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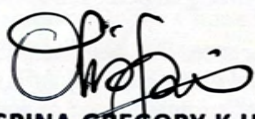
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EDITORIAL PREFACE

Welcome to the Volume 6 of the *Jurnal Pemikir Pendidikan* (Journal of Educational Thinkers, abbreviated as EduThinkers), one of the online open access journals published by Universiti Malaysia Sabah (UMS), Sabah, Malaysia. EduThinkers is a peer-reviewed journal devoted to the publication of original papers and serves as a forum for practical approaches to improving quality in issues pertaining to education and its related fields. Areas relevant to the scope of the journal include: Science Education, Mathematics Education, Teaching English as Second Language, History Education, Geography Education, Economics Education, Educational Management, Educational Psychology, Educational Sociology, Educational Philosophy, Educational Technology, Language Instruction, Curriculum and Instruction, Physical and Health Education, and its related fields.

For the 6th volume of the EduThinkers, we have collected articles reporting on the results of a range of studies carried out by educational researchers from institutions of education throughout Malaysia. The studies have examined a range of topics; from investigating the relationship between stress coping factors with the stress level during practical training among trainee teachers; self-efficacy, learning strategies, and academic achievement among Malaysian future educators; differential item functioning of achievement test items; effectiveness of teaching science subjects with multiple intelligence approaches, interactive multimedia software; through to reviewing the curriculum and development of an international student preparatory programme at university level.

We hope you will enjoy reading these articles and that you will find the research findings reported in the articles relevant to your own research interests and educational endeavours. The editorial board members of EduThinkers 6 are indebted to the appointed internal and external reviewers who have contributed their valuable time and effort in reviewing and proofreading the articles that were submitted for publication in EduThinkers 6.

Associate Professor Dr Lay Yoon Fah

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About the Editor-in-Chief



Associate Professor Dr Lay Yoon Fah is an associate professor of science education at the Faculty of Psychology and Education (FPE), Universiti Malaysia Sabah (UMS). He holds a Ph.D in Science Education, M.Sc. in Human Resource Development, and B.A.Ed.(Hons.) in Chemistry and Commerce. He has more than 24 years of working experience, ranging from a secondary school science/mathematics teacher, senior assistant of secondary schools, science/mathematics lecturer of teacher training college/institute, head of department of educational research and development, a university senior lecturer, and subsequently an associate professor at the FPE, UMS. Currently, he is also a Research Fellow of the Unit for Rural Education Research (URER), FPE, UMS.

He has a wide range of research interests in the field of science education. His primary research interests are in the area of scientific skills, logical thinking abilities, attitude toward science, environmental education, professional development of science teachers, and international studies e.g., TIMSS and PISA. He is active in carrying out research in the field of science education and a frequent paper presenter in conferences and seminars at international and national levels.

He is a prolific book writer. His books on quantitative research methodology and statistical data analysis received overwhelming and encouraging response from undergraduate and postgraduate students of public and private institutions of higher education in Malaysia. He was also frequently being invited as a guest speaker for quantitative research methodology and statistical analysis courses by schools, polytechnics, matriculation colleges, and other government departments/agencies in Malaysia and abroad. He is currently the Editor-in-Chief of *Jurnal Pemikir Pendidikan* (Journal of Educational Thinkers) of FPE, UMS; the associate editor of Asian Education Action Research Journal (AEARJ) of Sultan Idris Education University (UPSI), and the editorial board member of *Atikan Jurnal Kajian Pendidikan*, Indonesia. He is also a manuscript reviewer for renowned international journals namely International Journal of Science and Mathematics Education (IJSME), International Journal of Science Education (IJSE), *Pertanika Journal of Social Sciences and Humanities* (Pertanika, JSSH), International Journal of Environmental and Science Education (IJESE), Research in Science and Technological Education (RSTE), Environmental Education Research (EER), The Asia-Pacific Education Researcher (TAPER), Asia Pacific Journal of Education (APJE), Journal of Turkish Science Education (TUSED), and the EURASIA Journal of Mathematics, Science, and Technology Education (EJMSTE), among others.

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Kandungan/Contents

RELATIONSHIP BETWEEN STRESS COPING FACTORS WITH STRESS LEVEL DURING PRACTICAL TRAINING AMONG TRAINEE TEACHERS: A PLS-SEM APPROACH	1
<i>Ngui Geok Kim & Lay Yoon Fah</i>	
CURRICULUM REVIEW AND DEVELOPMENT OF AN INTERNATIONAL STUDENT PREPARATORY PROGRAMME	13
<i>Loh Yoke Len., Chua Yong Wei, Chelster Sherralyn Jeoffrey Pudin, Natalie Ann Gregory, Priscilla Shak Yee Ping, & Yoon Sook Jhee</i>	
SELF-EFFICACY, LEARNING STRATEGIES, AND ACADEMIC ACHIEVEMENT AMONG MALAYSIAN FUTURE EDUCATORS	31
<i>Lam Mei Yu & Norlizah Che Hassan</i>	
MENGESAN KEBERBEZAAN FUNGSI ITEM BAGI ITEM-ITEM UJIAN PENCAPAIAN PRINSIP PERAKAUNAN TINGKATAN EMPAT DI NEGERI PERAK	49
<i>Lim Hooi Lian & Subashini A/P Sreenivasan</i>	
PEMBELAJARAN TOPIK DUNIA MELALUI DERIA KITA MENERUSI PENDEKATAN KECERDASAN PELBAGAI	67
<i>Noor Baizura Bahrum, Mohd. Ali Samsudin, & Noor Hasyimah Haniza</i>	
PENILAIAN KOSWER MULTIMEDIA INTERAKTIF DENGAN PENDEKATAN KOPERATIF MASTERI DALAM MENINGKATKAN PENCAPAIAN RESPIRASI SEL	81
<i>Fazzlijan Mohamed Adnan Khan</i>	
KAJIAN KEBERKESANAN PRINSIP MOMENTUM-IMPULS BAGI MATA PELAJARAN FIZIK SPM	95
<i>Nik Syaharudin Nik Daud, Mohd. Mustamam Abd. Karim, Nor Lelawati Hassan, & Nurulhuda Abdul Rahman</i>	
Mengenai Jurnal/About the Journal	106
Arahan kepada Penulis/Instructions to Authors	107

RELATIONSHIP BETWEEN STRESS COPING FACTORS WITH STRESS LEVEL DURING PRACTICAL TRAINING AMONG TRAINEE TEACHERS: A PLS-SEM APPROACH

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ABSTRACT

Practicum is a highly stressful situation whereby trainee teachers are subjected to a high quality standard, deals with numerous students' behaviour, adapt with the school climate and so forth. In this stress coping factors comprising of self-efficacy, subjective well-being and emotional intelligence are associated with practicum stress experienced by 137 trainee teachers in the Sabah Teacher Education Institutions (TEIs). Resiliency Scale for Young Adults (RSYA), Teachers' Sense of Efficacy Scale, the Emotional Intelligence Traits, Satisfaction with Life Scale (SWLS) and Rating Pre-Service Teacher Events for Stress Scale were adapted and used in this study. Collected data were analysed using the PLS-SEM approach. The result showed self-efficacy, emotional intelligence, subjective well-being and stress are moderate but resiliency has moderately low level. Self-efficacy and subjective well-being are significant predictors of resilience and stress, however, emotional intelligence is not. It is hoped that this study will provide more understanding about stress and stress coping abilities so that appropriate orientation, content, and practice during practicum can be planned and implemented in an effort to prepare high quality educators.

Keywords: practicum, stress, stress coping factors, resiliency, self-efficacy, emotional intelligence, subjective wellbeing, PLS-SEM.

INTRODUCTION

The practicum is an important aspect of teachers' education (Farrell, 2008;). The practicum becomes the best avenue for them to examine and evaluate their knowledge and skills in actual teaching environment and aligning it to their personal educational philosophy and theories (Kabilan & Raja Izzabam, 2008; Kennedy, 1996; Goh & Matthews, 2011). The positive experience during practicum is related to the reinforcement of their intention to continue with the teaching profession but on the contrary, it may lead to turnover among the trainee teachers. Ong et al. (2004) stated that practicum promotes confidence and this in turn supports learning.

Although practicum seems to provide numerous benefits to the trainee teachers, it may also lead to stress (Caires et al., 2010). There are many studies in the past (Borg, 1990; Wendt & Bain, 1989; Capel, 1997; Morton et al., 1997; Malek & Ajmal, 2010) indicating the phenomenon of practicum stress. When stress is perceived highly, this could result in the teachers to quit the teaching course. Practicum becomes so stressful because there are many factors, internal and external causing teachers to be psychologically challenged. These factors include balancing demands from students, mentoring teachers, school administrators, supervisors and adapting to the new work environment (Klassen & Durksen, 2014).

LITERATURE REVIEW

It became imperative that teacher trainees develop coping ability to deal with the stressful situation during practicum. According to the numerous theoretical models to explain stress such as the Person-Environment Fit Theory (French & Kaplan, 1972; French et al., 1982; French & Kahn, 1962), the Lazarus Transactional Process Model (Lazarus & Folkman, 1984), the Spielberger State-Trait Process Model (Spielberger et al., 2002), the Karasek Demand-Control Model (Karasek & Theorell, 1990) and the National Institute of Occupational Safety and Health (NIOSH) Model (NIOSH, 2002), stress can be overcome by good coping strategies. According to Soave (2014), coping strategies may include resilience, self-efficacy, emotional intelligence and subjective well-being.

A resilient person is able to cope with practicum stress and continue to enjoy a positive and healthy life (Bonanno, 2012). Resilience is an important personal attribute for trainee teachers as it provides protection from stress and ensure that trainee teachers continue with their training program. According to Castro et al. (2010), teachers who are resilient showed greater coping ability.

Self-efficacy refers to an individual's perception and belief about something. In the context of teaching and learning, trainee teachers' self-efficacy refers to their perception and belief about the teaching practicum. Bandura's social cognitive theory (1986) provides the theoretical framework to support

one's behavior to be more efficacious than others. According to Wood and Bandura (1989), individual who believes about his ability to become more motivated, to have cognitive resources and actions is more likely to be efficacious, thus having more ability to perform a particular task for a period of time in order to attain a desired outcome. Teachers who have high efficacy will have confidence in his or her competency and show greater commitment towards their job, accepting innovation, give more efforts to teach and experience lower risk to burnout as well as being more satisfied with their work (Hoy & Spero, 2005; Skaalvik & Skaalvik, 2010; Tschannen-Moran & Woolfolk-Hoy, 2001).

Emotional intelligence has also been reported to help cope with stress. Weisenger (2000) explained emotional intelligence as the ability to sense, understand and apply forces behind emotions in daily practice. Emotion is used to deal with problems as individuals identify emotional meaning and comprehend them before attempting to solve problem (Salovey & Mayer, 1990). By employing emotion, a person can shape his or her behaviour and thinking processes to deal with stressful situation. Since trainee teachers faced stressful situation during practicum, emotional intelligence knowledge and practice can help them to overcome these challenges (Tan, Abd Aziz & Mahani, 2010).

Subjective well-being refers to happiness or satisfaction with life (Diener, 1984). Being happy is an armour against stress as it provides the individual with the ability to adapt to the changes in his or her life (Windle et al., 2010). Subjective well-being can strengthen resilience towards stress. Therefore, it is also regarded as a coping ability to manage the impacts of practicum stress.

Research Objectives

The research objectives are:

- i. To determine the level of resilience, self-efficacy, emotional intelligence, subjective wellbeing and stress among the trainee teachers;
- ii. To determine the relationships between resilience, self-efficacy, emotional intelligence and subjective wellbeing with teachers' stress during practicum.

METHODOLOGY

Research Design

The methodology uses PLS-SEM to examine the inter-relationships of numerous factors affecting trainee teachers' stress level during practicum training. These variables are inter-related and gives effect to the dependent variable or endogenous variable in the PLS-SEM context, namely: stress during practicum training.

Table 2: Assessment of the Reflective Measurement Model

Latent Variables	Internal Consistency (CR)	Indicator Reliability (Outer Loadings)	Convergent Validity (AVE)	Discriminant Validity (HTMT)
Resilience	0.962	An item (DT11, OL = 0.376) is deleted, 7 items retained (OL = <0.708)	0.506	Yes
Emotional Intelligence	0.950	25 items revised ((OL = <0.708).	0.392	Yes
Self-Efficacy	0.969	All 12 items have outer loading > 0.708	0.722	Yes
Subjective Wellbeing	0.938	All 5 items have outer loading > 0.708	0.751	Yes
Stress	0.937	9 items have outer loading > 0.708. Only one item has OL < 0.708) (S8, OL = 0.675) which was retained	0.598	Yes

The reflective measure model is assessed based on the convergent validity which is given by its average variance extracted (AVE). Additionally, significance and relevance of the outer weights and the collinearity among the indicators are also referred to. It is shown that the convergent validity indicated satisfactory values of both composite reliability and AVE for resilience, self-efficacy, subjective well-being and stress whereas for emotional intelligence, the composite reliability is not supported with an acceptable AVE (< 0.5).

The significance and relevance of the outer weights was determined through bootstrapping analysis. Table 3 presents the bootstrapping analysis result. Emotional intelligence is shown as an insignificant predictor of resilience and stress. Resilience is also not a significant predictor of stress. However, self-efficacy is a significant predictor of emotional intelligence, resilience, stress and subjective wellbeing. Furthermore, subjective wellbeing is a significant predictor of emotional intelligence, resilience and stress.

Table 3: Path Coefficient Result from Bootstrapping Analysis

Latent Variables	Original Sample (O)	Sample Mean (M)	Standard Errors (STERR)	T-statistics	P Values
EI → RESI	0.193	0.217	0.110	1.759	0.079
EI → STR	0.170	0.167	0.184	0.924	0.356
RESI → STR	0.180	0.175	0.160	1.126	0.261
SE → EI	0.405	0.406	0.090	4.481	0.000
SE → RESI	0.474	0.462	0.109	4.362	0.000
SE → STR	-0.344	-0.354	0.134	2.574	0.010
SE → SWB	0.451	0.456	0.083	5.462	0.000
SWB → EI	0.369	0.376	0.089	4.165	0.000
SWB → RESI	0.273	0.264	0.078	3.517	0.000
SWB → STR	-0.264	-0.261	0.130	2.030	0.043

The structural model is also assessed to determine the inter-relationship between the constructs. Collinearity among the indicators were assessed based on the Variance Inflation Factor (VIF) values which must be below five ($VIF < 5$). In Table 4 below, it is indicated that all values of VIF are below 5, thus concluding that there is no multi-collinearity among the indicators.

Table 4: Collinearity among Indicators in the Latent Variables

Latent Variables	Emotional Intelligence	Resilience	Self-Efficacy	Stress	Subjective Wellbeing
Emotional Intelligence		1.771		1.868	
Resilience				2.608	
Self-efficacy	1.256	1.546		2.133	1.000
Stress					
Subjective wellbeing	1.256	1.498		1.693	

The predictive capabilities of the structural model is determined based on the R square (R^2) and the effect size (f^2). In Figure 2, the R^2 values are indicated. It shows that self efficacy explains 20.4% of variance in subjective wellbeing and 43.5% of variance in emotional intelligence. Also, self-efficacy, emotional intelligence and subjective wellbeing contribute 61.7% to the variance in resilience. However, the combination of self-efficacy, emotional intelligence, subjective wellbeing and resilience only contributed 10.8% to the variance in stress. Based on the path coefficient, self-efficacy is moderately related to emotional intelligence ($\beta = 0.405$), resilience ($\beta = 0.474$) and subjective wellbeing ($\beta = 0.451$).

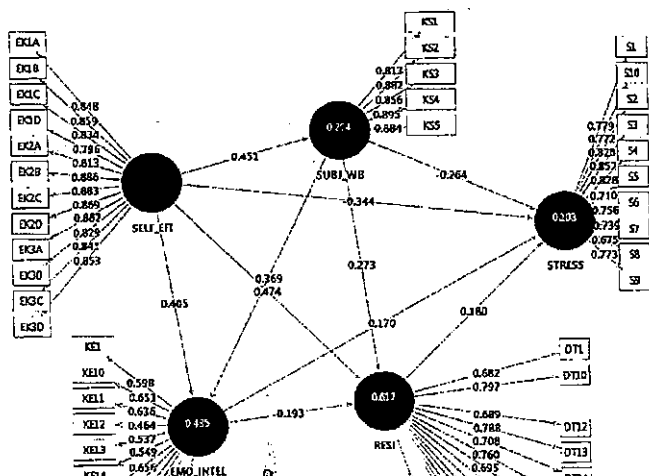


Figure 1: PLS Algorithm Indicating the R^2 values

Table 5 shows the effect size, f^2 which indicates the relative effect of each variables. Emotional intelligence has a greater effect on resilience compared to stress. Likewise, self-efficacy also has a greater impact on resilience than subjective wellbeing and emotional intelligence but least of all on stress. Subjective wellbeing has a greater impact on emotional intelligence than in resilience and stress. Overall, self-efficacy and subjective wellbeing give greater effect on resilience and stress compared to emotional intelligence.

Table 5: The Effect Size, f^2

Latent Variables	Emotional Intelligence	Resilience	Self-Efficacy	Stress	Subjective Wellbeing
Emotional Intelligence		0.055		0.017	
Resilience				0.014	
Self-efficacy	0.231	0.379		0.062	0.256
Stress					
Subjective wellbeing	0.192	0.130		0.046	

DISCUSSION

This study shows that resilience is moderately low while self-efficacy, emotional intelligence, subjective wellbeing and stress are all moderate. The trainee teachers' resilience, self-efficacy, emotional intelligence and subjective wellbeing may have been the combination of past personal experience before going into the teaching education course. Therefore, there is a mixture of trainee teachers with most of them having moderate levels.

This research is based on theoretical concepts that identifies a high possibility of inter-relationships between resilience, self-efficacy, emotional intelligence and emotional wellbeing and effect on stress. PLS-SEM as a statistical tool measured and determined the relevance of the structural model. The result showed that emotional intelligence is not a good predictor of stress as it yielded unfavourable outer loadings although AVE was good. However, self-efficacy and subjective wellbeing are better predictors of resilience and stress.

Overall, the result showed that self-efficacy is a strong exogenous latent variables to predict emotional intelligence, subjective wellbeing, resilience and stress. Subjective wellbeing can predict emotional intelligence, resilience and stress. In this study, emotional intelligence does not contribute significantly to resilience and stress. Further to that, the low resiliency among the trainee teachers do not have any significant impact on their stress.

CONCLUSION

Overall, the result in this study highlighted the relationships among the variables: between self efficacy and resilience, subjective wellbeing and stress. It has also shown that both self efficacy as well as subjective well-being are significant contributor to resilience and stress. However, emotional intelligence is an insignificant predictor of resilience and stress. Furthermore, the assessment in the reflective measurement model and the formative measurement model suggest that emotional intelligence does not have a good fit in the structural model. The path coefficient indicated that the inter-relationships between the latent variables do exist but the beta coefficients do not show strong relationship among these constructs. One of the limitations of this study could be contributed by the small sample size and therefore require more data collection to validate this initial finding. However, it has been shown through this study that both self-efficacy and subjective well-being play significant roles to explain resilience and stress. Therefore, it provides merits to include promotion of self-efficacy and subjective wellbeing in the teacher education curriculum as this can help to improve their resiliency and consequently manage stress effectively. Further to that, other theoretical supports of about other variables' contribution to stress such as school climate, workloads, etc should be explored.

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CURRICULUM REVIEW AND DEVELOPMENT OF AN INTERNATIONAL STUDENT PREPARATORY PROGRAMME

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ABSTRACT

In addition to the entry criterion of obtaining the stipulated minimum IELTS band or TOEFL score, an alternative route taken by international students is to participate in a preparatory programme and achieve the required results. Many of these students select the latter option due to their low proficiency level of English. The current research examined a foundation programme for international students in terms of its curriculum via a questionnaire survey, focus group discussion, and face-to-face semi-structured interviews. The sample comprised former students of the programme who are currently studying in Universiti Malaysia Sabah, lecturers teaching these students, and deans of schools where these students are studying. Based on the findings, an alternative programme is proposed to overcome the shortcomings of the existing programme.

Keywords: International students, foundation/preparatory programme, English language proficiency, tertiary education

INTRODUCTION

At Universiti Malaysia Sabah, the International Student Foundation Programme (ISFP) was developed as a preparatory programme to equip international students with English as a Foreign Language (EFL) and English as a Second Language (ESL) for the Certificate of English Language Competency. It is primarily for candidates who want to continue their undergraduate or post-graduate studies.

This programme consists of two main phases which are conducted over a duration of six months with 800 contact hours. Phase 1 concentrates on modules for English Language Skills (from basic to intermediate for EFL & ESL learners). It consists of five core modules which are:

- i. Module 1 – Grammar Skills
- ii. Module 2 – Reading Skills
- iii. Module 3 – Writing Skills
- iv. Module 4 – Listening Skills
- v. Module 5 – Speaking Skills

Phase 2 of the programme focuses on Extended Pre-Sessional Modules (from intermediate to high intermediate for EFL & ESL learners) which expose students to a variety of topics from general or current issues to scholarly knowledge. The modules consist of:

- i. Module 6 - Research Writing in English
- ii. Module 7 - Public Speaking in English
- iii. Module 8 - Malay Language
- iv. Module 9 - Malaysian History & Culture
- v. Module 10 - Malaysian Civilization

The ISFP is designed for students of all language proficiencies, as they are streamed and taught according to their English Language competency which is determined after taking the English Placement Test (EPT).

Problem Statement

Although students obtained the ISFP certificate, some of them still have problems in using the English language as a medium of communication when they embark on their undergraduate or postgraduate studies, particularly when the language of instruction is in English. UMS academic staff from various schools have lamented on the poor academic performance of these students and they pinpoint that their lack of English language proficiency as one of the factors that contribute to their failures in pursuing their basic degree.

