) with (M=3.89, SD=0.96). From the data obtained, it could be concluded that most of the high achievers were happy with their family and their life qualities.
### D) Analysis of the Relationship between Life Satisfaction and Academic Achievement

	Academic Achievement CGPA (r-value)	Significant Value p
Overall Life Satisfaction	-0.155	0.309
Social Life	-0.038	0.805
Self	-0.209	0.169
Physical Appearance	-0.232	0.126
Family	0.134	0.379

 
 Table 7: Relationship between Life Satisfaction Domain and Academic Achievement on Life Satisfaction

Table 7 provides data that clarifies the relationship between the four extended life satisfaction domains and academic achievement on overall high achievers' life satisfaction. The finding showed that there is no significant relationship between overall life satisfaction and academic achievement; r=-0.155, p=0.309. For each domain, the finding suggested that there is significant relationship between each of the domain of life satisfaction to academic achievement. The results indicated relationship between academic achievement with social life (r=0.038, p=0.805), self – satisfaction (r = -0.209, p=0.169), physical appearance (r = -0.232, p=0.126) and family satisfaction (r = 0.134, p=0.379). The result showed that academic achievement and each domain of life satisfaction (social life, self-satisfaction, physical appearance and family satisfaction) does not have any effect on high achievers' overall life satisfaction.

# **DISCUSSION AND CONCLUSION**

The results of the study demonstrate no significant relationship between life satisfaction and academic achievement among high achievers. The results obtained in this study are consistent with findings in past studies. In the first part of the research, majority of the respondents reported moderate high level of life satisfaction, parallel with other studies done on level of satisfaction among adults and college students (Civitci & Civitci, 2015; Santos et al.,

2014; Gilman & Hueber, 2006). Of four domains discussed thoroughly in this paper (family, self, social and physical appearance), family satisfaction domain was recorded to be a domain where high achievers are highly satisfied with. Family and parental support is a significant factor among the respondents in this study, a finding similar to past studies (Bushra & Rehana, 2010). The withdrawal of family supports could result in low level of family satisfaction (Lewis et al., 2011). Therefore, it could be said that most of the high achievers in this study do not experience rough conflicts or unresolvable problems with their family members as they reported a high level of life satisfaction. Social satisfaction, although not being the highest mean score, offers a valuable viewpoint in this study. In general, the high achievers are ecstatic with their interpersonal relationship and current social life. Social life satisfaction tends to be higher because the relationships that are built in the daily social life are mostly chosen rather than imposed (Diener & Diener, 2009). Therefore, the reason these respondents feel satisfied with this domain could be attributed to the fact that their social life is a decision made by them. Other than that, these respondents, coming from a collectivist community might feel that by socializing within the community, they are fulfilling their responsibilities as a part of the community (Diener & Diener, 2009; Krishnan, 2004).

Another domain that has been discussed in this study is selfsatisfaction. Self - satisfaction generally means, the high achievers are contented with their actual selves and individuals. According to Diener and Diener (2009), the very fact that collectivists put more importance in the rest of the community members than themselves might be the cause of their lack of satisfaction in the self-satisfaction domain. However, the high achievers of this study are moderately satisfied considering that their university life allows them to get involved in activities that give them the chance to use their skills to contribute to the society and this exposure will provide them with a positive self-identity (Sirgy& Wu, 2009; Rode et al., 2005; Arias, 2004). High achievers, however, were found to be moderately pleased with their physical appearance. Chow (2005) and Rhijin and Lero (2014) suggested that individuals who accept themselves as who they are and consider that others think of them the same way, are most probably more satisfied with their life. Looking at the results, it would mean that most of the participants who reported a quite low level of satisfaction in physical appearance might be the result of their low confidence level in their appearance.

The last part of this study examined relationship between academic achievement and life satisfaction. The findings indicated that high level of satisfaction predicted high achievement but there is no significant relationship between academic achievement and life satisfaction Different from findings in this study, a review of literature reveals that some studies claimed that, generally, students with higher academic achievement have a higher level of life satisfaction (Lewis et al., 2011). In addition to that, Quinn & Duckworth (2007) also stated that earning better grades would predict a higher level of life satisfaction as, according to them, students perform well because they are happy and performing well makes them feel even happier.

Excellent academic achievement and life satisfaction should come hand in hand in producing better students who are balanced in both their academic and also their inner being (Lewis et al., 2011). All efforts in producing great outcomes from education need to take into consideration not only the aspect of students' academic, but also their satisfaction in their life. This is because, as reported by Lewis et al. (2011), high level of life satisfaction will lead to various positive outcomes in a number of domains in life which include interpersonal, career and their physical functioning. On the contrary, students who have a low level of life satisfaction will exhibit more problematic behaviours (Busra & Rehana, 2010; Gilman & Huebner, 2006).