In addition, students appear to be over-burdened in the second phase as they have to remember factual information learnt in Malaysian History and Culture, and Malaysian Civilization as well as grammatical, lexical, and syntactic knowledge of a new language, that is Malay language. This is reflected in the substantial number of absentees during these classes and low scores for these modules by students who are proficient in English. Furthermore, they perceive that the two former modules would not enhance their studies in UMS.

The observations mentioned could point to particular weaknesses of the ISFP and measures should be taken to improve the programme. Furthermore, the curriculum for ISFP has not been reviewed since its inception in 2008. Thus, it is timely to conduct a review of the curriculum in 2013 so that the changing needs of students can be addressed. Prior to proposing recommendations for a new programme, it is necessary to conduct an in-depth study to gather valid data related to the ISFP curriculum.

Research Aim and Objectives

The aim and objectives of this research project which was conducted over a period of six months are as follows:

- a. Aim: To review and improve the existing ISFP curriculum.
- b. Objectives:
 - i. To obtain feedback on strengths and weaknesses of the existing syllabuses, assessments and teaching materials of the ten modules taught in ISFP;
 - ii. To determine the language and learning needs of international students;
 - iii. To identify the aspects of the existing curriculum that need to be modified;
 - iv. To make recommendations on how to alter the aspects identified.

Research Questions

- i. What are (a) the strengths and (b) the weaknesses of the existing syllabuses, assessments, and teaching materials of the ten modules taught in ISFP?
- ii. What are the language and learning needs of international students?
- iii. Which aspects of the existing curriculum need to be modified?
- iv. How can the aspects identified be altered to tailor the curriculum to the needs of the international students?

LITERATURE REVIEW

Curriculum is defined by Tanner and Tanner (1980) as intended learning experiences and outcomes planned and designed systematically to construct knowledge and experience. Curriculum needs to be evaluated and reviewed to ascertain how the implemented curriculum has impacted the students' learning experiences. This is a vital procedure conducted to revise or improvise the curriculum and materials used (UNESCO-IBE, n.d). The review conducted in this programme was based on evaluation principles. Evaluation is defined as a process of collecting information for decision making especially in terms of the deliverance of the desired outcomes (ICAP, 2014). It also provides descriptive information about the strengths of the programme's goals, process, implementation and product. The information elicited is used for decision-making of the current project or future planning. Curriculum evaluation refers to the process of depicting, gathering, and providing information related to the curriculum for future decision making. This decision could help to maintain the existing curriculum, adjust the curriculum or to remove the old curriculum and replace it with a new one (Stufflebeam, 1983).

Curriculum Review

The review of this programme was conducted based on Context, Input, Process, and Product (CIPP) model. CIPP model introduced by Stufflebeam (1983) focuses on four components of evaluation, namely context, input, process, and product. Context identifies needs, problems, and opportunities within the targeted environment. Input evaluation defines the strategies, approached, facilities, and financial support involved in delivering or implementing a project. Process evaluation monitors the progress, document the project, and maintain accountability throughout the project. Product evaluation examines the intended and unintended outcomes in order to know how the project has benefited the stakeholders.

This paper focuses on input evaluation of the programme. Input of the programme refers to the intended content to be delivered, materials used for content delivery. Input evaluation of the programme also included the relevance of the content in preparing the students for future studies. Furthermore, it also examined the relevance of the language skills component and general knowledge about the host country. It also examined how the content was applied in their degree programme. This evaluation was crucial to identify the gap of the programme and the needs of the students, if any. It also identified how far the content could be applied in their degree programme.

Curriculum Design

Experts in the field of curriculum design have proposed a variety of models to develop effective curriculums. Among the well-known ones cited by Dagalea (n.d.) are the Tyler Model (1949) by Ralph Tyler, the Taba Model (1962) by Hilda Taba, and the Saylor and Alexander Model (1974) by Galen Saylor and William Alexander. Since then, Mrutyunjaya Mishra (n.d.) has listed other approaches including the developmental approach, the functional approach, the ecological approach, subject/teacher centred design, learner centred curriculum, activity based curriculum, integrated curriculum, core curriculum, hidden curriculum, collateral curriculum, null curriculum, and spiral curriculum. In addition, backward design is a practical approach of identifying the target goal followed by charting the course to guide learners in attaining the goal (Wiggins & McTighe, 2005). Despite the different labels, all these approaches inherently possess a common goal, which is to develop learners' knowledge and to equip them with the skills that they need in their future endeavour.

Since all these approaches have their strengths and weaknesses, an eclectic approach in harnessing their beneficial aspects is encouraged in designing any curriculum. As an illustration, the initial step could be to pinpoint the target goals as advocated by the backward design. Next, the knowledge and skills that enable learners to achieve the goals may be ascertained. Then, in accordance to the learner centred approach, the learners' needs are taken into consideration when selecting materials and activities to enhance learning.

MATERIALS AND METHODS

This was a mixed method research which combined qualitative and quantitative data analyses. The data collection involved focus group discussions with ISFP teachers, UMS lecturers, and students; two surveys using two sets of questionnaires for current and former ISFP students; and face-to-face interviews with administrators and managerial staff. To begin with, the ISFP teachers' feedback was gathered via focus group discussions conducted among those who teach the same module. Similarly, focus group discussions or face-to-face interviews were conducted among identified UMS lecturers to elicit their responses. Next, focus group discussions were held with current and former students after they filled in the survey questionnaires. Data obtained via questionnaires were analysed using Statistical Packages for Social Sciences (SPSS). Finally, the interview sessions with UMS administrators and UMS Link management were recorded and transcribed before analyses were conducted.

Samples

The sample comprised 216 respondents. Those from UMS are the Director of International Student Affairs Centre, deans, lecturers, and former students of ISFP who are in their second or third year of studies in both Kota Kinabalu and Labuan campuses. In addition, those directly involved in ISFP were selected as respondents. They are the managerial staff of UMS Link, former ISFP Academic Coordinator, and Student Affairs Coordinator, ISFP academic staff, and 20th cohort of students who completed the ISFP in April 2013. Refer to Table 1 for the exact number of respondents.

Table 1: Number of Respondents

No.	Sample	Number of Respondents
1	Director of International Affairs Centre	1
2	Deans	3
3	Lecturers	22
4	Former students of ISFP (current UMS students)	80
5	Managerial staff of UMS Link	3
6	Current and former Coordinators of ISFP	2
7	Academic staff of ISFP	10
8	Students of the 20 th intake	95
	Total	216

Instruments

The instruments designed for the research included a questionnaire, and three sets of questions for focus group discussion sessions or interviews. The questionnaire for former ISFP students comprises four components, namely demographic details, ranking modules according to degree of usefulness, evaluation of modules using a four-point Likert Scale, and overall opinion of the programme and recommendations. Firstly, focus group discussion questions, which were targeted at former ISFP students, focus on the strengths and weaknesses of ISFP in preparing them for tertiary education in UMS and recommendations on positive changes for the programme. Secondly, focus group discussion or interview questions, which were designed for lecturers, seek their opinions on former ISFP students' ability to undertake academic tasks, the appropriateness of ISFP curriculum in providing the foundation for tertiary education, and their recommendations to enhance the programme. Thirdly, interview questions, which were specifically for deans, include the academic performance of former ISFP students, the appropriateness of the programme, and their proposals on how to better equip students for tertiary education in UMS.

Data Collection Procedures and Analysis

The data collection procedures involved identifying the respondents, and conducting the survey, focus group discussion, and interview sessions. The data obtained via questionnaires were analysed using Statistical Packages for Social Sciences (SPSS) whereas the interview sessions with UMS deans and lecturers were recorded and transcribed before analyses were conducted.

RESULTS

Research Question 1(a):

What are the strengths of the existing syllabuses, assessments, and teaching materials of the ten modules taught in ISFP?

The strengths of these three aspects will be presented from the perspectives of the respondents who are directly involved in the teaching and learning processes, namely ISFP teachers, current and former ISFP students.

The qualitative data from the focus group discussion and interview sessions with ISFP teachers revealed a general agreement that the existing syllabuses, assessments, and teaching materials have their merits. This is evidenced by improvement in students' command of English language, their ability to communicate in basic conversational Malay, as well as their knowledge of the historical and socio-cultural aspects of Malaysia. To a significant extent, the syllabus contents of these modules are useful and helpful to students in gaining knowledge of the English grammatical system, the conventions of research writing and public speeches besides providing practices in reading comprehension, writing simple essays of different genres, and speaking to an audience. The strengths of Public Speaking module are all components are useful to students and they have learnt the conventions of making an individual speech. For example, components of Malay Language module (vocabulary, grammar, sentence structure, reading, speaking, and writing) are useful; students with good English language proficiency are able to write using proper sentence structure and identify vocabulary. Similarly, the strengths of Malaysian History and Culture module are suitable topics on comprehension and discussion offer opportunities for active exchange of opinions and reflections; and students showed an increased personal growth, that is accepting other people's ideas, and gaining self-confidence and self-esteem.

Next, assessments and allocation of marks are appropriate for all modules except for the grammar module. In addition, there is a substantial variety of assessments for listening, and speaking modules in particular. For instance, the assessments of the speaking module comprise dialogues, role-plays, and sketch presentations, while those of public speaking consist of

impromptu and prepared speeches with PowerPoint to enable students to gain confidence when speaking in public. Majority of the assessments are suitable for students' levels of English proficiency and the allocation of marks for assessments, is fair for reading, speaking, and public speaking, Malay language, Malaysian History and Culture, and Malaysian Civilization modules. Teachers also commented that the teaching materials, which are local and imported textbooks, may be useful as reference materials and they would normally use other supplementary materials to enhance the teaching process and facilitate the learning process. These materials include handouts (notes and worksheets), video clips, PowerPoint slides, and online exercises.

Current and former ISFP students also expressed their views on the strengths of the ten modules via two sets of questionnaires and several focus group discussion sessions. The data show that their feedback was in congruence that learning the English-focused modules has enhanced their command of the language, especially among successful students who obtained good grades for the programme. They highlighted macro and micro language skills on listening, speaking, reading, and writing; rudiments of grammar; and the process involved in research writing and public speaking as the strengths of the modules concerned. Among the different genres of essays in the Writing Skills module, they pinpointed the argumentative essay as the most important because they are required to write in this genre for their assignments at the university.

On the contrary, only a minority of the students viewed the three non-English focused modules positively. Among them, one student commented that the input on conversational Malay language, historical events and cultural diversity of Malaysia was of practical application, informative, and interesting, respectively. They also considered the oral and written modes of assessments as a positive aspect of the modules such as individual interviews, sketch presentations, impromptu speeches, prepared speeches with PowerPoint, watching a movie and answering questions based on the movie; note taking while listening; and project presentations other than the normal pen and paper tests. Finally yet importantly, students generally preferred supplemented teaching materials to the textbooks because these materials are related to more current issues that they can associate with.

Research Question 1(b):

What are the weaknesses of the existing syllabus, assessments, and teaching materials of the ten modules?

Similar to the first research question, ISFP teachers, current and former ISFP students' feedback on the weaknesses of these three aspects will be deliberated. Their opinions were obtained via focus group discussion sessions and questionnaires.

The results indicate that although ISFP teachers generally agreed on the contents of the syllabuses, several of them were of the opinion that the contents for Public Speaking and Research Writing syllabuses were too dense for the duration of 60 contact hours. They have to complete teaching the contents of the modules within the stipulated time with scarcely any opportunities to pause and check students' mastery of what has been taught or guide them individually in their speeches, presentations, and academic essays, especially when the class enrolment exceeds 20. Consequently, weaker students do not have sufficient time to acquire what is being taught. Therefore, it could be observed that a majority of students had difficulties in delivering speeches to an audience and writing academic essays as they are unfamiliar with these skills. In addition, students pointed out that the Writing Skills module did not prepare them adequately for the Research Writing module. Furthermore, a majority of the former ISFP students commented that some of the contents of the Writing Skills module learned were not helpful in their studies in UMS.

The weaknesses in assessments were highlighted by teachers who are teaching the grammar, listening, and writing modules. They highlighted that the allocation of marks for Grammar is not appropriate. Besides that, there is no standardization of class assignments for the grammar and listening modules. In addition, the writing assessments do not measure students' ability, especially those with low proficiency level, because 40% is allocated for assignments comprising four essays whose authenticity remains dubious.

The data also revealed that the textbooks for Grammar, Listening Skills (for Academic Purposes), Reading Skills, Writing Skills, Public Speaking, and Malaysian Civilization were too demanding on students' proficiency level. For example, a teacher stated that the grammar textbook provides detailed aspects of grammar using specialised linguistic terminologies. Students who do not know the basics of grammar, such as nouns, adjectives, verbs, and adverbs are clearly at a loss when reading these explanatory notes. Even some teachers feel that it is challenging to explain the notes to the students. There is only single page of discrete, mechanical, and not contextualised exercises for each grammatical unit. This does not seem to provide adequate practice for students to master it. As for the textbook for Listening for Academic Purposes, students face difficulties in understanding the spoken texts or the script. Next, the passages or texts in the reading textbook are too lengthy with vocabulary that proves to be beyond the students' level of comprehension. Furthermore, the textbook for Public Speaking caters more for working adults rather than for tertiary students as examples of language usage are related to the workplace. Lastly, students pointed out that the contents of the textbook for Malaysian Civilization are related to concepts and terminologies which are unfamiliar to them.

Research Question 2:

What are the language and learning needs of international students?

Students' responses and teachers' views to the above research question will be presented from two perspectives, namely their language needs, that is why do they need to learn the language, and their learning needs, that is what do they need in order to learn.

The data gathered from students' focus group discussions indicate that the fundamental purpose of these students learning English is for verbal communication in oral and written modes that meet the demands of a tertiary education. There is great necessity for them to be able to understand when listening to lectures and reading academic texts such as reference books and journal articles. In addition, they need to be able to express their opinions as accurately, fluently, and competently as possible when they deliver their presentations and write academic essays as part of their assignments. As highlighted by teachers involved in teaching non-English focused modules, a language barrier between students and them could result in adverse effects on the academic performance of the students who are not motivated to learn because they do not understand the medium of instructions. This could be one of the reasons for these non-focused English modules to be rated as the three 'least motivated to learn' by current ISFP students. The quantitative results in Table 2 show that the lower the mean, the higher the ranking. Besides learning English, students also expressed the usefulness of learning the national language which is Malay for daily transactional or conversational purposes.

Table 2: Ranking of Modules by Former and Current ISFP Students

Module	Former ISFP Students		Current ISFP Students	
	Rank	Mean	Rank	Mean
Speaking	1	3.30	3	4.41
Listening	2	3.74	4	4.65
Reading	3	4.04	2	4.35
Writing	4	4.67	1	3.91
Grammar	5	4.89	5	5.13
Public Speaking	6	5.22	6	5.19
Research Writing	7	5.89	7	5.65
Malay Language	8	7.07	8	5.89
Malaysian History and Culture	9	8.00	9	7.80
Malaysian Civilisation	10	8.17	10	8.07

Based on teachers' comments during focus group discussion sessions, students need to be equipped with the macro and micro skills pertaining to

language learning. They agreed that poor reading skills and limited vocabulary knowledge act as a barrier in reading comprehension. Therefore, students need to be taught recognising words to connect with ideas; skimming; scanning; distinguishing opinions from facts; identifying main ideas and supporting details; referencing; inferencing; and drawing conclusions. Furthermore, they felt the dire need to train students in writing grammatically and syntactically correct sentences with appropriate vocabulary. In order for students to achieve all the linguistic abilities mentioned in the preceding paragraph, it is vital for students to learn the rudiments of the grammatical system and lexicology of the English language and be able to apply this knowledge appositely. Teachers also stressed the necessity for students to learn how to listen for specific information; write in-text citations (quotations and paraphrasing, summarising), and end-of-text references for their academic assignments; and to utilise their body language, pronunciation, intonation, and enunciation for effective presentations.

To optimise students' learning capacity, the ISFP Academic and Student Affairs coordinators listed other factors related to students' capability to adapt to a foreign culture, a new environment, a different lifestyle, and a different approach to learning a foreign language. Their ability to adapt to these changes appear to affect their attitudes, behaviour, rate of learning, and ultimately their academic performance. For instance, there is no translation from English to students' native language during lesson time unlike students' learning environment in their home countries. This seems the most difficult hurdle for students with low proficiency in English when they do not comprehend the medium of instruction. To assist students achieve satisfactory results, they need sufficient time for learning to occur, remedial classes, motivational talks, peer teaching, guidance, and counselling.

Research Question 3:

Which aspects of the existing curriculum need to be modified?

The qualitative responses from ISFP teachers, students, UMS lecturers and administrators have helped in pinpointing which aspects of the present curriculum need to be modified namely focus of the programme, duration, modules, teaching materials, pedagogical approach, and assessments.

The paramount aspect highlighted by UMS lecturers and administrators as well as former and current ISFP students was the focus of the programme. Nearly a third (30%) of the programme comprises of non-English focused modules namely Malay Language, Malaysian History and Culture, and Malaysian Civilisation. These respondents pointed out that since a substantial number of former ISFP students still lack the proficiency in the target language, the focus of the programme should be reviewed to a higher percentage of marks for English. Students felt burdened having to learn two foreign languages simultaneously. Many students confessed that it was very difficult for them to learn the three non-English focused modules (Malay language, Malaysian

History and Culture, and Malaysian Civilization). All students interviewed seconded that the contents of both the latter modules are too in-depth for foreign students. They also failed to cope with these modules because they were learning English language at the same time. In addition, the academic staff proposed that the duration of the programme should be reviewed because students with low proficiency level in English would require a longer duration to learn the language skills. Teachers also emphasised the need to review the time allocated for research writing and public speaking modules.

Next, a majority of teachers and students preferred the combination of two language skills in one module for more effective learning and application of skills. Therefore, it is necessary to revise the current discreet language skill for each English focused module and its syllabus. For instance, the UMS Link administrators pointed out that the research writing module may be too demanding for students with little or no knowledge of English. Even local students who newly enroll in a university would not know how to do research writing. Hence, it is not fair to grade ISFP students on this module. In fact, this module is not tested in tertiary entrance examinations that are internationally recognised, such as IELTS and TOEFL. If it is only an exposure to students, it would be actually good for their knowledge. Furthermore, teachers noticed that some textbooks have been used since the programme was established ten years ago. For instance, the textbooks for grammar, reading, speaking, and public speaking modules need to be replaced so that students can relate to more current events and issues. Students and administrators suggested that the indoor pedagogical approach be diversified to create interest among learners and to provide opportunities for practical evaluation of skills or knowledge taught. Lastly, teachers advocated that the class assessments for a particular module should be synchronized so that students are given equal treatment.

Research Question 4:

How can these aspects be altered to tailor the curriculum to the needs of the international students?

The students' challenging language and learning needs which are identified in this study should be met so that they can be empowered to surmount the obstacles in their path to a successful tertiary education. The respondents proposed that both academic and non-academic support must be incorporated in the programme such as providing sufficient time for learning to occur, reviewing the current curriculum, as well as setting up facilities and counselling service for students. However, only recommendations pertaining to the research question and aspects mentioned in the fourth research question (that is, focus of the programme, duration, modules, teaching materials, pedagogical approach, and assessments) are deliberated.

The most pertinent issue to be addressed is the focus of the programme. The UMS lecturers and administrators were of the opinion that Malaysian History and Culture, Malaysian Civilization, and Malay Language need not be included as three distinct modules in ISFP. They justified this proposal by pointing out that the sole focus of ISFP should be on English in order to help students master the language more effectively and use the language within an academic context. Instead, the contact hours allocated for these modules would be utilised in reinforcing the English modules taught such as Public Speaking and Research Writing. They advocated that aspects of Malaysian history and culture be integrated within the English language modules by including related materials in English. On the other hand, the ULink management advocated that Malaysian History and Culture, Malaysian Civilization, and Malay Language, should continue to be taught as three individual modules but the grades should not be included in students' overall results. Similarly, they proposed that Research Writing should be taught but excluded from the overall results since international English examinations such as IELTS or TOEFL do not assess these language skills.

Besides altering the focus of the programme, UMS lecturers and deans, as well as ISFP teachers recommended a longer duration of study for students with low proficiency in English. This may be achieved by matching the duration for ISFP with students' English proficiency levels. As an illustration, the coordinators suggested that weaker students should be enrolled into one class and taught for nine months instead of the current six months. This would be more cost and time effective for students as repeating the programme upon failure would mean another six months. Alternatively, the ULink management proposed converting the current two phases into three phases according to three different proficiency levels, namely basic, low intermediate, and high intermediate.

Another aspect that ISFP students proposed changes was the type of modules. They preferred the language skills to be learnt in an integrative mode. For example, the Listening Skills and Speaking skills may be integrated in one module, and grammar into other language skills. The former ISFP students requested for academic writing skills to be included in the programme. In addition, the coordinators advocated incorporating other skills such as grammar and listening to improve reading comprehension. The UMS lecturers recommended the inclusion of pronunciation, presentation, and interpersonal skills, and basic knowledge on students' prospective programmes. Next, teachers and coordinators pointed out that textbooks need to be replaced with current ones and more appropriate for students' level of proficiency, beginning with a lower level textbook and gradually moving towards a higher level. For instance, the coordinators suggested that less complex textbooks should be selected for Grammar and Public Speaking. Several teachers proposed writing their own modules or evaluating textbooks published by other institutions of higher learning.

Finally yet importantly, teachers recommended improvement in the area of assessments. They highlighted the need to review the types of assessments and distribution of marks, taking into consideration students with low level of proficiency. In addition, standardized assignments and allocation of marks should be administered for the same module by introducing a systematic process for all assessment procedures. Teachers who teach listening advocated the use of various types of audio to test Listening for Academic Purposes (LAP). They also proposed the reduction of the passing mark from 70% to 60% which is a more accurate reflection of students' proficiency level. Before examinations are conducted, the ULink management representatives emphasized that students should be made familiar with the examination question format by specifying topics, the type and number of questions students are required to answer, and conducting mock-tests before mid-term and final examinations. Furthermore, the UMS lecturers encouraged the implementation of an exit test as a prerequisite for students to enroll in UMS in order to ascertain their level of proficiency in English.

DISCUSSION

The findings of the surveys, focus group discussions, and interviews conducted provide the justification for a revamp of the ISFP in terms of its name, curriculum, and types of modules. Based on students' learning and language needs identified in the current study and proposals from respondents, a new programme known as 'Intensive English Preparatory Programme' (IEPP) is designed. The word 'Foundation' is replaced by 'Preparatory' because this is not a foundation programme to prepare students for their future programmes or majors in UMS. The word 'English' is included in the name because the primary aim of IEPP is to equip students with the English language proficiency level essential for communicative and academic purposes. In addition, IEPP seeks to prepare students to function effectively as tertiary students in a Malaysian institution of higher learning by providing guidance in terms of study skills and knowledge about Malaysian culture. Certain aspects of the new programme will be discussed namely the duration, types of modules, pedagogical approach, and assessments.

The duration and phases of this programme remain the same, that is six months with two phases. The duration of each phase is three months (12 weeks) with eleven weeks of lessons which include continuous assessments and one week of final examination which is conducted at the end of each phase. If the duration of the programme is shorter than six months, students with low proficiency level may not perform well enough to secure a pass. On the other hand, it would not be cost effective to conduct the programme for more than six months. Although the duration is the same, the language needs of low proficiency students are met by the progressive approach of leading them from

basic to low intermediate and finally, to high intermediate proficiency level.

Since the aim focus of the programme is on improving participants' command of the English language, three of the existing modules, that is Malay Language, Malaysian History and Culture, and Malaysian Civilization, would be deemed as irrelevant in IEPP. There are six modules for each phase as listed in Table 3 and Table 4. These modules are progressive in nature as they are repeated at a higher level in the second phase. For the first phase, the former five modules are retained with a combination of certain skills, such as Listening and Speaking, as well as Reading and Writing. The receptive (listening and reading) and productive (speaking and writing) language skills are integrated in one module as this is a more realistic reflection of language use than learning these skills discretely or as separate and distinctive individual skills. The module on Grammar and Vocabulary comprises grammatical and lexical items taught from simple to complex. The emphasis in grammar is also incorporated in non-grammar modules by raising awareness of mistakes made by students when they speak and write and correcting these mistakes. This reinforces students' knowledge of grammar as well as encourages contextualized learning of grammar and application of this knowledge. Two modules taught in ISFP Phase 2, namely Public Speaking and Research Writing (renamed English for Academic Purposes), are taught in the first phase to allow sufficient time for students to be familiar with the language skills required for tertiary academic assignments. Elements of three modules in ISFP Phase 2, namely FS 0880 Malay Language, FS FS980 Malaysian History and Culture, and FS 1080 Malaysian Civilization, are incorporated into Module 6 and Module 12. Students gain knowledge about Malaysia and its culture as well as the Malay language through experiential learning and real life interaction with Malaysians outside the classroom environment. In addition, these two modules include study skills, soft skills, and co-curricular activities to equip students with skills for academic purposes and communication. It is hoped that this proposed curriculum is able to sustain students' interest and motivation to study.

Table 3: Summary of Contents for Six Phase 1 Modules

No.	Module	Summary of Contents
1	FS 1172 Grammar and Vocabulary 1	Auxiliary verbs, tenses, nouns, pronouns, articles, adjectives, quantifiers, prefixes and suffixes, subject-verb agreement, and modals
2	FS 1275 Listening and Speaking 1	Listening skills for general purposes Speaking skills for social purposes, from monologue to dialogue
3	FS 1372 Reading and Writing 1	Reading skills, dictionary skills Writing skills, from sentence level to paragraph level, and outline of essay to an essay

No.	Module	Summary of Contents
4	FS 1476 Public Speaking 1	Preparation for Public Speaking, ways of overcoming stage fright, and presentation of short speeches without visuals
5	FS 1574 English for Academic Purposes 1	Academic essays – argumentative, discursive, compare & contrast; academic word lists/academic phrases; sourcing information (the Internet, library); in-text citation (quotation and paraphrasing) and end-of-text referencing, summary/paragraph, and essay map
6	FS 1630 Studying in Malaysia 1	Student rules and regulations, ethics/expectations; life managerial skills, study skills; soft skills; basic Malay Language for communication; Malay way of life (culture/customs); and introduction to Malaysian history, geography, and facts about Malaysia

Table 4: Summary of Contents of Six Phase 2 Modules

No.	Module	Summary of Contents
1	FS 1772 Grammar and Vocabulary 2	Sentence types, tenses, adverbs, prepositions, phrasal verbs, conjunctions, clauses, direct and indirect speech, active and passive, and error corrections
2	FS 1875 Listening and Speaking 2	Listening skills for academic purposes Speaking skills for academic purposes, from dialogue
3	FS 1972 Reading and Writing 2	Reading skills, dictionary skills Writing skills, from paragraphs to an essay consisting of 5 paragraphs
4	FS 2076 Public Speaking 2	Presentation of a variety of speeches in public with visual aids, participation in group discussion, and delivering an impromptu speech
5	FS 2174 English for Academic Purposes 2	Academic essays – argumentative, discussion, compare & contrast; academic word lists/academic phrases; sourcing information (the Internet, library); in-text citation (quotation and paraphrasing) and end-of-text referencing, summary/paragraph, and essay map, and 6-paragraph academic essay related to student's field of study
6	FS 2230 Studying in Malaysia 2	Student rules and regulations, ethics/expectations; Malaysian way of life (culture/customs); computer skills, examination skills; soft skills; basic Malay Language for communication and introduction to multi-ethnicity in Sabah

The assessment approach recommended is outcome-based, that is the skills are tested based on their application and not solely on the skills taught in the module. In other words, the skills are integrated during the assessment. For instance, to test Grammar and Vocabulary 1, students are required to write a paragraph about a picture or a topic. However, marks are awarded based on grammatical and lexical aspects and not writing skills. In this manner, the grammatical knowledge learnt is applied in writing the paragraph. The distribution of marks is illustrated in Table 5.

Table 5: Distribution of Marks

Component	Percentage
Course work	70%
e.g.	
Assignments	30%
Project	20%
2 Quizzes	20%
Final examination	30%
Total	100%

Marks attained for ten modules (1 to 5 and 7 to 11) are summed up and the total is divided by ten to obtain the average mark. The passing mark is 70%. Although the course work is allocated 70%, the quizzes, which are similar to individual testing, constitute 20%. Consequently, the testing components (quizzes and final examination) as a whole contribute 50%. Thus, the ratio between testing and non-testing components is 1:1. However, the ratio may vary depending on the nature of the modules concerned. The variation is acceptable on the condition that the ratio between coursework and final examination is 70:30. The passing mark of 70% is less demanding on students compared to ISFP's ratio of 3:2 (60% for testing and 40% for assignments). In addition, it is compulsory for students to fulfill all the requirements of the course work. If they do not complete even one type of course work, they are considered as having failed the whole programme. However, there is no formal assessment in terms of marks and grade for modules 6 and 12. The requirements to pass modules 6 and 12 are 100% attendance and submission of all tasks assigned. Failure in these modules does not have any bearing on students' IEPP results.

The pedagogical approach should include elements of fun in learning and hands-on or practical exercises/assignments/projects. In-class activities, assignments, and projects are implemented via different modes, beginning with pairs, or groups of 3 to 5 students, and finally individuals. This variety provides opportunities for students who are more proficient to peer teach and guide less proficient ones, particularly when they are initially introduced to a new skill. As they gain confidence when they become familiar with that certain skill, they would be able to do their assignments or projects independently. Alternatively, teachers can group the less proficient students together so that they can provide

them with the guidance that they need. In this manner, these students would not become 'passengers' when doing group work. In addition, outside the classroom learning activities could be conducted for students to apply the knowledge gained during lessons and for them to discover the Malaysian culture.

CONCLUSION

Based on the research findings, positive measures are taken to improve the current ISFP. The proposed Intensive English Preparatory Programme (IEPP) is tailored to meet the language and study needs of prospective international students of UMS. In addition, it provides them with the cultural knowledge and experience for them to adapt to a new environment. To safeguard the best interest of UMS Link Sdn. Bhd., this programme should be piloted on an intake of a smaller group of students that is the intake for the second semester of the academic year.

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SELF-EFFICACY, LEARNING STRATEGIES, AND ACADEMIC ACHIEVEMENT AMONG MALAYSIAN FUTURE EDUCATORS

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ABSTRACT

This study is to identify the level of learning strategies among Malaysian future educators, examine the relationship between self-efficacy, learning strategies, and academic achievement, determine whether gender have significant difference in self-efficacy and learning strategies. There are 310 respondents and the sample is undergraduates from the Faculty of Educational Studies, UPM. The instrument employed is Motivated Strategies for Learning Questionnaires (MSLQ). Finding revealed that future educators adopted help seeking strategy the most (mean=5.40) and effort regulation strategy the least (mean=4.70), there is a significant positive relationship between self-efficacy and learning strategies ($r=.652$, $DF=308$, $p<.01$), self-efficacy and academic achievement ($r=.125$, $DF=308$, $p<.05$), learning strategies and academic achievement ($r=.276$, $DF=308$, $p<.01$), and as a whole gender does not have any significant differences in self-efficacy, $t(308) = -0.180$, $p>.05$ and learning strategies, $t(308) = -1.294$, $p>.05$.

Keywords: Academic achievement, gender, self-efficacy, learning strategies, undergraduates.

INTRODUCTION

Self-efficacy is one of the most essential factors that motivated students in maintaining their effort throughout the learning process. Self-efficacy is the beliefs that individual has regarding own capability to perform an action and accomplish the task magnificently (Bandura, Caprara, Barbaranelli, Gerbino, & Pastorelli, 2003). Also, self-efficacy plays a significant role in enhancing learning motivation, facilitates self-regulation, forming ambitious learning goals and exhibits self-monitoring behavior (Valle, Nunez, Cabanach, Gonzalez-Pianda, Rodriguez, Rosario, Cerezo, & Munoz-Cadavid, 2008). Self-efficacy affects the academic performances of students in making decision, courses enrollment and how much effort being put on learning tasks (Pajares, 2002).

Students with high self-efficacy tend to actively utilize various cognitive and metacognitive learning strategies and also sensitive in control their motivational beliefs (Pintrich, 1999). Schunk and Zimmerman (2003) revealed that there is a reciprocal relationship between self-regulation ability and self-efficacy beliefs whereby the students tend to increase their self-regulation ability as they increase their self-efficacy beliefs and vice versa. Meanwhile, self-regulation means the ability to generate own thoughts, feelings and actions with proper planning and cyclically adapted to the environment that finally leads to the accomplishment of personal goals (Zimmerman, 2000). Pintrich (1999) viewed self-regulation activities as mediators between the learners, environment and academic achievement of the learners. According to social cognitive point of view, effective self-regulated hugely depends on students' self-efficacy to perform the learning tasks (Bandura, 1997).

Self-regulated learning is the strategies that utilized by students in regulating own cognition and managing the resources throughout the learning process. It is a multi-dimensional activity that takes into consideration of cognition, emotion, action and surroundings of the learners (Cheng, 2011). Self-regulated learning is a basic element of any major academic or human endeavor and is essential as when student progress to higher level in academic, the external support tends to decrease and at that moment, whether the student excel or not is dependent on the self-regulatory processes (Zimmerman, 2002). Self-regulated learning is important in the learning processes as the students have great control over own schedule and learning methods. In the self-regulated learning process, student is given the autonomy to manage, observe, guide and regulate own actions in order to achieve the goals of gaining knowledge, widen the expertise and improve oneself (Paris & Paris, 2001). The development and application of self-regulated learning skills among the students is largely affected by the beliefs of self-efficacy, the viewpoint regarding the subject and self-motivation (Darr & Fisher, 2004). Self-regulated learning strategies is self-initiated action that comprise set of learning goal and adjust the efforts to achieve the goal, self-monitoring which is widely known as meta-cognition, time management and also physical and social environment regulation (Zimmerman & Risemberg,

1997). In fact, both self-efficacy and learning strategies are essential in self-regulated learning (Zimmerman, Bonner, & Kovach, 1996).

Self-regulated learners are those who actively involved in time management, construct learning goals, utilize learning strategies, and monitor own cognition, motivation and behaviour aspects (Pintrich, 2004). The skillful self-regulated learners tend to generate extraordinary motivational beliefs in order to achieve the learning goals that being set. These students learn to concentrate on accomplishing the learning tasks despite of immediate impulses to surrender to attractive temptations (Bembenutty, 2008). The less skillful self-regulated learners are either not capable or not willing to generate appropriate self-efficacy beliefs, interest and task value which could enhance them to achieve the learning goals successfully. The accelerated pace of social, informational and technological change required individual to be self-regulate in learning for lifetime (Caprara, Fida, Vecchione, Bove, Vecchio, & Barbaranelli, 2008). Hence, current education aims to transform students to become an individual who are not merely gaining knowledge during school time but are capable to be lifelong learners (Organisation for Economic Co-operation and Development, 2003). Students can be train to become self-regulated learners and hence, enhance the academic achievement (Catnahalan, 2006). Empowering students with learning strategies is reflection of lifelong education which educates students the willpower to learn and the learning skills (Pintrich & de Groot, 1990).

Problem Statements

Many studies have been done on learning strategies of the students and showed that self-regulated learning is essential, as failure to self-regulate tends to be the core factor that leads to academic underachievement among the students from various academic levels (Schloemer & Brenan, 2006). A lot of students failed to fulfill university requirement due to lack of self-regulated learning skills (Rosario, Mourao, Nunez, Gonzalez-Picnda, Solano, & Valle, 2007). It is sad to know that a lot of students failed to see the value of learning in what they were supposed to learn (Pintrich, 1999). Besides that, some of the students did not feel competent enough to master the topic taught by teachers. In addition, there are also students who feel bored to engage in learning processes (Pekrun, Goetz, Titz, & Perry, 2002). Moreover, some students failed to utilize the learning strategies which are effective and get used of becoming passive learners since young age as majority of the activities in classroom do not provide opportunities for students to direct their own learning (Catnahalan, 2006). The learning process that merely involves transmission and recall of facts are not conducive for the development of self-regulation among the students. In Malaysia, it is a challenging process to educate students to become self-regulated learner as local education system seems to be teacher centred. Due to spoon-feeding by teachers since young age, majority of Malaysian students

tend to become passive learner (Malaysian Strategic Research Center, 1994). The students seem to depend on teachers instead of exploring the knowledge themselves. This phenomenon is not encouraging, the situation raised concern among the educators as numerous researches abroad showed that there is significant positive relationship between self-regulated learning and academic achievement. Also, researches showed that self-efficacy is positively correlated with academic achievement.

However, such research still limited in Malaysia as compared to overseas. There is also no previous research that focuses specifically on the relationship between self-efficacy, learning strategies and academic achievement among the future educators in Malaysia. This study aims to identify the level of learning strategies, determine the relationship between self-efficacy, learning strategies and academic achievement, and investigate the gender difference in self-efficacy and learning strategies among the future educators in Malaysia.

LITERATURE REVIEW

Valle et al. (2008) indicated that undergraduates in public university of Northern Spain tend to utilize organization strategy the most (mean score=3.74). The mean score for meta-cognitive self-regulation, time and study environment management, effort regulation and elaboration is 3.45, 3.45, 3.41 and 3.37 respectively. Besides that, Ahmed (2008) found that undergraduates at Al-Hussein Bin Talal University in Jordan seem to make use of meta-cognitive self-regulation strategy the most (mean score=4.21). The mean score for time and study environment management, peer learning, effort regulation and help seeking is 3.96, 3.60, 2.50 and 2.36 respectively.

Pintrich and De Groot (1990) indicated that self-efficacy seems to be positively related to the utilization of self-regulatory strategies and also strongly related to the academic achievement of students. Bembenutty (2010) found that there is significant positive correlation between self-efficacy and self-regulation ($r=.40$, $p<.05$) among the college students who enrolled in an introductory Mathematic course at a public technical college in New York City. DiBenedetto and Bembenutty (2011) revealed that self-efficacy is correlated with self-regulation ($r=.63$) among the college students who enrolled in Biology course at an urban college in New York. Furthermore, there is significant positive relationship between self-efficacy of distance education and self-regulation ($r=.470$, $p<.01$) among the undergraduate students of distance learning programme in Anadolu University (Ergul, 2004). Also, there is significant correlation between self-efficacy and self-regulation learning strategies among the undergraduate students at Al-Hussein Bin Talal University in Jordan (Ahmed, 2008). The previous study clearly showed that there is significant positive relationship between self-efficacy and learning strategies. The college and undergraduate students who have high level of self-efficacy seem to widely utilize the self-regulation learning strategies in the learning process.

Ergul (2004) signified that there is significant positive relationship between self-efficacy of distance education and academic achievement ($r=.249$, $p<.01$) among the undergraduates of distance learning programmes at Anadolu University. Lynch (2010) found that there is a significant relationship between self-efficacy and final grades among the undergraduates who studied Physics at a university in New England. Also, Radovan (2011) revealed that self-efficacy seem to positively affect the grade among the undergraduates at university ($\beta=.147$, $p<.05$). Moreover, Azlina (2007) indicated that lack of self-efficacy is one of the significant predictors for academic achievement ($\beta=-0.17$, $p<.01$) among the Electrical Engineering undergraduates at Malaysia University of Technology. Mousoulides and Philippou (2005) revealed that self-efficacy is a good predictor for Mathematics achievement among the Cypriot sophomore pre-service teachers. In addition, Ahmed (2008) pointed out that there is significant difference in self-efficacy ($t=1.987$, $p=0.01$) among the high and low achieving undergraduates at Al-Hussein Bin Talal University in Jordan. The undergraduates who have high academic achievement tend to have greater self-efficacy (mean=4.82, SD=1.31) compared to their counterpart who have low academic achievement (mean=3.34, SD=1.45). The past researches revealed that there is significant positive relationship between self-efficacy and academic achievement among the undergraduates and pre-service teachers.

Valle et al. (2008) implied that there is significant positive relationship between self-regulated learning and academic achievement among the undergraduates in public university in Northern Spain. Lynch (2010) revealed that elaboration, effort, critical thinking, meta-cognitive strategies and also time and study environment tend to have significant correlation with the final grades of undergraduates who studied Physics at a university in New England. Also, Radovan (2011) revealed that effort regulation tends to positively affect the course grade among the undergraduates in university. Azlina (2007) found that self-regulated learning explains 35.2% of the variance in CGPA (cumulative grade point average) among the Electrical Engineering undergraduates at Malaysia University of Technology. The resource management and meta-cognitive learning strategies are the significant predictors on academic achievement ($\beta=0.40$; $\beta=0.28$, $p<.01$). Bail, Zhang, and Tachiyama (2008) indicated that undergraduates who enrolled in self-regulated learning course have significantly higher academic achievement in four semesters after the course compared to control group.

However, Goodpasture, Lindner, and Thomas (2007) revealed that self-regulated learning is not significantly correlated with academic achievement among the undergraduates in historically black college or university (HBCU) in allied health majors. Also, Ergul (2004) found that there is no significant relationship between self-regulation and academic achievement among the undergraduates of distance learning programs in Anadolu University. It is important to note that although great amount of past studies indicated that there is significant positive relationship between self-regulated learning strategies

and academic achievement, there is also a minority of studies that found contradict result which is self-regulated learning is not significantly correlated with academic achievement among the undergraduates.

Caprara et al. (2008) revealed that self-regulatory efficacy level of Italian female students is higher than male students who are from two public junior high schools near to Rome. However, Lynch (2010) found that self-efficacy of male undergraduates is significantly higher compared to female undergraduates who enrolled in Physics course at a university in New England. In contrast, Ergul (2004) found that there is no significant gender difference in self-efficacy among the undergraduates of distance learning programme in Anadolu University. Yukselturk and Bulut (2009) also showed that there is no significant gender difference in self-efficacy among the students who enrolled in online Computer Programming course that offered by Middle East Technical University. Overall, the previous researches found conflicting results as some of the study showed that there is significant gender difference in self-efficacy while other study revealed that there is no significant gender difference in self-efficacy among the students and undergraduates.

The study on gender by DiBenedetto and Bembenutty (2011) found that female college students possess higher self-regulation ($t=2.64$, $p<.05$) compared to male students who enrolled in Biology at an urban college in New York. Ergul (2004) noticed that there is significant gender difference in self-regulation ($Z=2.225$, $p<.05$) among the undergraduates of distance learning programs in Anadolu University. The finding seems to favour female than male undergraduates. In contrast, Yukselturk and Bulut (2009) showed that there is no significant gender difference in self-regulated learning components among the students who enrolled in online Computer Programming course that offered by Middle East Technical University. Lynch (2010) also signified that there is no significant gender difference in elaboration, meta-cognitive, time-study environment and effort among the undergraduates who studied Physics course at a university in New England. In short, the previous studies gained inconsistent findings as some of the researchers indicated that there is significant gender difference in learning strategies while other researchers pointed out that there is no significant gender difference in learning strategies among the college students and undergraduates.

METHODS

This study employed cross-sectional quantitative survey design to investigate the relationship between self-efficacy, learning strategies and academic achievement among the future educators. The study was conducted at Faculty of Educational Studies, UPM. The data was collected during the academic year of second semester 2011/2012. The population was undergraduates of Faculty of Educational Studies, UPM. Out of 1279 people, 310 subjects were chosen to participate in the study.

Stratified sampling is adopted to reduce sampling error and to increase the precision without increasing the number of sample. Stratified sampling ensures that all strata which are undergraduates from Year 1 to Year 4 are represented equally. Stratified sampling is carried out to determine the ratio between the strata, ascertain the sample size, divide the amount of sample according to the initial ratio within the population and choose the sample using simple random sampling. Table 1 lists the number of students in each years of study and appropriate number of sample from each Years of Study.