Those who have a balanced life (life satisfaction in multiple domains) are likely to have higher subjective well-being. Young adults, especially, are likely to experience imbalance in multiple domains; rarely experience satisfaction within single domain. Although research evidence cited support many of the theoretical notions of life satisfaction, more empirical investigations are needed. High level of life satisfaction cannot be attained through basic needs or growth needs. Instead, both needs should be met to induce subjective well-being.

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# "Book Review of Education and Technology: Key Issues and Debates"

Review by	: Noridah Abu Bakar, Universiti Teknologi MARA,
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Reference	: Selwyn, Neil (2011). Education and Technology: Key
	Issues and Debates,
New York	: Continuum International Publishing Group, p 1-197

The book is written by Neil Selwyn, a Professor from the Faculty of Education in Monash University, Australia to probe our mind regarding issues of technology use in education that seems like inconsistent and often results in unintended consequences and subtle side-effects. The author makes an effort to highlight the problematic as well as the positive aspects of education and technology where most technology development is driven by ambitions to improve and innovate.

This book challenges expectations of the technological 'transformation' of education where digital technology is usually presumed to facilitate new and improved forms of education, but often is used to do the same things with just a minor difference. Hence, this book urges readers to be more realistic about education and technology. Despite the author's effort in initiating a discussion of issues about the influence of technology in education, his point of view is generally optimistic and favorable of technology as a driver for better education, with proper strategic planning. The discussion around education is open and there are clear emphasis that technology in education is for us to manage instead of simply adopting it.

In the initial part of the book, the author tries to discuss the importance of technology in education, the underpinning theories in education and technology, issues related to individual learning and finally the role of teachers and educational institutions. The book highlights a range of educational processes, procedures and practices that can influence and socially shape the nature of technology use. These include classroom culture, ideas about pedagogy and curriculum, and the links between education and the world of work. Also included is the issue of educational policymaking and the hidden curriculum, as well as the everyday pressures of being a student or a teacher. Readers interested in teaching pedagogy, educational strategic management, risk management, classroom activities procedures in learning via technology will find this book interesting.

The author starts by defining education and technology. 'Learning' is defined as individual's involvement in making sense of who they are and developing an understanding of the world in which they live. From this perspective, learning is seen as a continuing process of 'participation' rather than a discrete instance of 'acquisition'. Yet, education is not simply a technical matter of facilitating an individual's learning. Indeed, thinking about education and technology only in terms of 'learning' narrows our attention towards specific processes and activities centred on the individual 'learner' rather than the broader aims and purposes of 'education'.

In basic terms, technology is understood as the process by which humans modify nature to meet their needs and wants. For example, learning management systems now play an important role in reducing teacher workloads and supports the tracking and monitoring of student progress, the management of learning materials and the provision of formative and summative assessments.

An interesting discussion on the challenges and barriers of using the technology in education is presented. Readers can identify the risks involved which may facilitate them in creating risk management practices. The following paragraphs is an explanation of the eight chapters in the book. In the first chapter, the author attempts to develop a basis for reevaluating educational technology. He starts by explaining education and technology in different perspectives and theories like Bloom taxonomy and Behaviorism. The author concludes that 'education' can be best explained "BOOK REVIEW OF EDUCATION AND TECHNOLOGY: KEY ISSUES AND DEBATES"

as the conditions and arrangements where learning takes place while 'technology' is understood as the process by which humans modify nature to meet their needs and wants. Therefore, it is important to acknowledge that technologies do not always change things in education for the better. One of the questions leave at the end of chapter one is 'To what extent are the advantages of digital technologies related to matters of quantity rather than quality?' This is because digital technologies are often celebrated in terms of their speed, size and storage capacity. It is noted that understanding the advantages and limitations of the technology may assist us in utilizing technology efficiently.

The second chapter of the book attempts to make sense of the use of technology in education. Here, the author suggests to overcome barriers that deter people from taking part in learning through the distribution of educational opportunities via technology. This is supported by the advantages that technology may offer like making learning more flexible, more accessible, more reliable, reducing costs, and allowing people to learn anywhere and anytime.

Apart from that, the push for digital technology in education also stems from a range of interests and agendas outside of the education profession like policymakers, employers and parents. Indeed, pressures for technological change and technological expectations increasingly stem from young people who are now entering schools, colleges and universities. They are cohorts of students who were born in the era of the Internet and smartphones, and who consider digital technologies as an integral and natural part of life.

The use of technology in education is also due to 'disruptive innovation' which often leads to the reduction of prices, and forces providers to either change their ways or cease business. New innovation often forces education institutions to keep up with technology in education.

In short, most of the arguments about technology and education change in the second chapter involve fundamental challenges to existing ideas of what education is, why it is provided and how it is carried out. The author highlights that we need to think carefully about education and technology due to assumptions on the usefulness of technology while providing assistance to individuals in the learning process, facilitating the roles of

teachers in the learning process, improving curriculum and enhancing the status of the educational institution.