Table 1: Number of students and appropriate number of sample from each Years of Study

Years of Study	Number of students	Sample
Year 1	323	78
Year 2	310	75
Year 3	362	88
Year 4	284	69

Cluster sampling is utilized to select sample from population. The clusters in the study are courses that offered based on years of study. The researcher randomly selected the clusters within a year of study and conducted the study on all samples in the chosen clusters. Table 2 lists the selected random clusters.

Table 2: Clusters that randomly selected

Years of Study	Clusters that being randomly chosen
Year 1	Physical Education Teaching English as a Second Language (TESL) Teaching Malay as a First Language (PBMP)
Year 2	Agriculture Science Guidance and Counselling
Year 3	Information Technology Physical Education
Year 4	Guidance and Counselling Teaching Malay as a First Language (PBMP)

Overall, the study consists of 88 (28.40%) male respondents and 222 (71.60%) female respondents. Out of 310 respondents, 78 respondents are in Year 1, 75 respondents are in Year 2, 88 respondents are in Year 3 and 69 of the respondents are in Year 4. Besides that, out of 310 respondents, 275 (88.70%) of the respondents are Malay, 18 (5.80%) of the respondents are Chinese, six (1.90%) of the respondents are Indian and 11 (3.50%) of the respondents rated own ethnicity as other.

The instrument used have been translated into Malay language and verified by two language experts. Informed consent is included in questionnaire. The academic achievement is measured based on the cumulative grade point average (CGPA). The instrument that utilized is Motivated Strategies for Learning Questionnaire (MSLQ). MSLQ is a self-report instrument developed by Pintrich, Smith, Garcia and Mc Keachie (1991). It aims to assess the motivational orientations and utilization of learning strategies among the college students.

The instrument comprised of Motivation Scale and Learning Strategies Scale. Learning Strategies Scale is utilized to assess self-regulated learning strategies of future educators. Learning Strategies Scale assesses the utilization of cognitive and meta-cognitive strategies, and concern about self-management of different resources. Table 3 lists the nine subscales of Learning Strategies.

Table 3: Learning Strategies Scale in MSLQ

Scale	Subscale
Learning Strategies	1. Cognitive and meta-cognitive Strategies
	a. Rehearsal
	b. Elaboration
	c. Organization
	d. Critical Thinking
	e. Meta cognitive Self-Regulation
	2. Resource Management Strategies
	a. Time and Study Environment
	b. Effort Regulation
	c. Peer Learning
	d. Help Seeking

MSLQ is a valid, reliable, efficient and convenient instrument for different types of research (Duncan & McKeachie, 2005). In the study, the instrument that translated into bilingual is validated by two language experts to confirm the validity of instrument. In the original validation study, Pintrich, Smith, Garcia, and McKeachie (1993) utilized the scores of 356 Midwestern college students to assess MSLQ survey. A pilot study was carried out to confirm that modified version of MSLQ is still considered as a reliable instrument. 30 undergraduate students participated in the pilot study. The results of pilot study showed that the instrument is reliable as all the alpha values are within the range of acceptable. The alpha coefficient for Self-Efficacy is .82, while the alpha coefficient for Learning Strategies is .83.

RESULTS AND DISCUSSION

The result of descriptive frequency showed that respondents seem to utilize more cognitive and meta-cognitive strategies compared to resource management strategies (Table 4). Sungur and Yerdelen (2011) also found that high school students utilize more cognitive and meta-cognitive strategies compared to resource management strategies. Pintrich (2004) proposed that one of the essential dimensions in self-regulated learning is in term of cognition. Cognition dimension is the mental process that utilized by students in encode, process or learn throughout the learning task. Mostly, students do apply the cognitive strategies in the learning process. The future educators learned about the cognitive strategies and meaningful learning throughout their degree course in education. Thus, they tend to practice the strategies acquired.

The respondents seem to make use of help seeking strategy the most and effort regulation strategy the least. Sungur and Yerdelen (2011) revealed that high school students seem to utilize effort regulation strategy the less ($M=3.68$). The future educators utilized help seeking strategy the most might be because since they were young, teachers and parents encourage students to seek help from others whenever they face difficulties in understanding certain topic. In addition, the future educators make use of effort regulation strategy the less might be because majority of them are easily distracted by stuff other than learning such as outing and face-booking during study time.

Table 4: Respondent level of learning strategies

Learning Strategies	Mean	Standard deviation
Cognitive and Meta-cognitive Strategies		
Rehearsal	5.154	.892
Elaboration	5.126	.870
Organization	5.180	.847
Critical Thinking	4.937	.750
Meta-cognitive Self-Regulation	5.001	.696
Resource Management Strategies		
Time and Study Environment Management	4.769	.785
Effort Regulation	4.698	.848
Peer Learning	5.053	.944
Help Seeking	5.404	.819

The results of Pearson correlation coefficients showed that there is a significant positive relationship between self-efficacy and learning strategies ($r=.652$, $DF=308$, $p<.01$) (Table 5). The magnitude of the relationship is large (Cohen, 1988). Regarding the subscales of learning strategies, finding revealed

that self-efficacy is positively correlated with all the nine subscales (Table 5). The magnitude of the relationship ranged from medium to large (Cohen, 1988). Bembenutty (2010), DiBenedetto and Bembenutty (2011), Ergul (2004) and Ahmed (2008) also showed that there is significant positive relationship between self-efficacy and learning strategies among the college students and undergraduates. According to Bandura (1986), self-efficacy which is the beliefs that individual has regarding own ability to perform a task is vital in sustains self-regulated learning among the students. Social cognitive theory stated that effective self-regulation mainly rely on self-efficacy of the students (Bandura 1997). Zimmerman (2000) revealed that self-efficacy is a main component that influences all phases of self-regulation. Pintrich (1999) indicated that students with high self-efficacy seem to actively utilize various cognitive and meta-cognitive learning strategies in learning. The future educators who have high self-efficacy are more confident with their own ability to master certain topic effectively and thus, tend to confidently and actively utilize various learning strategies.

Table 5: Coefficients of relationship between self-efficacy and learning strategies

		Self-efficacy (<i>r</i>)
Learning Strategies	Pearson Correlation	.652**
	Sig. (2-tailed)	.000
Rehearsal	Pearson Correlation	.475**
	Sig. (2-tailed)	.000
Elaboration	Pearson Correlation	.588**
	Sig. (2-tailed)	.000
Organization	Pearson Correlation	.483**
	Sig. (2-tailed)	.000
Critical Thinking	Pearson Correlation	.507**
	Sig. (2-tailed)	.000
Meta-cognitive Self-Regulation	Pearson Correlation	.557**
	Sig. (2-tailed)	.000
Time and Study Environment Management	Pearson Correlation	.472**
	Sig. (2-tailed)	.000

		Self-efficacy (<i>r</i>)
Effort Regulation	Pearson Correlation	.402**
	Sig. (2-tailed)	.000
Peer Learning	Pearson Correlation	.448**
	Sig. (2-tailed)	.000
Help Seeking	Pearson Correlation	.568**
	Sig. (2-tailed)	.000

** Correlation is significant at the 0.01 level (2-tailed)

The results of Pearson correlation coefficients showed that there is a significant positive relationship between self-efficacy and academic achievement ($r=.125$, $DF=308$, $p<.05$) (Table 6). The magnitude of the relationship is small (Cohen, 1988). Ergul (2004), Lynch (2010) and Radovan (2011) also showed that there is significant positive relationship between self-efficacy and academic achievement among the undergraduates. Azlina (2007) signified that lack of self-efficacy is one of the significant predictors on academic achievement among Electrical Engineering undergraduates at Malaysia University of Technology. Pintrich and De Groot (1990) signified that self-efficacy of the students tend to strongly related to their academic achievement. The future educators who have high self-efficacy are more confident on own ability to excel in study, tend to exert effort and study confidently, hence, score better in academic achievement.

Table 6: Coefficients of relationship between self-efficacy and academic achievement

Self-efficacy	Academic achievement (<i>r</i>)
Pearson Correlation	.125*
Sig. (2-tailed)	.028
<i>n</i>	310

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

The results of Pearson correlation showed that there is a significant positive relationship between learning strategies and academic achievement ($r=.276$, $DF=308$, $p<.01$) (Table 7). The magnitude of the relationship is small (Cohen, 1988). Valle and colleagues (2008), Heikkilaa and Lonkab (2006), Lynch (2010) and Azlina (2007) also indicated that there is significant positive relationship between learning strategies and academic achievement among the undergraduates. Bail, Zhang, and Tachiyama (2008) stated that undergraduates who enrolled in self-regulated learning course have significantly higher academic achievement after the course compared to control group. Bandura (1997) stated that self-regulated learning is a basic element of academic

endeavor. The cognitive strategies seem to efficiently enhance the academic achievement of the students (Pintrich & DeGroot, 1990). According to Zimmerman (2002), self-regulated learning is important as when the student progress to higher level, the external support tends to lessen and whether the student succeed or not is dependent on self-regulatory processes. The extensive usage of learning strategies is correlated with high academic achievement might be due to the utilization of various learning strategies that assists future educators to understand better on particular topic, hence, score higher in academic achievement.

Regarding the subscales of learning strategies, the finding revealed that rehearsal, elaboration, organization, critical thinking, meta-cognitive self-regulation, time and study environment management and effort regulation is positively correlated with academic achievement (Table 7). The magnitude of relationship is small (Cohen, 1988). Lynch (2010) showed that elaboration, effort, critical thinking, meta-cognitive strategies and time and study environment management has significant correlation with final grades of undergraduates who enrolled in Physics at a university in New England. Radovan (2011) also found that effort regulation is positively related to course grade among the undergraduates. However, peers learning and help seeking are not significantly correlated with academic achievement. Ahmed (2008) revealed that there is no significant difference in peer learning and help-seeking among the high and low achieving undergraduates at Al-Hussein Bin Talal University in Jordan. Despite of future educators are encouraged to form study group and seek help from external environment, however, individual is unique and for some, they seem to excel and learn better by doing revision on their own and master certain topic through self-understanding and self-exploration.

Table 7: Coefficients of relationship between learning strategies and academic achievement

		Academic achievement (<i>r</i>)
Learning Strategies	Pearson Correlation	.276**
	Sig. (2-tailed)	.000
Rehearsal	Pearson Correlation	.129*
	Sig. (2-tailed)	.023
Elaboration	Pearson Correlation	.196**
	Sig. (2-tailed)	.000
Organization	Pearson Correlation	.270**
	Sig. (2-tailed)	.000

		Academic achievement (<i>r</i>)
Critical Thinking	Pearson Correlation	.169**
	Sig. (2-tailed)	.003
Meta-cognitive Self-Regulation	Pearson Correlation	.292**
	Sig. (2-tailed)	.000
Time and Study Environment Management	Pearson Correlation	.262**
	Sig. (2-tailed)	.000
Effort Regulation	Pearson Correlation	.287**
	Sig. (2-tailed)	.000
Peer Learning	Pearson Correlation	.000
	Sig. (2-tailed)	.996
Help Seeking	Pearson Correlation	.083
	Sig. (2-tailed)	.146

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

**. Correlation is significant at the 0.01 level (2-tailed).

The result of independent samples t-test indicated that there is no significant gender difference in self-efficacy. The mean score for male respondents is 5.45 and the standard deviation is 0.89 while the mean score for female respondents is 5.47 and the standard deviation is 0.86. The two-tail significance which is .857 indicates that $p > .05$ and, therefore, is not significant. Hence, there is no significant gender difference in self-efficacy, $t(308) = -0.180$, $p > .05$. Ergul (2004) and Yukselturk and Bulut (2009) imply that there is no significant gender difference in self-efficacy among the college and undergraduate students. The male and female future educators tend to have similar level of self-efficacy might be because of both gender seem to be treated equally since young, received the same education and mixed around in the school. Hence, they have equal beliefs regarding own ability to accomplish a learning task.

The result of independent samples t-test indicated that as a whole, there is no significant gender difference in learning strategies. The mean score for male respondents is 4.92 and the standard deviation is 0.65 while the mean score

for female respondents is 5.03 and the standard deviation is 0.61. The two-tail significance which is .197 indicates that $p > .05$ and, therefore, is not significant. Hence, as a whole, there is no significant gender difference in learning strategies, $t(308) = -1.294$, $p > .05$. Yukselturk and Bulut (2009) also showed that there is no significant gender differences self-regulated learning components among the students who enrolled in online Computer Programming course. The male and female future educators tend to have equal tendency of learning strategies might be because they are exposed to various learning strategies throughout the education course. Thus, they seem to practice the knowledge that they have learned, hence, have similar learning strategies.

There is significant gender difference in time and study environment management ($p < .05$) and effort regulation strategy ($p < .01$). For gender difference in time and study environment management, the mean score for male respondents is 4.62 and the standard deviation is 0.80 while the mean score for female respondents is 4.83 and the standard deviation is 0.77. The two-tail significance which is .038 indicates that $p < .05$ and, therefore, is significant. Hence, there is significant gender difference in time and study environment management, $t(308) = -2.085$, $p < .05$. For gender difference in effort regulation, the mean score for male respondents is 4.49 and the standard deviation is 0.85 while the mean score for female respondents is 4.78 and the standard deviation is 0.84. The two-tail significance which is .007 indicates that $p < .01$ and, therefore, is significant. Hence, there is significant gender difference in effort regulation, $t(308) = -2.711$, $p < .01$. The finding seems to favour female than male. This might be because female is trained to do house chores and take care of siblings since young, in which they learned to arrange their time effectively.

In term of theoretical significance, the study contributes to the body of knowledge by further confirming the relationship between self-efficacy, learning strategies and academic achievement among the undergraduates. The study also contributes to the body of knowledge in Malaysia as the researcher conducted the study among the undergraduates in local university. In term of practical significance, the Ministry of Education (MOE) will acknowledge the relationship between self-efficacy, self-regulated learning and academic achievement among the students in Malaysia. The MOE might instil and promote self-regulated learning among the students since young through the school curriculum.

CONCLUSION

The result showed that future educators seem to adopt more cognitive and meta-cognitive strategies compared to resource management strategies. There is significant positive relationship between self-efficacy, learning strategies and academic achievement. Gender does not have any significant differences in self-efficacy and learning strategies. However, gender have a significant difference

in time and study environment management and effort regulation strategy. The finding is based on responses made by future educators at UPM. Further studies shall be done using a wider sample of Malaysian students or future educator population in order to generalize the findings. Also, future research in Malaysia may investigate the impact of self-efficacy and learning strategies on academic achievement rather than merely determining relationship between the variables.

The institution of higher learning shall instil and promote self-regulated learning among the future educators through the courses offer. The learning setting needs to be more student-centred rather than teacher-centred. The role of lecturer is merely as facilitator that guides the future educators. Throughout teacher education training programme, the future educators need to set their own learning goals, involve in group discussions and complete the assignments which require critical analysis instead of merely convergent kinds of coursework. Also, the institution of higher learning may conduct campaigns which promote and enhance both self-efficacy and learning strategies among the future educators.

The future educators may learn to monitor and enhance the self-efficacy of oneself from time to time, set proper learning goals, regularly monitor own progress and wisely utilize the learning strategies throughout the learning process. They shall learn to be active learners who always actively participate in the learning process. They may also participate in workshops that enhance their self-efficacy and learning strategies or seek professional guidance from counsellor if they having difficulty to regulate themselves throughout the learning process. It is essential for the future educators to be self-regulated learners in order to be good role model and qualified to educate the young generation when they finish their studies and graduate.

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MENGESAN KEBERBEZAAN FUNGSI ITEM BAGI ITEM-ITEM UJIAN PENCAPAIAN PRINSIP PERAKAUNAN TINGKATAN EMPAT DI NEGERI PERAK

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ABSTRAK

Kajian ini bertujuan mengesan keberbezaan fungsi item (*Differential Item Functioning, DIF*) bagi item-item ujian pencapaian Prinsip Perakaunan Tingkatan Empat di negeri Perak. Instrumen kajian merupakan satu set ujian pencapaian mata pelajaran Prinsip Perakaunan yang mengandungi 40 soalan aneka pilihan dengan empat fungsi pengganggu. Sampel kajian terdiri daripada 1000 orang pelajar dari 20 buah sekolah negeri Perak. Analisis data telah dijalankan dengan menggunakan Program Winsteps, Microsoft Excel, dan SPSS. Kaedah yang digunakan untuk mengesan DIF ialah analisa statistik menggunakan nilai $t \geq \pm 1.96$ pada $p = .05$. Saiz DIF ditentukan melalui nilai DIF Contrast $\pm .5$. Data dianalisis dan dapatan kajian menunjukkan: (1) Item-item di dalam ujian pencapaian Prinsip Perakaunan Tingkatan 4 menunjukkan 17 item sebagai item suspek DIF. Berdasarkan Nilai DIF Contrast, tiada item yang disahkan mempunyai saiz DIF yang besar dan boleh diabaikan; (2) Item-item di dalam ujian pencapaian Prinsip Perakaunan Tingkatan 4 menunjukkan lapan item sebagai item suspek DIF terhadap jantina. Berdasarkan nilai DIF Contrast, tiada item yang disahkan mempunyai saiz DIF yang besar dan boleh diabaikan. Gambaran yang komprehensif berasaskan maklumat perbezaan prestasi pelajar dengan item-item yang dikaji menunjukkan item tiada kesan DIF yang nyata.

Kata Kunci: *Differential Item Functioning (DIF)*; Prinsip Perakaunan; Program Winsteps

PENGENALAN

Mata pelajaran Prinsip Perakaunan mendukung matlamat Falsafah Pendidikan Kebangsaan dalam melahirkan individu yang mempunyai akauntabiliti, berfikiran kritikal dan reflektif, mengamalkan budaya kerja yang beretika, berkemahiran dalam teknologi maklumat, membudayakan pembelajaran sepanjang hayat, mempunyai kemahiran komunikasi yang baik melalui pendekatan pembelajaran bermakna dan kesepaduan teori serta amalan perakaunan (Bahagian Pembangunan Kurikulum, 2015). Kurikulum pendidikan perakaunan kita memikul arah tuju dan objektif yang jelas dan unggul, selaras dengan matlamat Falsafah Pendidikan Kebangsaan (FPK) dalam menghadapi era globalisasi abad ke-21 yang semakin mencabar (Bahagian Pembangunan Kurikulum, 2015). Segala pengetahuan dan kemahiran semasa ini boleh diperoleh di peringkat sekolah agar memastikan individu mendapatkan peluang pekerjaan yang lebih luas dan baik (Hanushek & Kimko, 2000). Sehubungan itu, mata pelajaran Prinsip Perakaunan adalah induk kepada sistem pendidikan kita, iaitu amalan pengajaran dan pembelajaran mata pelajaran ini patutlah lebih mementingkan aspek penyediaan pelajar yang peka dan kritikal kepada perubahan global, terutamanya dalam bidang perdagangan dan ekonomi, agar berupaya menjadi tenaga kerja yang setanding dengan ekspektasi taraf antarabangsa dalam semua bidang kerjaya. Ekoran daripada itu, dapat melahirkan tenaga buruh yang berkemahiran tinggi atau professional (Bahagian Pembangunan Kurikulum, 2015).

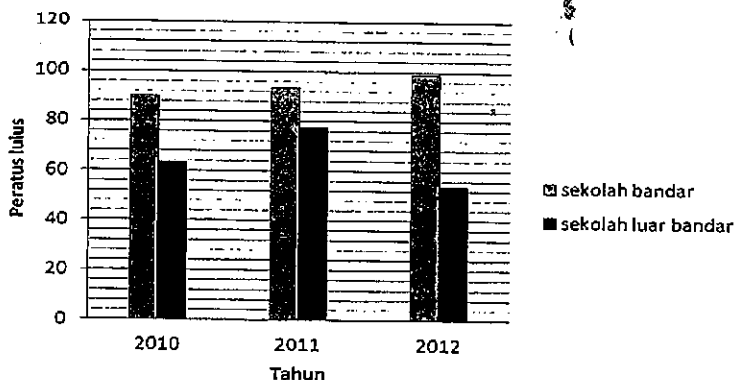
Dalam bidang pendidikan, ujian pencapaian mengukur tingkah laku pengajaran dan pembelajaran kognitif, afektif, dan psikomotor (Siti Rahayah Ariffin, 2003). Secara khususnya, ujian pencapaian diadakan untuk menilai prestasi dan kemampuan pelajar dalam sesuatu bidang. Ujian pencapaian untuk penguasaan pengetahuan sesuatu mata pelajaran seperti Prinsip Perakaunan diadakan untuk mengukur kebolehan pelajar dalam mata pelajaran tersebut (Zuraini et al., 2009). Selain itu, ujian pencapaian piawai diadakan secara selaras di seluruh negara iaitu peperiksaan Sijil Pelajaran Malaysia (SPM) meliputi sukatan kandungan Tingkatan Empat dan Lima. Ujian ini yang menentukan takdir pelajar di Malaysia untuk menempatkan pelajar meneruskan penerokaan pendidikan lanjutan ke institusi pengajian tinggi demi melayakkan diri sebagai tenaga kerja yang berkemahiran tinggi atau profesional. Maksy dan Lin Zheng, (2008) telah mendapati bahawa gred yang dijangka akan didapati oleh pelajar dalam ujian pencapaian mempunyai hubungan yang signifikan ke atas performa mereka.

Berikutan itu, pengukuran yang berkualiti dalam mengukur pencapaian pelajar diperlukan khususnya dalam peperiksaan awam. Oleh itu, untuk memastikan bahawa item-item yang terdapat dalam sesuatu ujian tidak memihak kepada pihak yang tertentu perlu dititikberatkan. Kemungkinan boleh berlaku keadaan di mana sesetengah item dalam ujian menunjukkan '*Differential Item Functioning*' (DIF) iaitu item berfungsi berbeza-beza terhadap sesuatu

kumpulan (Ercikan, 2002). Perbezaan ini menunjukkan pelajar-pelajar yang mempunyai kebolehan yang sama, tetapi daripada kelompok kumpulan yang berlainan mempunyai kebarangkalian yang berbeza untuk mendapat jawapan yang betul (Linarce, 2013). Dengan ini, pembinaan kertas soalan untuk ujian tersebut perlu berkualiti dan adil untuk semua pelajar di Malaysia.

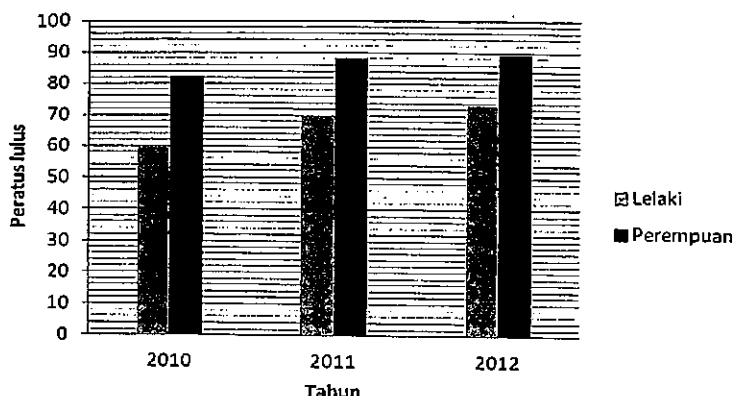
Pernyataan Masalah

Laporan Lembaga Peperiksaan Malaysia (2013) melaporkan bahawa kelulusan peperiksaan SPM mencatatkan peratus kelulusan dari segi lokasi iaitu kawasan bandar dengan luar bandar yang tidak seimbang. Perbezaan yang sangat ketara hasil daripada keputusan SPM mata pelajaran Prinsip Perakaunan bagi negeri Perak dari tahun 2010 hingga 2012 berdasarkan sekolah bandar dan luar bandar (Lembaga Peperiksaan Malaysia, 2013) ditunjukkan dalam Rajah 1. Keputusan sepuluh buah sekolah di bandar dan sepuluh buah sekolah di luar bandar dibandingkan dalam Rajah 1.



Rajah 1: Peratus Kelulusan Mata Pelajaran Prinsip Perakaunan Mengikut Lokasi di Perak. (Lembaga Peperiksaan Malaysia, 2013)

Pada tahun 2010, sekolah di bandar mencatatkan peratus kelulusan sebanyak 89.94% berbanding sekolah di luar bandar dengan peratus kelulusan 63.37%. Pada tahun berikutnya sekolah bandar mencatatkan keputusan yang lebih tinggi (93.36%) berbanding sekolah di luar bandar (77.43%). Pada tahun 2012, sekali lagi sekolah di bandar mendahului sekolah di luar bandar dengan perbezaan peratus kelulusan yang tinggi sebanyak 44.97%. Perbezaan peratus kelulusan yang sangat ketara antara sekolah bandar dengan sekolah luar bandar ini perlu diteliti.



Rajah 2: Peratus Kelulusan Mata Pelajaran Prinsip Perakaunan SPM Mengikut Jantina di Perak. (Lembaga Peperiksaan Malaysia, 2013)

Rajah 2 pula menunjukkan data peratus kelulusan mata pelajaran (Prinsip Perakaunan SPM yang berdasarkan jantina yang dikeluarkan oleh Lembaga Peperiksaan Malaysia (2013) untuk negeri Perak. Pada tahun 2010, peratus kelulusan pelajar lelaki adalah 59.9% berbanding dengan peratus kelulusan pelajar perempuan adalah 82.3%. Pada tahun 2011 pula, peratus kelulusan pelajar lelaki adalah 69.9% dan 87.8% bagi pelajar perempuan. Seterusnya pada tahun 2012, peratus kelulusan pelajar lelaki menunjukkan 73.4% dan pelajar perempuan ialah 89.1%. Perbezaan pencapaian yang jelas antara lelaki dengan perempuan dapat dilihat. Kenapakah keadaan ini berlaku berdasarkan bukti analisa hasil keputusan SPM 3 tahun berturut-turut seperti dilaporkan?

Terdapat banyak faktor DIF menyumbang dan mempengaruhi tahap pencapaian pelajar (Nworgu, 2011). Dua faktor utama yang menyumbang kepada perbezaan pencapaian ialah faktor jantina dan lokasi. Doran and Holland (1993) telah mengkaji hubungan pencapaian dalam Ujian Pencapaian Prinsip Perakaunan dengan jantina dan mendapati pencapaian pelajar perempuan dalam Prinsip Perakaunan adalah lebih menonjol. Selain itu, Ogebor (2012) juga menyatakan wujudnya item yang berfungsi berbeza-beza mengikut lokasi sekolah dalam ujian pencapaian ekonomi (NECO) dan berpihak kepada pelajar bandar.

Terdapat banyak kajian telah dijalankan bagi mata pelajaran sains dan matematik tentang isu DIF tetapi kurang kajian tentang isu ini dalam mata pelajaran Prinsip Perakaunan (Tho, 1994). Selain itu, menurut Boyd, Boyd, & Boyd (2000), kaum wanita lebih mendominasi pekerjaan dalam bidang perakaunan. Daripada masalah-masalah yang dikenalpasti, kajian ini telah mengesan DIF item dalam ujian pencapaian mata pelajaran Prinsip Perakaunan. Antara isu penting yang hendak dikaji ialah adakah item yang digunakan benar-benar berfungsi secara berbeza. Item ujian perlu diuji agar tidak berfungsi secara berbeza-beza terhadap jantina dan lokasi sekolah agar keadilan sosial terjamin.

Objektif Kajian

Kajian ini dijalankan untuk:

- Mengesan DIF item-item dalam ujian pencapaian mata pelajaran Prinsip Perakaunan Tingkatan Empat terhadap pelajar-pelajar luar bandar berbanding pelajar-pelajar bandar.
- Mengesan DIF item-item dalam ujian pencapaian mata pelajaran Prinsip Perakaunan Tingkatan Empat terhadap pelajar-pelajar lelaki berbanding pelajar-pelajar perempuan.

SOROTAN KAJIAN

Keberbezaan Fungsi Item (*Differential Item Functioning*)

Analisa DIF merujuk kepada kaedah yang lazimnya digunakan untuk menyemak jika sesebuah ujian berat sebelah kepada kumpulan yang diberikan (Camili & Shepard, 1994). Selain itu, DIF merujuk kepada satu set teknik statistik untuk menyemak atau menguji perbezaan prestasi antara kumpulan pelajar terhadap respons item yang diberikan selepas mengawal trait atau ciri-ciri yang diakses (Scherbaum & Goldstein, 2008). Apabila individu daripada kumpulan yang berbeza dengan ciri-ciri yang sama mempunyai kebarangkalian menjawab betul yang sama menghasilkan kesan impak item di mana item tersebut berpihak kepada pelajar dengan kebarangkalian yang tinggi menjawab betul, DIF akan wujud.

DIF yang merujuk kepada bias statistik di mana satu atau lebih parameter daripada modal statistik tersebut disalahtafsirkan atau lebih tafsir (Camili, 2006; Wiberg, 2007). Apabila DIF wujud dalam sesuatu item, punca varians ini perlu dikaji agar tidak berat sebelah (Hossein Karami, 2012). Kehingaran dalam varians (*construct- irrelevant variance*) berpunca daripada faktor kumpulan pelajar diuji. Dalam kajian DIF, terdapat dua kumpulan yang terdiri daripada kumpulan fokal dan kumpulan rujukan. Kumpulan fokal merujuk kepada kumpulan minoriti umpamanya di mana berada dalam kumpulan kurang pencapaiannya. Kumpulan yang berpencapaian lebih baik ialah kumpulan rujukan (Hossein Karami, 2012).

Terdapat dua jenis DIF iaitu DIF seragam dan DIF bukan seragam. DIF seragam wujud apabila satu kumpulan pelajar sentiasa menunjukkan pencapaian yang baik berbanding kumpulan yang lain pada skala kemampuan yang berbeza-beza. DIF bukan seragam pula wujud apabila ahli dalam satu kumpulan menunjukkan kebolehan berbeza pada skala kemampuan yang sama dan wujudnya kesan interaksi antara kumpulan dan skala kemampuan.

Kriteria diperlukan apabila menyesuaikan responden pada skala kebolehan yang biasanya dipanggil '*latent trait*' atau konstruk terpendam. DIF boleh menjadi bukti bias jika dan banya jika faktor penyebab DIF tersebut tidak

relevan kepada konstruk diukur dalam ujian tersebut. Jika faktor itu sebahagian daripada konstruk, ia dikenali sebagai kesan impak item dan bukannya bias. Panel pakar perlu dirujuk agar kesahan kepada tafsiran lebih jitu.

Ujian Pencapaian Prinsip Perakaunan

Penilaian dalam pencapaian ujian Prinsip Perakaunan perlulah berterusan dan penting dalam memantau proses pembelajaran mata pelajaran ini (Marriot & Lau, 2008). Kajian oleh Tho (1994) telah menyiasat segala faktor-faktor yang menyebabkan perbezaan performa pencapaian dalam peperiksaan Prinsip Perakaunan pelajar di peringkat universiti kursus Perakaunan pengajian tinggi di Universiti Malaya. Menurut Tho (1994) ketiadaan penyelidikan di Malaysia yang diterbitkan dalam Prinsip Perakaunan menjadi perangsang utama kajian tentang ujian pencapaian Prinsip Perakaunan. Analisis regresi berganda menjelaskan 66% daripada variasi dalam pencapaian pelajar disumbangkan oleh gred dalam mata pelajaran matematik dan ekonomi sekolah menengah. Walau bagaimanapun, pembolehubah sosio-demografi jantina dan status kediaman tidak menyumbang kepada kepelbagaian dalam pencapaian pelajar.

Selain itu, kajian Koh dan Koh (2012) menjelaskan impak enam pembolehubah iaitu jantina, pengetahuan sedia ada akaun, aptitud terhadap akademik, latar belakang mata pelajaran matematik, pengalaman bekerja serta umur mempengaruhi pencapaian dalam ujian pencapaian Prinsip Perakaunan pelajar tahun 3 Sarjana Muda Perakaunan. Kajian ini melibatkan 526 sampel dan didapati pencapaian pelajar lelaki lebih menonjol berbanding pelajar perempuan dalam semua aspek kecemerlangan pencapaian akademik dalam subjek Perakaunan. Selain itu, pengaruh teori budaya perlu dipertimbangkan dalam mengukur pencapaian dalam Prinsip Perakaunan supaya pengukuran prestasi lebih baik (Gray, 2005).

Gallagher (2001) menyatakan perbezaan pencapaian di antara jantina disebabkan oleh interaksi faktor budaya dan sosial. Kajian oleh Jackling dan Anderson (1998), menjelaskan bahawa pencapaian pelajar perakaunan pelajar separuh masa lebih baik berbanding pelajar sepenuh masa. Dima dan Mbekomize (2013) pula mendapati pelajar perempuan lebih tinggi pencapaian berbanding pelajar lelaki kerana faktor sikap dan komitmen tinggi terhadap pencapaian Prinsip Perakaunan. Okafor dan Egbon (2011) menyatakan tiada perbezaan dalam pencapaian ujian Perakaunan di Nigeria. Ross (2009) bersependapat dengan Dima dan Mbekomize (2013) bahawa pelajar perempuan lebih tinggi pencapaian dalam ujian pencapaian Prinsip Perakaunan (CIMA) di Afrika. Brahmasrene dan Whitten (2001) pula melaporkan pelajar lelaki lebih tinggi pencapaian dalam ujian pencapaian Prinsip Perakaunan berbanding pelajar perempuan. Kajian longitudinal oleh Sheard (2009) pula mendapati pencapaian pelajar perempuan adalah lebih baik berbanding dengan pelajar lelaki dalam perakaunan di peringkat pengajian tinggi disebabkan komitmen dan sikap terhadap akademik.

Kerangka Teori

Teori yang digunakan untuk kajian ini ialah Teori Gerak Balas Item (*Item Response Theory - IRT*). Teori ini memberi penekanan kepada tingkah-laku individu apabila memberikan respons kepada item-item ujian. Konsep asas bagi pendekatan Teori Gerak Balas Item bergantung kepada item-item secara individu berbanding teori klasik yang bergantung kepada aggerat bagi respon-respon untuk item seperti markah ujian (Baker, 2001). Model Rasch satu parameter diaplikasikan untuk tujuan kajian ini yang mengandaikan semua item adalah mempunyai darjah diskriminasi yang sama serta item tidak dapat dijawab melalui tekaan (Angoff, 1993). Model Rasch ialah model matematik berdasarkan teori kebarangkalian. Keluk Ciri Item menyediakan kebarangkalian pelajar menjawab betul pada titik yang berbeza pada skala kecekapan yang sama memudahkan perbandingan di antara sub kumpulan dilakukan.

Fokus utama Teori Respons Item dalam mengesan DIF ialah parameter item dan Keluk Ciri Item (*Item Characteristic Curve - ICC*) seperti dicadangkan oleh Camilli dan Shepard (1994). Kaedah Teori Gerak Balas Item dalam mengesan DIF membenarkan pengesanan item-item ujian yang tidak berfungsi serupa bagi kumpulan pelajar yang berlainan melalui perbandingan Keluk Ciri Item. DIF disyaki wujud apabila Keluk Ciri Item bagi item yang sama berbeza-beza untuk dua kumpulan yang dibandingkan melebihi ralat persampelan. Sebelum memulakan analisis pengesanan DIF menggunakan Model Rasch, andaian dibuat bahawa semua item dalam ujian mematuhi kehendak model seperti unidimensional, berhierarki, linear dan objektif. Nilai kebolehppercayaan pengasingan item (*Item separation reliability*) mencapai nilai lebih daripada 0.90 dapat memenuhi ciri unidimensional. Item-item yang mempunyai nilai 'mean square' (MNSQ) bagi infit dan outfit mestilah dalam julat antara 0.7 hingga 1.3 logits. Item-item yang berada di luar julat ini berkemungkinan mengukur kebingaran yang tidak berkaitan dengan ujian. Keserasian dengan model diperolehi dengan nilai keserasian *chi-square* berdasarkan frekuensi yang diperhatikan atau dijangkakan untuk skor diperolehi (Orlando & Thissen, 2000).

Selepas menyemak keperluan model iaitu unidimensional dan keserasian dengan model, prosedur 'anchoring' atau meletakkan nilai pautan dilaksanakan. Prosedur ini penting untuk mengesan DIF bagi setiap item agar menghasilkan piawaian yang tinggi untuk perbandingan min antara kumpulan. Dengan ini, item-item tersebut akan mempunyai nilai min menghampiri 0 dan SD menghampiri 1 untuk dijadikan taburan normal iaitu $t(0,1)$. Satu translasi penting dalam menghasilkan satu asalan yang biasa kepada kedua-dua set item bagi menganggarkan kesukaran yang sama bagi perbandingan antara kumpulan.

Item-item peperiksaan Prinsip Perakaunan SPM menepati kehendak model agar sesuatu ujian atau pembolehubah adalah terbina daripada item-item yang mempunyai persamaan dari segi konstruk yang hendak diukur. Proses mengesan item-item yang berfungsi berbeza-beza bagi kumpulan berdasarkan

lokasi (bandar dan luar bandar) serta jantina (lelaki dan perempuan) adalah berdasarkan nilai pautan yang telah diletakkan sebelumnya. Kandungan ujian perlulah dianalisa dengan teliti berdasarkan sukatan pelajaran Prinsip Perakaunan terkini supaya tidak mempengaruhi pengesanan DIF (Lane, Wang, & Magone, 1996). Item yang berbentuk aneka pilihan lazimnya menggunakan jumlah skor diperolehi dalam ujian untuk menganggarkan skala kebolehan pelajar. Berdasarkan nilai $t \geq \pm 1.96$ kewujudan DIF dapat dikesan secara statistik.

Distribusi hipotetikal untuk kumpulan perbandingan diberikan pada skala kebolehan yang sama bagi setiap item memberikan bukti DIF bagi item tersebut. Perbezaan dalam pencapaian item diukur dengan membandingkan kebarangkalian menjawab betul merentasi pembolehubah dikehendaki dalam subpopulasi (Penfield & Lam, 2000). Skor yang diperolehi melambangkan pencapaian dalam Prinsip Perakaunan boleh digunakan sebagai pembolehubah yang dikehendaki dalam kajian. Perbezaan pencapaian yang dilihat pada parameter kesukaran item dalam Model Rasch diterjemahkan dalam bentuk gambarajah dengan memplotkan 'scatter plot' bagi sub-kumpulan lokasi dan jantina terlibat. Item-item yang mempunyai parameter kesukaran item melebihi ± 0.5 logit bagi setiap subkumpulan diperhatikan dan saiz DIF dapat dikesan. Dalam ujian pendidikan untuk pencapaian, item-item yang berbeza skala dalam sub kumpulan adalah dikatakan berfungsi berbeza-beza atau DIF kerana item didapati agak sukar bagi satu sub kumpulan berbanding sub kumpulan yang lain (Andrich, 1988). Aspek pembangunan item ujian pencapaian perlulah mengambil kira faktor kebebasan konstruk item, pentadbiran ujian yang teratur dan rubrik penskoran (Yen, 1993) agar kebebasan setempat lebih mantap.

METODOLOGI

Sebanyak 15 buah sekolah di luar bandar dan 5 buah sekolah di bandar sekitar Ipoh terlibat dengan kajian ini. Sampel yang terlibat dalam kajian terdiri daripada pelajar Tingkatan Empat yang mengambil Prinsip Perakaunan di sekolah-sekolah negeri Perak. Seramai 1000 sampel telah terlibat dalam kajian ini. Sampel-sampel yang dipilih terdiri daripada pelbagai kebolehan dan mengikuti pembelajaran mata pelajaran Prinsip Perakaunan yang sama. Taburan sampel mengikut jantina dan lokasi sekolah adalah seperti dalam Jadual 1.

Jadual 1: Taburan Sampel dalam Kajian

Demografi	Kategori	Frekuensi	Peratus(%)
Jantina	Lelaki	487	48.7
	Perempuan	513	51.3
Jenis sekolah	Luar Bandar	482	48.2
	Bandar	518	51.8

Pengkaji telah membina satu ujian pencapaian yang mengandungi 40 item pelbagai pilihan yang dipilih secara rawak daripada koleksi item kertas 1 Prinsip Perakaunan SPM daripada tahun 2005-2010. Menurut Bahagian Pembangunan Kurikulum (2015) ujian pencapaian kertas 1 Prinsip Perakaunan mengandungi aras kognitif pengetahuan, pemahaman dan aplikasi yang sesuai dengan pelajar Tingkatan Empat dan item-item disusun mengikut aras kesukaran bernisbah 6:3:1 (senang: sederhana:susah) (Lembaga Peperiksaan Malaysia, 2015). Tiga orang guru cemerlang dan pakar mata pelajaran Prinsip Perakaunan serta mempunyai pengalaman mengajar melebihi minima 10 tahun dirujuk untuk mendapatkan pengesahan aras kesukaran ini. Item-item dalam soalan Prinsip Perakaunan disusun dalam bentuk pendekatan pernyataan, diagramatik, pengiraan, situasi, penyelesaian masalah dan sebagainya berdasarkan Kurikulum Standard Prinsip Perakaunan. Ini kerana pelbagai bentuk item yang diutarakan sebagai memberi rangsangan minda kepada calon dan ia adalah mirip soalan peperiksaan SPM sebenar. Ia juga bertujuan untuk mendapatkan kesahan kandungan bagi ujian tersebut.

Item-item ini ditadbirkan kepada sampel dan dijawab dalam masa 1 jam 15 minit. Arahan dan prosedur pentadbiran ujian disediakan untuk memastikan ujian-ujian ditadbir dengan standard. Program analisis komputer Model Rasch: WINSTEPS digunakan untuk menganalisis data. Terlebih dahulu program ini mesti menentukan sama ada data ujian padan dengan Model Rasch (Andrich, 2004). Hasil ujian telah dianalisis menggunakan Model Pengukuran Rasch dan perisian WINSTEP serta laporan hasil kajian dilaporkan.

DAPATAN KAJIAN

Jadual 2 menunjukkan analisa DIF merentasi sekolah di bandar dan sekolah di luar bandar. Terdapat item-item yang dikesan mempunyai DIF bagi kumpulan pelajar di luar bandar dan bandar. Sebanyak 17 item didapati berfungsi secara berbeza mengikut lokasi sekolah. Item-item suspek DIF yang bertindak berbeza-beza ini ialah item 2, 3, 8, 9, 11, 13, 14, 16, 17, 19, 25, 26, 27, 28, 31, 32, dan 39. Item-item ini dilabelkan sebagai DIF kerana nilai $t \geq \pm 1.96$ pada aras $p=.05$. Linacre (2011) menyatakan bahawa item-item yang $t \geq \pm 1.96$ pada aras $p=.05$ merupakan item suspek DIF.