In the third chapter, the author takes a look at history of education and technology where he includes history in development of educational theories. Three advantages of looking from the historical perspective on education are justified.

Firstly, historical approach frames the development of technology within a long-term perspective, allowing us to understand how one technology may have ramifications for proceeding technologies, rather than one technology simply 'replacing' or 'superseding' another process. Secondly, a historical approach allows us to identify the significant long-term issues and concerns at play as specific technologies become 'embedded' into everyday life. Lastly, looking back at pre-digital histories can remind us of the ways in which 'new' technologies tend to be heavily promoted and 'sold' to education audiences.

In the fourth chapter, the author explores the controversies related to technology in education. He insists that we cannot fully understand education and technology unless we consider the key issue of how technology use can support, enhance and even improve learning. Therefore, we need to examine the ways in which digital technologies are associated with learning, and think a little more carefully about what learning 'gains' and improvements can be said to derive from technology use.

Readers interested in understanding the five of the key learning theories namely behaviourism, cognitivism, constructivism, constructionism and socio-cultural psychology which have influenced people's expectations of education and technology over the twentieth century may find a review of their contributions here. The different theories described in this chapter present learning as individually centred. In contrast, growing numbers of psychologists over the last twenty years or so have turned their attention to understanding the influence of the wider social and cultural environments on individual's learning and cognitive development. In this sense, many educationalists also share the view that learning is a profoundly social process. While accepting the general principle of individuals constructing their own knowledge and understanding, there is increased emphasis on how "BOOK REVIEW OF EDUCATION AND TECHNOLOGY: KEY ISSUES AND DEBATES"

these learning processes are located within 'socio-cultural' environment. In this sense, a successful learner is someone who is able to appropriate and deploy all of these resources in his or her actions and speech. The sociocultural approach, therefore, stresses the importance of interaction with other people as a key resource for supporting cognitive activity and learning. In particular, other people are seen to play important roles in first selecting and shaping the learning experiences that are presented to individuals, and then supporting them in progressing to the next stage of knowledge and understanding.

Two emerging theories of technology-based learning that were further explored are 'connectivism' and 'connected learning'. Connectivism is an idea that learning relates primarily to the ability to access and use distributed information on a 'just-in-time' basis while 'connected learning' is described as a framework rather than theory of learning. As with socio-cultural theories of learning, the basic premise is that learning takes place through interactions with other people and resources in an individual's social contexts, including peers and more knowledgeable mentors.

The fifth chapter focuses on the teachers and technology. Among the issue is to what extent digital technology is compatible with teachers and teaching. As the core role of teacher is one of leading others in their learning, they are frequently blamed for being in adapting of digital technologies and there is a need to identify why teachers use the technology and vice versa. Here, the author discussed a few models like 'SAMR', 'LOTI' and 'TPACK'. Regardless of models and frameworks that direct our attention towards some important factors to bear in mind when making sense of teachers and teaching, the author argues that these models only explain the need of using technology in the classroom without guaranteeing of better teaching. Thus, to fully understand the relationship between technology and teaching, we need to consider how digital technology interacts with the work of a teacher.

The sixth chapter discusses the relation between technology and educational institution where each has its own structures. Thus, it is important to consider how digital technologies 'fit' with the structures. The author also argues if digital technologies really offer a better way of organising and providing educational opportunities. After discussing the

issues of reschooling and deschooling, the author suggests immediate changes that could be made to existing school curriculum and assessment in realising the potential of digital technology.

Chapter seven discusses the different forms of technology and individualisation of education as digital technologies now accommodate individuals' specific needs and interests. Personalise Learning Environment (PLE) is discussed as a means of allowing individuals to bring together and organise the various online tools, services and resources that they use in the course of their learning. The limitations of individualised learning, the difficulties of self-directed online learning, the social and emotional limitations of online education and the inequalities of individualised learning are also discussed.

Finally in the eighth chapter, the author discusses the current and future of technology in education. Technology is not only conceived as a tool to enhance and improve existing practices in educational setup, indeed it functions as a tool to enable education transformation towards more meaningful education for all learners. The author notes that misunderstanding the complex nature of change in education and technology will possibly risk overlooking crucial issues that impact education and change. Hence, we need to develop and promote better understandings of the realities of education and technology. The most important debates about education and technology concern must reflect what is actually happening. There a need of being critical in offering pushback against the current ways of doing things and offering alternatives. This involves being realistic, objective and skeptical, but with sense of hope.

Overall the book highlights potential ways to democratise of education and technology including encouraging students and teachers in producing digital technologies for education. The author has raised many questions in this book which can be useful for higher education leaders, instructors, course designer, organizations and students as they are actors who have key roles to overcome current issues in education and technology.

Disclaimer : This review has not been submitted and will not be submitted for publication anywhere else.

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