Jadual 2: Keberbezaan Fungsi Item antara Lokasi

Kumpulan (Bandar)	DIF Measure (Kesukaran item)	Kumpulan (Luar Bandar)	DIF Measure (Kesukaran item)	DIF Contrast (Saiz DIF)	Nilai t	No Item
B	0	L	-1	0	*3.66	2
B	0	L	0	0	*2.87	3

Kumpulan (Bandar)	DIF Measure (Kesukaran item)	Kumpulan (Luar Bandar)	DIF Measure (Kesukaran item)	DIF Contrast (Saiz DIF)	Nilai t	No Item
B	0	L	0	0	*3.68	8
B	1	L	0	0	*4.30	9
B	0	L	0	0	*3.59	11
B	0	L	0	0	*-2.63	13
B	0	L	0	0	*2.94	14
B	0	L	0	0	*-2.14	16
B	0	L	0	0	*3.57	17
B	0	L	0	0	*-2.68	19
B	0	L	0	0	*-3.30	25
B	0	L	0	0	*-2.20	26
B	0	L	0	0	*-3.88	27
B	0	L	0	0	*-3.50	28
B	0	L	0	0	*-4.15	31
B	0	L	0	0	*-2.33	32
B	0	L	1	0	*-2.84	39

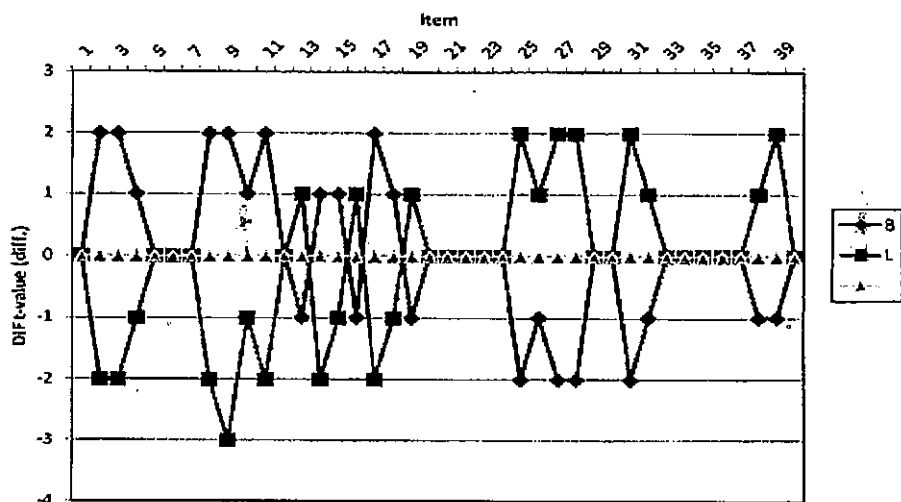
* Item DIF berdasarkan nilai $t \geq \pm 1.96$ pada $p = .05$

Jadual 3 menunjukkan item-item DIF mengikut lokasi sekolah bandar dan luar bandar. DIF measure merujuk kepada perbezaan signifikan antara dua nilai indeks kesukaran bagi dua kelompok atau kumpulan. Manakala DIF contrast merujuk kepada perbezaan antara indeks kesukaran item bagi setiap kelompok atau kumpulan. Ia adalah penting untuk mengesan peringkat pengesanan jurang perbezaan indeks kesukaran setiap item. *DIF measures* mengesahkan item berdasarkan anggaran kelompok pelajar sekolah luar bandar dan bandar. Lebih sukar sesuatu item untuk disahkan, lebih besar saiz *DIF Measure* (Linacre, 2011). Dalam kajian ini, *DIF contrast* semua item adalah sifar menunjukkan DIF yang dikesan boleh diabaikan. *DIF contrast* ialah ukuran perbezaan dalam DIF measure dua kelompok pelajar. Menurut Bond dan Fox (2007), DIF contrast yang berada di antara julat $\pm .5$ di antara kelompok pelajar merupakan item yang boleh diabaikan. Berdasarkan Jadual 2 didapati item 2 and item 39 lebih susah untuk pelajar luar bandar berbanding pelajar bandar. Item 9 lebih susah untuk pelajar bandar berbanding pelajar luar bandar.

Jadual 3: Item-item DIF mengikut Lokasi Sekolah Bandar dan Luar Bandar

Kelompok Pelajar	Item DIF	%
Luar Bandar	2,39	5

Rajah 3 menunjukkan plot kedudukan item yang dikesan sebagai DIF berdasarkan nilai $t \geq \pm 1.96$. Menurut Bond dan Fox (2007), DIF *contrast* yang melebihi $\pm .5$ di antara kelompok pelajar dibandingkan boleh dikatakan item yang sangat DIF. Secara kesimpulannya, sebanyak 17 item dikesan sebagai item DIF secara statistik tetapi berdasarkan nilai magnitud DIF *contrast* boleh dikatakan tiada item yang menyumbang kepada DIF secara membina.



Rajah 3: DIF lokasi

Jadual 4: Keberbezaan Fungsi Item antara Jantina

Kumpulan (Lelaki)	DIF Measure (Kesukaran item)	Kumpulan (Perempuan)	DIF Measure (Kesukaran item)	DIF Contrast (Saiz DIF)	Nilai t	No Item
L	0	P	0	0	*2.75	8
L	0	P	-1	0	*2.12	10
L	0	P	0	0	*1.96	12
L	0	P	0	0	*-2.71	17
L	1	P	1	0	*-2.13	20
L	0	P	0	0	*3.56	33
L	0	P	0	0	*-2.83	38
L	0	P	0	0	*-2.81	39

* Item DIF berdasarkan nilai $t \geq \pm 1.96$ pada $p=0.05$

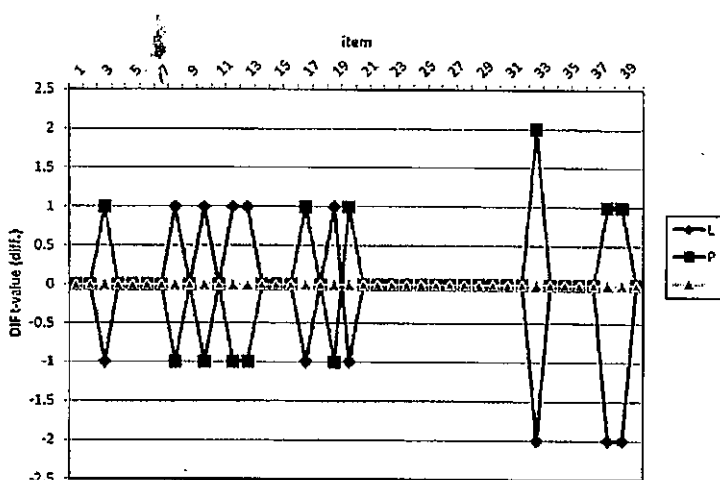
Analisis diteruskan dengan melihat keberbezaan fungsi item, DIF antara pelajar-pelajar lelaki dengan pelajar-pelajar perempuan untuk menjawab soalan kajian seterusnya. Item-item yang didapati berfungsi berbeza-beza kepada

39 berdasarkan Jadual 4. Item ini secara statistikalnya adalah item suspek DIF berdasarkan nilai $t \geq \pm 1.96$ pada aras $p=.05$. DIF contrast (saiz DIF) ialah sifar. Keputusan ini jelas menunjukkan DIF yang dikesan boleh diabaikan dan ujian pencapaian tersebut tidak memihak kepada lelaki atau perempuan.

Jadual 5: Item-item DIF mengikut Jantina

Kelompok Pelajar	Item DIF	%
Lelaki	-	0
Perempuan	10	2.5

Berdasarkan Jadual 5, didapati tiada item yang memihak kepada kelompok pelajar lelaki. Item 10 lebih susah untuk kelompok pelajar perempuan berbanding pelajar lelaki. Saiz DIF yang dikesan boleh diabaikan. Rajah 4 menunjukkan plot kedudukan item yang dikesan sebagai DIF berdasarkan nilai $t \geq 1.96$.



Rajah 4: DIF jantina

PERBINCANGAN DAN KESIMPULAN

Daripada analisis yang dijalankan didapati sebanyak 17 item suspek dalam ujian pencapaian ini berfungsi secara berbeza-beza mengikut faktor lokasi sekolah. Item-item 2, 3, 8, 9, 11, 13, 14, 16, 17, 19, 25, 26, 27, 28, 31, 32 dan 39 didapati berfungsi secara berbeza-beza dan menunjukkan keberbezaan fungsi item pada aras $p=.05$ dengan $t \geq \pm 1.96$. Walau bagaimanapun, berdasarkan nilai DIF contrast (± 0.5) menunjukkan saiz DIF yang boleh diabaikan di antara

kelompok pelajar bandar dan luar bandar. Didapati item 2 dan item 39 lebih sukar untuk pelajar luar bandar manakala item 9 lebih sukar kepada pelajar bandar berdasarkan nilai DIF measure yang dilaporkan.

Dapatan kajian ini selari dengan dapatan kajian oleh Ogbebor (2012) yang melaporkan bahawa terdapatnya item DIF yang dikesan secara statistik berdasarkan lokasi dalam Peperiksaan Awam tetapi saiz DIF yang dikesan boleh diabaikan kerana magnitudnya kecil. Menurut Roever (2005), mengenal pasti item yang berfungsi berbeza-beza mengikut kelompok pelajar merupakan langkah pertama mengesan item yang berat sebelah. Tambahan pula, kajian oleh Obe (1984), menunjukkan pencapaian pelajar di sekolah bandar lebih menonjol daripada sekolah di luar bandar kerana item lebih berpihak kepada mereka.

Daripada analisis yang dijalankan didapati sebanyak lapan item suspek DIF dalam ujian pencapaian ini berfungsi secara berbeza-beza mengikut faktor jantina. Item-item 8, 10, 12, 17, 20, 33, 38 dan 39 didapati berfungsi secara berbeza-beza dan menunjukkan keberbezaan fungsi item pada aras $p=0.05$ dengan $t \geq \pm 1.96$. Walaubagaimanapun, berdasarkan nilai DIF contrast (± 0.5) menunjukkan saiz DIF yang dikesan boleh diabaikan antara kelompok pelajar lelaki dan perempuan. Didapati item 10 lebih sukar untuk pelajar perempuan berbanding pelajar lelaki.

Dapatan soalan kajian ini selari dengan dengan dapatan kajian oleh Gierl, Khaliq, dan Boughton (1999) yang melaporkan tiada magnitud DIF yang besar yang dikesan berfungsi berbeza-beza dalam ujian aneka pilihan yang ditadbirnya. Ini bermaksud skor pelajar dalam ujian yang ditadbir ditentukan oleh kebolehan pelajar yang sama merentasi kumpulan jantina. Dapatan kajian ini selari juga dengan dapatan kajian oleh Parker (2005) yang melaporkan tiada magnitud saiz DIF yang besar dikesan dalam ujian pencapaian yang ditadbirnya di antara lelaki dan perempuan di negara Afrika dalam ujian pencapaian ekonomi.

Implikasi daripada kajian ini menyumbang kepada pengukuran pendidikan dalam mata pelajaran Prinsip Perakaunan. Dapatan kajian memberikan refleksi bahawa alat ukur yang digunakan menyumbang secara membina. Pencapaian dalam Prinsip Perakaunan perlu diberikan perhatian agar masa depan mata pelajaran ini lebih baik. Kajian ini akan menjadi panduan dan mendorong guru-guru semasa membuat kesimpulan berhubung item yang perlu diadakan dalam ujian pencapaian. Pemilihan item perlulah bersesuaian dengan segenap lapisan pelajar dalam pengujian. Item-item yang perlu diubahsuai atau disingkirkan sama sekali perlu dipertimbangkan agar penilaian melibatkan seluruh Malaysia adalah adil untuk semua pelajar.

Punca-punca item dalam ujian pencapaian yang memihak kepada pelajar lelaki atau perempuan perlu dikaji dan diperbetulkan. Item-item yang dikesan ini akan membantu penggubal item membina garis panduan agar item tersebut tidak diadakan dalam ujian pencapaian. Garis panduan bagi pembinaan item akan menghasilkan penilaian yang lebih adil dalam mengukur pencapaian

pelajar dalam Prinsip Perakaunan. Ujian pencapaian yang lebih bersifat objektif dapat dihasilkan.

Punca-punca item dalam ujian pencapaian yang memihak kepada pelajar sekolah luar bandar atau pelajar sekolah bandar perlu diperhalusi agar memotivasikan kedua-dua kelompok pelajar mengambil matapelajaran Prinsip Perakaunan. Tambahan pula, dalam kajian ini didapati banyak item yang secara statistik adalah item suspek DIF kepada kelompok pelajar berdasarkan lokasi. Proses membina ujian pencapaian oleh guru dalam mengukur pencapaian pelajar dalam Prinsip Perakaunan perlu diberikan perhatian agar ujian yang dibina benar-benar mengukur pencapaian pelajar. Guru-guru perlu lebih teliti dalam memilih item yang berkualiti dalam ujian pencapaian.

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PEMBELAJARAN TOPIK DUNIA MELALUI DERIA KITA MENERUSI PENDEKATAN KECERDASAN PELBAGAI

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ABSTRAK

Kajian ini bertujuan mengenal pasti pendekatan kecerdasan pelbagai terhadap pencapaian murid Tingkatan Dua dalam topik 'Dunia Melalui Deria Kita'. Sampel kajian adalah seramai 60 orang murid Tingkatan Dua iaitu seramai 30 orang murid bagi kumpulan eksperimen iaitu murid yang mengikuti rancangan pelajaran yang terancang berdasarkan pendekatan kecerdasan pelbagai dan 30 orang murid lagi bagi kumpulan kawalan yang mengikuti pengajaran secara konvensional. Untuk mengenal pasti kesan jenis pendekatan pengajaran terhadap pencapaian murid, ujian pra bagi topik 'Dunia Melalui Deria Kita' ditadbir sebelum rawatan dijalankan. Manakala, ujian pasca bagi topik yang sama pula ditadbir selepas rawatan dijalankan. Analisis data dilakukan dengan menggunakan Analisis Kovarians (ANCOVA). Dapatan kajian mendapati bahawa pendekatan kecerdasan pelbagai berkesan dalam meningkatkan pencapaian murid dalam topik 'Dunia Melalui Deria Kita'. Justeru, guru-guru disarankan untuk melaksanakan pengajaran Sains dengan mengambil kira kecerdasan murid yang pelbagai melalui pendekatan kecerdasan pelbagai.

Kata kunci: Kecerdasan pelbagai, pembelajaran Sains

PENGENALAN

Pendidikan sains merupakan satu cabang ilmu yang penting dalam perkembangan ekonomi dan pembangunan sesebuah negara. Justeru itu, banyak perubahan dan penambahbaikan yang berlaku dalam sistem pendidikan di Malaysia selari dengan kemajuan negara. Transformasi pendidikan yang dilakukan merupakan satu anjakan baru untuk melonjakkan sistem pendidikan setaraf dengan standard antarabangsa. Menurut Kementerian Pelajaran Malaysia (2012), kebimbangan terhadap pencapaian dibawah purata antarabangsa bagi mata pelajaran Matematik dan Sains dalam *Trends in International Mathematics and Science Study* (TIMSS) dan kegagalan mencapai tahap kemahiran minimum dalam pentaksiran *Programme for International Student Assessment* (PISA) menyebabkan banyak usaha pembaharuan yang dilakukan dalam pendidikan Sains bagi menekankan pembinaan kemahiran saintifik, literasi saintifik dan kemahiran berfikir aras tinggi mengikut Pelan Pembangunan Pendidikan Malaysia (PPPM).

Pendekatan Pelbagai Kecerdasan Untuk Pendemokrasian Pembelajaran Sains

Satu daripada aspirasi sistem PPPM adalah memberikan peluang pendidikan yang sama rata bagi membolehkan murid mencapai potensi masing-masing. Pelaksanaan kurikulum sains di sekolah boleh dijalankan menggunakan Teori Kecerdasan Pelbagai dalam proses pengajaran dan pembelajaran yang menekankan peluang kesamarataan untuk menonjolkan potensi diri pada pendekatan berbeza (Gardner, 1999). Melalui pengajaran berasaskan Teori Kecerdasan Pelbagai, proses pembelajaran berlaku mencakupi pelbagai jenis kecerdasan murid. Ini membantu guru dalam membuat keputusan pedagogi yang boleh menggalakkan manfaat pembelajaran sains diperolehi oleh setiap individu (Kaya, 2008). Pelbagai pilihan strategi pengajaran kecerdasan pelbagai dapat disesuaikan dengan keupayaan murid untuk terlibat dengan pembelajaran sains (Kaya, 2008). Kefahaman bahawa kecerdasan murid adalah pelbagai diterajui oleh Gardner (1983, 1999) yang mencadangkan lapan kecerdasan iaitu verbal linguistik, visual ruang, logik matematik, interpersonal, intrapersonal, kinestetik, muzik dan naturalis.

Menurut Hodson dan Reid (1988), pencapaian dalam mata pelajaran Sains dapat ditingkatkan sekiranya pendekatan kecerdasan pelbagai menjadi sebahagian daripada cara pemikiran dan pengetahuan guru dalam amalan pengajaran. Pada tahun 2011, Gangi menyarankan supaya guru diberikan panduan agar pengajaran yang dilaksanakan mencakupi kecerdasan pelajar yang pelbagai dan mempertimbangkan gaya pembelajaran murid apabila merancang suatu pengajaran (Dunn, 2000).

METODOLOGI

Tujuan kajian dijalankan adalah untuk mengenal pasti kesan pendekatan kecerdasan pelbagai terhadap pencapaian murid Tingkatan Dua dalam topik 'Dunia Melalui Deria Kita' setelah mengikuti pengajaran menggunakan pendekatan kecerdasan pelbagai berbanding pendekatan konvensional. Bagi pendekatan konvensional, strategi yang digunakan adalah bertumpu kepada penerangan, memberi kerja rumah dan latihan tubi (Armstrong, 2009) serta tumpuan perbincangan terhadap isi kandungan buku teks dan nota (Yap Wei Li, 2016). Reka bentuk kajian ini diwakili secara skematik, iaitu X_1 merupakan pendekatan kecerdasan pelbagai yang dilaksanakan pada kumpulan eksperimen, manakala X_2 merupakan pendekatan konvensional yang dilaksanakan pada kumpulan kawalan seperti yang ditunjukkan dalam Jadual 1. O_1 merupakan ujian pra bagi topik 'Dunia Melalui Deria Kita' dan O_2 mewakili ujian pasca bagi topik yang sama. Kedua-dua kumpulan menjalani ujian pra dan ujian pasca. Pengajaran Sains bagi kumpulan eksperimen telah dirancang oleh penyelidik dengan mengadaptasi Model Laluan Pemahaman (Baym, Viens & Slatin, 2005). Rawatan telah dijalankan terhadap sampel dalam tempoh sembilan minggu menggunakan rancangan pengajaran yang disediakan.

Jadual 1: Reka Bentuk Kajian

Kumpulan	Ujian Pra	Rawatan	Ujian Pasca
Kumpulan Eksperimen	O_1	X_1	O_2
Kumpulan Kawalan	O_1	X_2	O_2

Kumpulan eksperimen dan kumpulan kawalan adalah terdiri daripada murid-murid Tingkatan Dua. Jadual 2 menunjukkan pengagihan kumpulan berdasarkan kaedah pengajaran.

Jadual 2: Jumlah Murid Mengikut kaedah pengajaran

Kaedah Pengajaran	Murid (Sampel kajian)
Pendekatan Teori Kecerdasan Pelbagai	30
Pendekatan konvensional	30
Jumlah	60

Kaedah persampelan bertujuan digunakan dalam kajian ini. Menurut Chua (2011), persampelan bertujuan digunakan apabila sekumpulan subjek yang mempunyai ciri-ciri tertentu dipilih sebagai responden kajian. Dalam konteks kajian ini, sampel kajian yang dipilih adalah terdiri daripada murid-murid Tingkatan Dua yang mempunyai tahap pencapaian yang setara bagi mata pelajaran Sains iaitu merujuk kepada keputusan Ujian Pencapaian Sekolah Rendah (UPSR) murid-murid tersebut.

Selanjutnya, kesan pendekatan kecerdasan pelbagai pula diukur melalui pencapaian murid dalam topik 'Dunia Melalui Deria Kita'. Oleh itu, ujian pra dijalankan sebelum rawatan dan ujian pasca dijalankan selepas rawatan bagi mengukur pencapaian murid bagi topik 'Dunia Melalui Deria Kita'. Instrumen yang digunakan adalah ujian pencapaian 'Dunia Melalui Deria Kita' yang diadaptasi mengikut konstruk-konstruk yang ditaksir dalam kertas peperiksaan Sains Penilaian Menengah Rendah (PMR) dari tahun 2005 hingga tahun 2012. Pengesahan terhadap ujian pencapaian tersebut dilakukan oleh dua orang pakar.

Pelaksanaan Kecerdasan Pelbagai Untuk Pembelajaran Dunia Melalui Deria Kita

Pengajaran diintegrasikan dengan teori kecerdasan pelbagai dilaksanakan menggunakan Model Laluan Pemahaman yang dicadangkan oleh Baum dll. (2005) yang disesuaikan mengikut huraian sukatan pelajaran KBSM (Pusat Perkembangan Kurikulum, 2001) dan rancangan pengajaran tahunan. Model Laluan Pemahaman menekankan titik masuk pada awal pengajaran, dan titik keluar untuk menilai pemahaman murid. Titik masuk digunakan sebagai pendekatan untuk mencipta pelbagai cara untuk mendalami topik 'Dunia Melalui Deria Kita'. Tujuh titik masuk yang diperkenalkan oleh Baum dll. (2005) adalah naratif, kuantitatif, logik, estetik, eksistensial, pengalaman dan sosial. Titik keluar pula merupakan pemahaman murid yang diterjemahkan melalui prestasi tingkah laku, produk atau hasil tugasan. Tempoh rawatan adalah selama sembilan minggu.

i. Minggu pertama:

Pada minggu pertama pengajaran topik Dunia Melalui Deria Kita, objektif pembelajaran adalah memahami organ deria dan fungsinya. Titik masuk yang dilaksanakan adalah titik masuk naratif dengan melaksanakan aktiviti penyenaian A hingga Z. Titik masuk kedua yang digunakan adalah titik masuk pengalaman dan sosial dengan melaksanakan aktiviti permainan. Manakala titik keluar yang digunakan ialah menghasilkan folio yang bertajuk organ deria manusia. Kecerdasan yang dominan adalah kinestetik, interpersonal, verbal linguistik dan intrapersonal

ii. Minggu kedua:

Pada minggu kedua, objektif pembelajaran adalah memahami deria sentuhan. Titik masuk yang digunakan adalah titik masuk pengalaman dan sosial dengan melaksanakan aktiviti *hands on* iaitu murid mengkaji kepekaan kulit terhadap rangsangan pada bahagian badan terhadap rakan. Titik masuk kedua yang digunakan adalah estetik yang mana murid-murid melaksanakan aktiviti menyanyi dalam kumpulan berdasarkan puisi yang dibina mengikut rentak lagu. Manakala titik keluar yang digunakan ialah membuat persembahan *power point* bagi mempromosikan aktiviti Persatuan Braille Malaysia. Kecerdasan yang dominan adalah interpersonal, verbal linguistik dan muzik.

iii. Minggu ketiga:

Seterusnya pada minggu ketiga, objektif pembelajaran adalah memahami deria bau. Titik masuk yang digunakan adalah titik masuk naratif dan sosial dengan melaksanakan aktiviti menonton video berkaitan dengan hidung manusia seterusnya melengkapkan penulisan sesawang. Titik masuk kedua yang digunakan adalah titik masuk sosial dengan melaksanakan aktiviti nyanyian lagu Hidung Saya mengikut rentak lagu *Head and Shoulders, Knees and Toes*. Manakala titik keluar yang digunakan ialah membina sebuah model hidung manusia. Kecerdasan yang dominan adalah verbal linguistik, interpersonal dan muzik.

iv. Minggu keempat:

Pada minggu keempat, objektif pembelajaran adalah memahami deria rasa. Titik masuk yang digunakan adalah titik masuk pengalaman dan sosial dengan melaksanakan aktiviti *hands on* iaitu aktiviti mengesan kawasan berbeza pada lidah yang bergerak balas terhadap rasa yang berbeza dan menghubungkaitkan deria rasa dan deria bau. Titik masuk kedua yang digunakan adalah titik masuk kuantitatif dengan melaksanakan aktiviti membina carta palang melalui penggunaan program *Microsoft Excel*. Manakala titik keluar yang digunakan adalah menghasilkan sebuah poster berkaitan dengan deria rasa. Kecerdasan yang dominan adalah interpersonal, logik matematik dan visual ruang.

v. Minggu kelima:

Bagi minggu kelima, objektif pembelajaran adalah memahami deria pendengaran. Titik masuk yang dilaksanakan adalah titik masuk estetik dengan melaksanakan aktiviti melukis struktur telinga berdasarkan rajah yang tidak lengkap. Titik masuk yang digunakan adalah titik masuk pengalaman dan sosial dengan melaksanakan aktiviti di luar bilik darjah dengan meleret gegelung yang mewakili mekanisme pendengaran secara berkumpulan. Manakala titik keluar yang digunakan ialah menghasilkan sebuah rencana yang dilaporkan oleh seorang wartawan berkenaan dengan kisah anggota polis melatih anjing pengesan. Kecerdasan yang dominan adalah kinestetik, interpersonal, visual ruang dan verbal linguistik.

vi. Minggu keenam:

Pada minggu keenam, objektif pembelajaran adalah memahami deria penglihatan. Titik masuk yang digunakan adalah titik masuk sosial dengan melaksanakan aktiviti permainan berdasarkan *bingo*. Titik masuk kedua adalah titik masuk pengalaman dengan melaksanakan aktiviti membina *flipbook* yang membolehkan mekanisme pembentukan imej di dalam mata manusia dapat dilihat. Manakala titik keluar yang digunakan adalah menghasilkan sebuah model mata manusia. Kecerdasan yang dominan adalah visual ruang, intrapersonal dan verbal linguistik.

vii. Minggu ketujuh:

Pada minggu ketujuh, objektif pembelajaran adalah memahami cahaya dan penglihatan. Titik masuk pertama yang digunakan adalah titik masuk pengalaman dan kuantitatif dengan melaksanakan aktiviti *hands on* iaitu dengan menjalankan eksperimen bagi menentukan sifat-sifat cahaya. Titik masuk kedua adalah titik masuk pengalaman dengan melaksanakan aktiviti *hands on* iaitu mengkaji ilusi optik dan titik buta. Manakala titik keluar yang digunakan ialah menghasilkan sebuah poster berkaitan dengan kecacatan penglihatan dan penggunaan teknologi untuk membetulkannya. Kecerdasan yang dominan adalah kinestetik, logik matematik dan visual ruang.

viii. Minggu kelapan:

Pada minggu kelapan, objektif pembelajaran adalah memahami bunyi dan pendengaran. Titik masuk yang digunakan adalah titik masuk pengalaman dan sosial dengan melaksanakan aktiviti pendengaran stereofonik yang diperlukan bagi menentukan arah bunyi. Titik masuk kedua adalah titik masuk sosial dengan melaksanakan permainan teka silang kata dengan memecahkan kod berdasarkan kod karakter yang diberi. Manakala titik keluar yang digunakan ialah membina persembahan *power point* bertajuk kecacatan pendengaran dan cara merawatnya. Kecerdasan yang dominan adalah interpersonal, visual ruang, verbal linguistik dan interpersonal.

ix. Minggu kesembilan:

Pada minggu kesembilan, objektif pembelajaran yang terakhir adalah memahami rangsangan dan gerak balas tumbuhan. Titik masuk yang digunakan adalah titik masuk pengalaman dengan melaksanakan aktiviti mengkaji gerak balas tumbuhan. Titik masuk kedua adalah titik masuk eksistensial dengan melaksanakan aktiviti falsafah konsep iaitu mengkaji gerak balas tumbuhan terhasil. Titik keluar yang digunakan ialah mencipta risalah berkaitan dengan khasiat dan ciri-ciri pokok herba. Kecerdasan yang dominan adalah naturalis, intrapersonal dan visual ruang.

DAPATAN DAN PERBINCANGAN

Analisis Ujian t dijalankan untuk melihatsama ada ujian pra adalah berbeza secara signifikan atau tidak. Menurut Jadual 3, Ujian Levene menunjukkan $p = 0.142$ di mana $p > 0.05$. Maka varians kedua-dua sampel iaitu murid dalam kumpulan kawalan dan rawatan adalah setara. Bagi analisis terhadap ujian pra, keputusan ujian pada Jadual 4 menunjukkan min skor ujian pra murid kumpulan kawalan dalam sampel adalah (9.700) berbeza secara signifikan dengan min skor ujian pra murid kumpulan rawatan (6.333) dalam populasi $t(60) = 5.074$, $p < 0.05$. Daripada keputusan ini, hipotesis nol ditolak kerana $p < 0.05$. Maka, terdapat perbezaan yang signifikan dalam ujian pra bagi murid yang berada

dalam kumpulan kawalan dan murid yang berada dalam kumpulan rawatan. Perbezaan pada ujian pra memerlukan ujian Analisis Kovarians (ANCOVA) dijalankan.

Jadual 3: Keputusan ujian Levene

		Ujian Levene untuk kesamaan varians		Ujian t untuk kesamaan min						Perbezaan ralat standard	
		F	Sig	t	Darjah kebebasan	Sig	Beza min	Beza ralat standard		Bawah	Atas
Ujian pra	Varians sama diandaikan	2.217	0.142	5.074	58	0.00	3.36667	0.66347	2.03859	4.69474	
	Varians sama tidak diandaikan			5.074	53.251	0.000	3.36667	0.66347	2.03606	4.69727	

Jadual 4: Analisis Ujian Pra

		Pendekatan	N	Min	Sisihan piawai	Min ralat standard
Skor Ujian pra	Kawalan		30	9.7000	2.15198	0.39290
	Rawatan		30	6.3333	2.92826	0.53462

Melalui analisis ANCOVA satu hala, kesan pendekatan kecerdasan pelbagai terhadap pencapaian topik Dunia Melalui Deria Kita ke atas min skor pencapaian dapat ditentukan. Keputusan analisis ini ditunjukkan dalam Jadual 5. Hasil analisis ANCOVA satu hala ke atas data kajian ini menunjukkan nilai $F(1,57)=6.471$, Min Kuasa Dua Ralat=110.746 dan nilai $p=0.014$ ($p<0.05$). Ini menunjukkan perbezaan kesan pendekatan pengajaran adalah signifikan. Berdasarkan analisis ini, hipotesis nol 1 ditolak. Didapati juga daripada Jadual 5 bahawa pintasan adalah signifikan secara statistik. Kegagalan memenuhi andaian ini menunjukkan bahawa terdapat interaksi antara kovariat dan rawatan dan ujian pra tidak boleh digunakan sebagai kovariat.

Jadual 5: Keputusan ujian ANCOVA untuk min skor ujian pasca pencapaian topik Dunia Melalui Deria Kita

Sumber	Jumlah Kuasa Dua Jenis III	Darjah Kebebasan	Min kuasa Dua	F	Sig.	Saiz kesan
Model	201.145 ^a	2	100.573	5.877	0.005	0.171
Diperbetulkan						
Pintasan	519.003	1	519.003	30.328	0.000	0.347
Min skor ujian pra	188.995	1	188.995	11.044	0.002	0.162
Pendekatan	110.746	1	110.746	6.471	0.014	0.102
Ralat	975.438	57	17.113			
Jumlah	15437.000	60				
Jumlah diperbetulkan	1176.583	59				

a. R kuasa dua=.171 (R kuasa dua diubahsuai = .142)

Darjah kekuatan hubungan (*effect size*) antara pendekatan pengajaran dan min skor ujian pencapaian ditunjukkan oleh nilai saiz kesan separa. Nilai saiz kesan separa adalah kecil. Berdasarkan indeks darjah kekuatan hubungan yang dikemukakan oleh Green, Salkind & Akey (1997), hubungan antara pendekatan kecerdasan pelbagai dan min skor ujian pasca pencapaian adalah berada pada tahap yang rendah. Perbezaan dalam pendekatan pengajaran menjelaskan 10% daripada varians min skor ujian pasca, setelah min skor ujian pra dikawal secara statistik.

Jadual 6 menunjukkan min skor ujian pasca dianggarkan setelah min skor ujian pra dikawal bagi pendekatan teori kecerdasan pelbagai ($M=17.049$) adalah lebih tinggi daripada min skor ujian pasca bagi pengajaran konvensional ($M=13.784$). Dalam kajian ini pengajaran berasaskan kecerdasan pelbagai memberi kesan dalam meningkatkan pencapaian murid dalam topik 'Dunia Melalui Deria Kita' dalam kalangan pelajar Tingkatan Dua.

Jadual 6: Min skor ujian pasca pencapaian dan ralat piawai bagi pengajaran berasaskan Teori Kecerdasan Pelbagai dan pengajaran konvensional.

Pemboleh ubah Bersandar: Min Skor Ujian Pasca

Pendekatan pengajaran	Min	Ralat Piawai	Sela Keyakinan 95%	
			Had Bawah	Had Atas
Pendekatan kecerdasan pelbagai	17.049 ^a	0.835	15.377	18.721
Pendekatan konvensional	13.784 ^a	0.835	12.112	15.456

a. Dinilai berdasarkan kovariat dalam model: Min skor ujian pra = 8.0167.

Dapatan kajian menunjukkan min skor ujian pasca (pencapaian topik 'Dunia Melalui Deria Kita') bagi kumpulan eksperimen (pendekatan kecerdasan pelbagai) adalah lebih tinggi daripada min skor ujian pasca bagi kumpulan kawalan (konvensional). Ini bermakna murid yang mengikuti pengajaran dan pembelajaran yang menggunakan pendekatan kecerdasan pelbagai menunjukkan pencapaian yang lebih baik dalam min skor ujian pencapaian bagi topik 'Dunia Melalui Deria Kita' berbanding dengan murid yang mengikuti kaedah pengajaran konvensional. Oleh itu, didapati bahawa pengaplikasian pendekatan kecerdasan pelbagai dalam proses pengajaran dan pembelajaran berupaya meningkatkan pencapaian murid.

Dapatan kajian ini adalah selaras dengan penyelidikan oleh sarjana terdahulu seperti Sarrazine (2005), Ozdemir dll., (2006), Douglas dll., (2008), Gangi (2011) dan Saban (2011) yang menunjukkan kelebihan pendekatan kecerdasan pelbagai berbanding kaedah pengajaran konvensional terhadap pencapaian Sains. Hal ini menunjukkan pendekatan kecerdasan pelbagai strategi yang dijalankan memberi peluang kepada murid untuk memahami pelajaran secara mendalam (Thompson & MacDougall, 2002; Yetisir, 2014). Pendekatan kecerdasan pelbagai juga membolehkan pengekalan terhadap pengetahuan murid dalam mata pelajaran Sains (Ozdemir, Guneyisu & Tekkaya, 2006). Selain itu, kecerdasan pelbagai berupaya mengembangkan potensi bakat yang sedia ada (Fleetham, 2006) yang dapat membantu murid untuk menyesuaikan diri dengan persekitaran mengikut kebolehan dan kecenderungan dan seterusnya mencapai kejayaan bukan sahaja dalam bidang akademik malahan juga dalam kehidupannya (Reinhartz & Beach, 1998; Wiles & Bondi, 1998).

Justeru, pendekatan kecerdasan pelbagai seharusnya dijadikan alat untuk memenuhi kekuatan intelektual murid yang berbeza. Malah, teori kecerdasan pelbagai mewakili falsafah untuk memupuk pembelajaran aktif, pembelajaran berpusatkan murid dan mengakui kognitif profil unik setiap murid. Pendekatan kecerdasan pelbagai yang ideal adalah kaya dengan pengalaman dan kerjasama dalam menyediakan konteks untuk murid menyedari kebijaksanaan, pembinaan peraturan sendiri, dan melibatkan diri secara aktif dalam pembelajaran (Moran Kornhaber & Gardner, 2006). Melalui gabungan kecerdasan dalam strategi pengajaran, guru dapat meningkatkan suasana persekitaran pembelajaran dan inovasi merentasi kurikulum. Dengan mengintegrasikan elemen kecerdasan pelbagai dalam pengajaran dan pembelajaran, guru-guru dapat memilih kaedah yang bersesuaian dengan gaya pengajaran mereka sendiri (Armstrong, 1994) yang mana pelaksanaannya adalah fleksibel (Lockwood, 1993).

Keputusan kajian ini bersetuju dengan dapatan kajian yang menjamin keupayaan pendekatan Teori Kecerdasan Pelbagai dalam meningkatkan pencapaian murid yang menjadi sebahagian daripada cara pemikiran dan pengetahuan guru dalam amalan pengajaran (Hodson dan Reid, 1988). Dapatan kajian juga menyalin semula keputusan kajian yang diperolehi daripada Sarrazine (2005), Gangi (2011), Douglas, Burton dan Reese-Durham (2008), Ozdemir dll., (2006) dan Saban (2011) yang telah menunjukkan

kelebihan pendekatan Teori Kecerdasan Pelbagai terhadap kaedah pengajaran konvensional terhadap pencapaian sains. Kajian ini membuktikan bahawa murid yang mengikuti pendekatan Teori Kecerdasan Pelbagai strategi yang dijalankan memberi peluang kepada murid untuk memahami pelajaran secara mendalam (Yetisir, 2014; Thompson & MacDougall, 2002) berbanding murid yang tidak mengikuti pengajaran yang sama. Pendekatan Teori Kecerdasan Pelbagai turut membolehkan pengekalan terhadap pengetahuan murid dalam Sains (Ozdemir dll., 2006) dalam pelbagai cara atas dasar pelbagai jenis kecerdasan yang terlibat (Hand, Wallace & Yang, 2004). Teori Kecerdasan Pelbagai menawarkan murid mengembangkan potensi bakat yang ada (Fleetham, 2006) seterusnya membantu pelajar menyesuaikan diri dengan persekitaran mengikut kebolehan dan kecenderungannya, mencapai kejayaan bukan sahaja dalam akademik bahkan dalam kehidupan serta membolehkan murid bersedia untuk berfungsi dalam masyarakat (Reinhartz & Beach, 1998; Wiles & Bondi, 1998).

Justeru, pendekatan Teori Kecerdasan Pelbagai melalui Model Laluan Pemahaman (Baum dll., 2005) boleh dijadikan sebagai alat untuk guru-guru sains mengadaptasi setiap topik dalam kurikulum sains bagi untuk memenuhi kekuatan intelektual pelajar yang berbeza. Tambahan pula, Teori Kecerdasan Pelbagai mewakili pendirian falsafah untuk memupuk pembelajaran aktif, pembelajaran berpusatkan murid dan mengakui kognitif profil unik setiap murid. Pendekatan kecerdasan pelbagai yang ideal adalah kaya dengan pengalaman dan kerjasama dalam menyediakan konteks untuk murid menyedari kebijaksanaan, pembinaan peraturan sendiri, dan melibatkan diri secara aktif dalam pembelajaran (Moran dll., 2006). Melalui gabungan kecerdasan dalam strategi pengajaran, guru dapat meningkatkan suasana persekitaran pembelajaran dan inovasi merentasi kurikulum. Dengan mengintegrasikan elemen kecerdasan pelbagai dalam pengajaran dan pembelajaran, guru-guru boleh memilih dengan cara yang sesuai dengan gaya pengajaran mereka sendiri yang unik dan selari dengan dasar pendidikan (Armstrong, 1994) yang mana pelaksanaannya adalah fleksibel (Lockwood, 1993).

KESIMPULAN

Berdasarkan dapatan kajian, pendekatan kecerdasan pelbagai berupaya meningkatkan pencapaian murid Tingkatan Dua dalam topik 'Dunia Melalui Deria Kita' berbanding kaedah pengajaran konvensional. Menurut Saban (2001), pendekatan pengajaran berasaskan kecerdasan pelbagai dapat membantu membawa kepada pencapaian matlamat Pelan Pembangunan Pendidikan Malaysia sekiranya Teori Kecerdasan Pelbagai diterima sebagai falsafah pengajaran. Pendekatan yang berbeza bagi setiap pengajaran memahirkkan guru untuk membina pengetahuan murid sekaligus menambahkan pengetahuan guru. Ini kerana setiap murid adalah unik dan guru perlu memupuk minat murid terhadap Sains berdasarkan kecerdasan dominan bagi setiap aktiviti yang dilaksanakan.

Secara tidak langsung dapat melibatkan murid secara aktif dalam pembelajaran berbanding pengajaran konvensional yang mana hanya kecerdasan verbal linguistik dan kecerdasan logik matematik sahaja yang mendominasi pengajaran (Ozdemir dll., 2006). Pengajaran berasaskan pendekatan kecerdasan pelbagai memberi peluang kepada murid mengembangkan potensi diri, meningkatkan keyakinan untuk menyumbangkan pendapat, dapat berfikir secara kreatif dan kritis serta dapat mengaplikasikan pengetahuan yang diperolehi dalam dunia sebenar. Sekaligus menyokong hasrat Falsafah Pendidikan Kebangsaan bagi mengembangkan potensi individu secara menyeluruh.

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PENILAIAN KOSWER MULTIMEDIA INTERAKTIF DENGAN PENDEKATAN KOPERATIF MASTERI DALAM MENINGKATKAN PENCAPAIAN RESPIRASI SEL

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ABSTRAK

Kajian ini dijalankan bagi melihat keberkesanan koswer multimedia interaktif bagi topik Respirasi Sel peringkat Matrikulasi terhadap skor pencapaian pemikiran aras tinggi (HOT). Satu koswer multimedia interaktif telah dibangunkan dan diaplikasikan melalui strategi yang dinamakan Pembelajaran Masteri berbantuan Multimedia (PMM) dan Pembelajaran Koperatif Masteri berbantuan Multimedia (PKMM). Pendekatan PMM melibatkan penggunaan koswer yang disematkan komponen-komponen masteri di dalamnya dan dijalankan melalui pembelajaran individu sementara PKMM dilaksanakan secara pembelajaran berkumpulan. Pembolehubah tidak bersandar adalah koswer multimedia interaktif dengan strategi PMM dan PKMM. Manakala pembolehubah bersandar yang dikaji ialah skor pencapaian ujian pra dan ujian pasca Respirasi Sel yang mengukur kesemua domain kognitif taksonomi Bloom baharu (mengingat, memahami, mengaplikasi, menganalisis, menilai dan mencipta). Kajian eksperimental kuasi digunakan dengan melibatkan 145 pelajar. Ujian ANCOVA satu hala dilakukan terhadap skor ujian pasca respirasi sel. Hasil analisis kajian ini mendapati pelajar yang melalui PKMM memperoleh pencapaian skor pencapaian lebih baik secara signifikan berbanding PMM. Hal ini dapat dijelaskan bahawa komponen-komponen pembelajaran masteri yang dipersembahkan melalui elemen animasi grafik dan teks telah memainkan peranan penting dalam mengstruktur langkah-langkah pengajaran yang lebih sistematik sebagai panduan kepada pelajar. Kombinasi pembelajaran koperatif pula telah mengukuhkan lagi peranan pembelajaran masteri untuk menguasai pembelajaran secara bersepadu.

Kata Kunci: Pembelajaran Koperatif Masteri, Koswer Multimedia Interaktif, Pembelajaran Respirasi Sel

PENGENALAN

Pengajaran dan pembelajaran Sains secara global telah mula dititikberatkan sejak dari awal kurun ke 19 dan mendapat perhatian para pendidik, penggubal dasar negara dan masyarakat sejagat keseluruhannya. Kepentingan pendidikan Sains menjadi kunci kepada perkembangan kehidupan masyarakat yang lebih progresif dan maju. Penguasaan bidang Sains dan Teknologi oleh pelajar merupakan tunjang kepada pembangunan yang berterusan dalam zaman yang mencabar dan amat kompetitif ini (Dow, 2006). Kini cabaran pendidikan Sains abad ke-21, semakin memberi tumpuan kepada pemikiran peringkat tinggi sebagai jangkaan hasil pembelajaran (Osborne, 2013). Cabaran itu diterjemahkan oleh Perdana Menteri keenam, Dato' Seri Mohd. Najib Tun Haji Abdul Razak dalam Pelan Pembangunan Pendidikan Malaysia 2013-2025 yang menggariskan sebelas anjakan strategik dan operasi untuk mengubah sistem pendidikan negara. Salah satu anjakan penting ialah memanfaatkan teknologi komunikasi dan maklumat untuk meningkatkan kualiti pembelajaran Sains di seluruh Malaysia. Justeru, penekanan terhadap Sains dan teknologi menjadi batu loncatan kepada kelangsungan teknologi multimedia dalam melonjakkan kualiti sistem pengajaran dan pembelajaran Sains di institusi-institusi pendidikan negara.

Kepentingan pendidikan Sains dalam memacu negara ke arah yang lebih maju dan sofistikated dapat direalisasikan dengan melahirkan pelajar-pelajar yang berkualiti di peringkat institusi pengajian tinggi (IPT). Bahagian Matrikulasi Kementerian Pelajaran Malaysia (BMKPM) telah diberikan tanggungjawab untuk menaik taraf pendidikan Sains terutamanya kepada golongan bumiputera selaras dengan matlamat penubuhannya secara rasmi pada 10 Mac 1999. Penubuhan Kolej Matrikulasi seluruh Malaysia di bawah kendalian BMKPM menyediakan pendidikan pra-universiti kepada pelajar – pelajar bumiputera dan bukan bumiputera lepasan Sijil Pelajaran Malaysia sebelum meneruskan pengajian di peringkat ijazah. Walau bagaimanapun kualiti keluaran pelajar-pelajar program Matrikulasi sering menjadi isu hangat masyarakat setempat dan buah mulut pensyarah-pensyarah institusi awam dan swasta (IPPTN, 2004). Oleh yang demikian pensyarah Matrikulasi memainkan peranan yang amat besar untuk mempelbagaikan kaedah pengajaran dengan menggunakan kecanggihan teknologi pendidikan mengikut strategi pembelajaran yang boleh diterima pakai oleh pelajar-pelajar.

Latar Belakang

Intervensi pembelajaran yang tidak berkesan secara langsung atau tidak akan menjejaskan pencapaian akademik terutamanya bagi subjek Sains. Proses pembelajaran pelajar akan berlaku dengan efektif dan berkesan apabila seorang pendidik merancang dan mempraktikkan aktiviti pengajaran dan pembelajaran yang menarik dengan mengambil kira tahap kebolehan pelajar. Strategi yang

bersesuaian amat penting untuk memastikan hasil pembelajaran yang maksimum dicapai. Pelbagai strategi pengajaran dan pembelajaran diketengahkan oleh pakar-pakar pendidik. Salah satu instruksi pengajaran yang terbukti berjaya diimplementasikan ialah pembelajaran berasaskan masteri (Guskey, 1997; Kulik et al., 1990). Bloom (1968) kemudian memperjelaskan dan membina model pembelajaran masteri yang mengandungi empat komponen iaitu (1) matlamat dan objektif pembelajaran, (2) bahan pengajaran, (3) maklum balas dan aktiviti pemulihan dan (4) pelajar yang kompeten. Beliau mencadangkan, semua konsep dan bahan pengajaran dalam satu topik pengajaran disusun kepada unit-unit kecil dan semakin terhadap tahap pembelajaran pelajar dilakukan di akhir setiap unit pembelajaran tersebut. Dalam masa yang sama beliau telah mengenal pasti serta membezakan aktiviti-aktiviti sokongan yang dapat membantu meningkatkan pencapaian pelajar yang berkebolehan akademik tinggi serta yang berkebolehan akademik rendah. Beliau mendapati, kuiz merupakan salah satu cara berkesan untuk diisi sebagai aktiviti maklum balas, pemulihan dan pengayaan dalam sesuatu pembelajaran.

Pendekatan dan idea yang dijelaskan oleh Bloom (1968) menimbulkan beberapa persoalan kepada pendidik yang ingin mengamalkan pembelajaran masteri dalam pengajaran dan pembelajaran mereka (Slavin, 1991). Mereka sering sukar untuk mendapatkan perincian yang tepat dan jitu terhadap elemen-elemen penting dalam pembelajaran masteri serta perubahan spesifik yang diperlukan untuk memastikan keberkesanan serta kejayaan pelaksanaan kaedah ini. Guskey (1997) telah mengisi jurang-jurang yang ada dengan memperkenalkan elemen-elemen penting untuk mengaplikasikan pembelajaran masteri. Dua elemen penting tersebut ialah (1) proses maklum balas, pemulihan dan pengayaan, dan (2) kesesuaian antara komponen-komponen pengajaran. Guskey (1990a) turut memperjelaskan cara pembelajaran masteri dapat diintegrasikan dengan inovasi-inovasi lain. Beliau mencadangkan strategi serta inovasi baru perlu diselitkan dalam pembelajaran masteri untuk menambah minat dan penglibatan sekali gus meningkatkan keberkesanan pembelajaran dalam diri pelajar. Guskey turut menegaskan strategi pengajaran yang melibatkan pembelajaran masteri perlu bersifat komprehensif dan dapat dilihat sebagai satu kaedah penambahbaikan yang mempunyai kerangka kerja yang koheren serta sistematik.

Justeru, menurut Guskey lagi, pembelajaran masteri sesuai dan boleh menjadi padanan yang ideal dengan strategi pembelajaran kooperatif. Sejak dari dahulu sehinggalah kini, ramai penyelidik dalam bidang pendidikan menyarankan agar pembelajaran kooperatif terus digunakan dalam proses pengajaran untuk memperbaiki kecupayaan kognitif pelajar, hubungan sosial, sikap positif dan kemahiran belajar (Hooper, Temiyakarn & Williams, 1993; Johnson et al., 2008; Slavin, 1991). Pembelajaran kooperatif memberi peluang kepada pelajar lemah memperbaiki gaya kemahiran belajar dan sikap belajar yang lebih positif seperti pelajar berkebolehan akademik tinggi. Kaedah pembelajaran akan menjadi lebih mudah dan cepat melalui strategi kooperatif

terutama dalam mata pelajaran Sains seperti Biologi yang mempunyai konsep-konsep abstrak (Tanner et al., 2003). Dengan bantuan penerangan terperinci berkaitan proses-proses dan istilah-istilah Biologi oleh pelajar berkebolehan akademik tinggi menyebabkan pelajar lemah akan berasa lebih yakin dan berupaya menyelesaikan permasalahan yang dihadapi mereka semasa sesi perbincangan. Dalam masa yang sama, kelebihan yang diperoleh pelajar berkebolehan tinggi adalah mereka mampu meningkatkan tahap masteri mereka dengan cara mengasah dan mengukuhkan lagi kefahaman terhadap sesuatu tugas (Chang & Zellner, 2011; Johnson & Johnson, 2008). Pembelajaran masteri menjadikan aspek koperatif dalam sesuatu pembelajaran lebih berstruktur dan terancang melalui pengajaran yang sistematik dan aktiviti maklum balas yang diberikan.

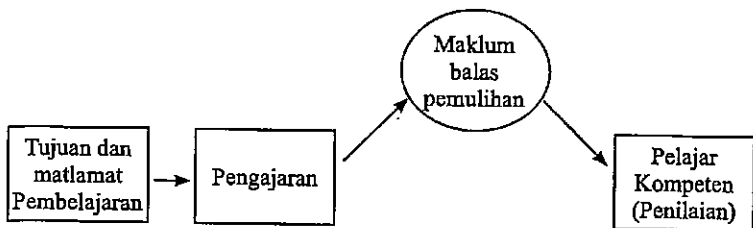
Ledakan dan kecanggihan teknologi, maklumat dan komunikasi yang semakin hari semakin berkembang telah mengurangkan bebanan guru dalam pengurusan dan penyediaan bahan bantu mengajar. Grant, Fazarro, dan Steinke (2014) menyarankan bahawa pembelajaran berasaskan masteri sesuai diadaptasikan dalam persekitaran multimedia. Mereka berpendapat kajian berkaitan pembelajaran masteri dengan medium bantuan teknologi multimedia perlu diperkembangkan dalam pelbagai aspek dan subjek mata pelajaran. Selaras dengan saranan kerajaan untuk menaik taraf sistem pendidikan negara, BMKPM telah menjadikan Kolej Matrikulasi sebagai pusat kecemerlangan (*Centre for Excellence*) dalam bidang pengajaran dan pembelajaran berasaskan teknologi, maklumat dan komunikasi. Oleh yang demikian penggunaan elemen-elemen teknologi, maklumat dan komunikasi terutamanya multimedia dalam pengajaran dan pembelajaran amat dititikberatkan untuk memastikan pelajar dapat menguasai pengajaran dengan baik dan berkesan. Hal ini menjadikan program Matrikulasi, merupakan program yang berprestij dalam melahirkan pelajar yang mempunyai minda kelas pertama. Hakikatnya, penggunaan komputer dengan menggabungkan strategi pembelajaran yang efektif mempunyai keupayaan yang tinggi untuk meningkatkan kualiti serta mutu pengajaran dan pembelajaran. Justeru, pengenalan kepada koswer multimedia interaktif dengan strategi pembelajaran boleh menjadi medium yang signifikan dalam usaha untuk mencapai objektif dan misi kecemerlangan akademik di peringkat Matrikulasi mahupun sistem pendidikan di sekolah secara keseluruhannya. Oleh itu objektif kajian ini adalah mengkaji keberkesanan koswer multimedia interaktif dengan menggunakan pendekatan masteri dan koperatif masteri dalam meningkatkan skor pencapaian respirasi sel pelajar-pelajar Matrikulasi.

Kajian ini akan menguji hipotesis seperti berikut:

H₀: Tidak terdapat perbezaan yang signifikan terhadap skor min ujian pasca Respirasi Sel bagi kumpulan pelajar yang menggunakan koswer multimedia interaktif PMM dan PKMM setelah kesan skor ujian pra Respirasi Sel dikawal.

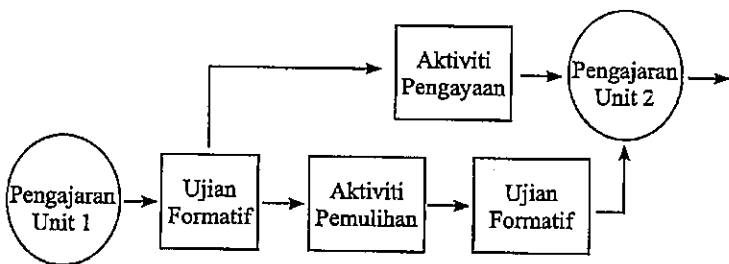
Kerangka Konsep Kajian

Pembangunan koswer kajian melibatkan gabungan pendekatan pembelajaran Masteri (PM) oleh Guskey (2007) menggariskan empat elemen penting dalam pembelajaran masteri (Rajah 1).



Rajah 1: Empat Elemen Pembelajaran Masteri (Guskey, 1997)

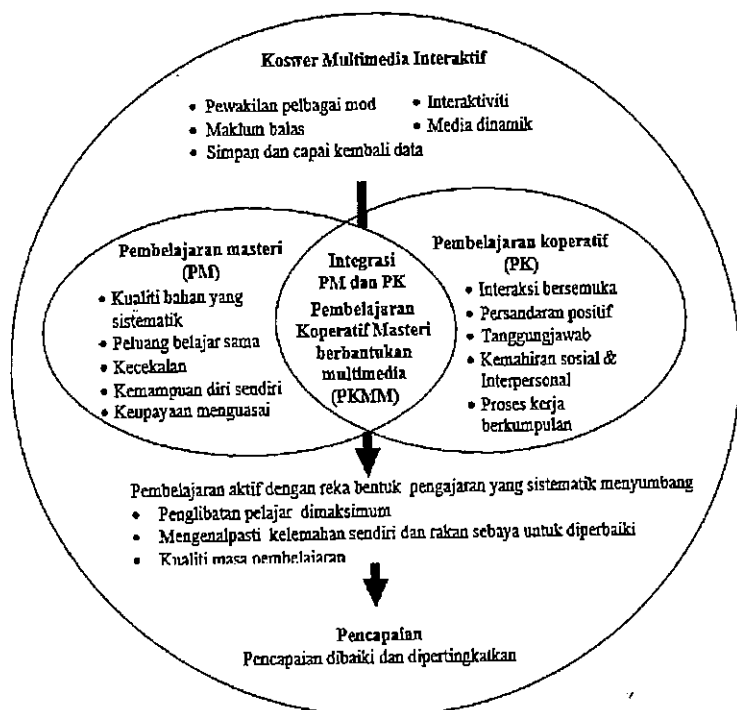
Keempat-empat elemen iaitu tujuan dan matlamat pembelajaran, pengajaran, maklum balas dan pemulihan dan pelajar kompeten ini, perlu disepadukan dan mempunyai kesinambungan antara satu sama lain untuk memastikan pembelajaran masteri berfungsi dengan baik. Sehubungan dengan itu, setiap elemen tersebut telah diterjemahkan dalam siri pembelajaran masteri yang komprehensif dan sistematik merangkumi beberapa proses seperti dalam Rajah 2.



Rajah 2: Proses Pengajaran dan Pembelajaran Masteri (Guskey, 1997)

Pembelajaran kooperatif (PK) pula dibina berdasarkan prinsip pengajaran yang mewujudkan kumpulan-kumpulan kecil supaya pelajar dapat bekerjasama untuk memaksimumkan pembelajaran sendiri dan rakan sebaya (Chang & Zellner, 2011; Johnson & Johnson, 2008). Pembelajaran kooperatif melibatkan keadaan kedudukan fizikal yang fleksibel, memberi bantuan dan berkongsi bahan pembelajaran antara satu sama lain. Kemahiran kooperatif menekankan pengajaran yang berstruktur dan bersistematik yang membolehkan pelajar bekerjasama dalam kumpulan kecil untuk mencapai tujuan yang sama (Kagan, 1994). Pembangunan koswer dalam kajian ini mengabungkan pembelajaran

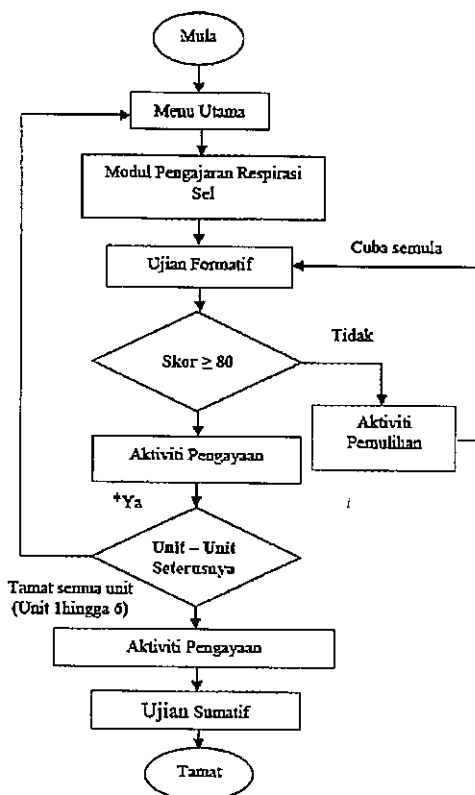
masteri dan koperatif bagi memastikan pembelajaran dalam persekitaran multimedia. Rajah 3 merumuskan kerangka konsep kajian yang merujuk kepada ciri koswer yang dibangunkan dan diaplikasikan dalam pengajaran dan pembelajaran.



Rajah 3: Kerangka Konsep Kajian

METODOLOGI

Prosedur kajian melibatkan pembangunan koswer bertajuk "*Cellular Respiration*" yang dibangunkan penyelidik menggunakan perisian *Adobe Flash CS4* dengan berasaskan Model Reka Bentuk dan Pembangunan Pembelajaran Multimedia Alessi dan Trollip (2001). Proses pembangunan dilakukan berpanduan kepada carta aliran isi kandungan dan pengajaran serta papan cerita yang telah disediakan. Rajah 4 menunjukkan carta alir koswer multimedia interaktif bagi topik Respirasi Sel bermula dengan unit satu (Pengelasan Respirasi Sel).



Nota:

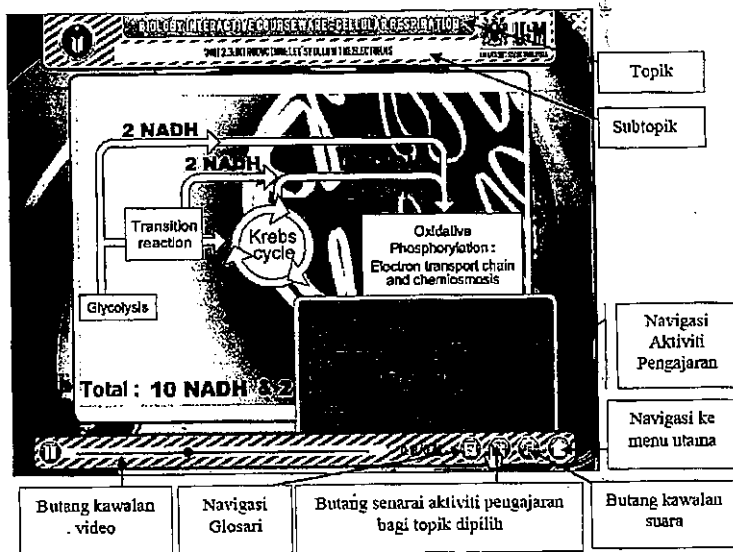
*Pelajar yang telah menjalani aktiviti pemulihan dan mencuba semula ujian formatif tetapi masih tidak berjaya mencapai skor 80%, dinasihatkan meminta bantuan fasilitator (pensyarah) untuk aktiviti pemulihan khas sebelum meneruskan ke aktiviti pengayaan dan unit seterusnya.

Rajah 4: Carta Aliran Perisian Multimedia Interaktif Respirasi Sel

Setiap langkah dalam carta aliran pengajaran ini akan berulang untuk unit-unit seterusnya iaitu unit dua (Respirasi Aerobik), unit tiga (Glikolisis), unit empat (Kitar Krebs), unit lima (Fosforilasi Oksidatif) dan unit enam (Respirasi Anaerobik). Setelah pelajar tamat mengikuti kesemua unit, pelajar perlu mencuba aktiviti pengayaan di mana pada peringkat ini aktiviti pengayaan lebih menjurus kepada pengetahuan keseluruhan topik Respirasi Sel. Pada bahagian ini pemikiran aras tinggi dalam topik ini diuji dengan memberi soalan-soalan yang berasaskan masalah. Sebelum menamatkan sesi pembelajaran pelajar perlu menjalani ujian sumatif bagi mengetahui tahap penguasaan keseluruhan topik Respirasi Sel. Kandungan koswer yang digunakan bagi kumpulan PMM

dan PKMM adalah sama melibatkan proses-proses pembelajaran masteri iaitu maklum balas, pemulihan dan pengayaan. Aspek yang berbeza adalah dari segi pendekatan, sama ada dilaksanakan secara pembelajaran individu (PMI) ataupun berkumpulan (PKMM).

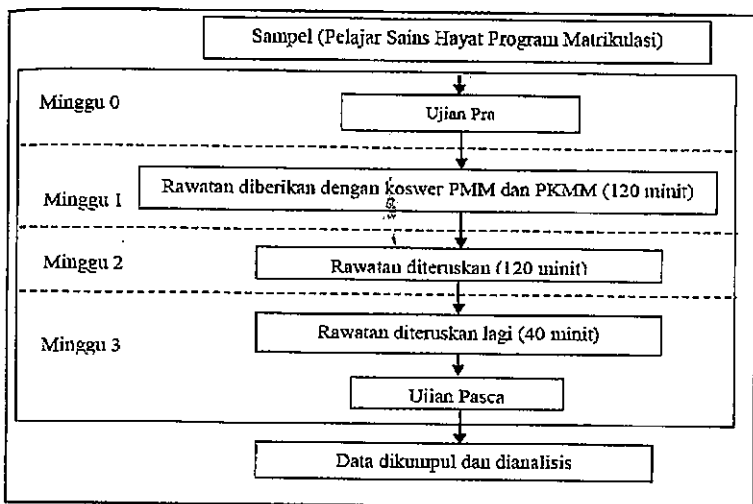
Kaedah penyampaian menggabungkan imej dua dan tiga dimensi dengan penerangan lisan berperanan untuk menerangkan secara visual struktur sel yang berkaitan dengan proses Respirasi Sel sebagai contoh struktur mitokondria dan sitoplasma dalam sel berkenaan. Proses-proses yang berturutan dalam Respirasi Sel diilustrasikan dalam bentuk grafik animasi. Penyelidik telah memastikan setiap animasi menerangkan hubungan antara satu proses sehingga peringkat proses yang terakhir. Reka bentuk koswer menggunakan butang sebagai interaksi dan navigasi dalam kawalan persembahan animasi modul pengajaran, aktiviti maklum balas, pemulihan dan pengayaan serta aktiviti ujian. Rajah 5 menunjukkan contoh paparan skrin susun atur navigasi aktiviti pengajaran di dalam koswer yang mengintegrasikan elemen multimedia interaktif.



Rajah 5: Paparan Skrin Susun Atur Navigasi Aktiviti Pengajaran

Kaedah dan reka bentuk kajian yang dipilih adalah eksperimental kuasi menggunakan kumpulan ujian pra dan ujian pasca. Populasi kajian terdiri daripada semua pelajar Matrikulasi di bawah kendalian Bahagian Matrikulasi Kementerian Pelajaran Malaysia (BMKPM) yang mengambil mata pelajaran

Biologi. Penyelidik menggunakan kaedah pensampelan bukan rawak dengan teknik pensampelan bertujuan (*purposive sampling*). Jumlah sampel kajian ini adalah seramai 145 orang pelajar daripada tiga Kolej Matrikulasi (KM) berlainan iaitu; KM Pulau Pinang, KM Pahang dan KM Johor. Seramai 78 pelajar menerima rawatan strategi PMM manakala 67 pelajar melalui strategi PKMM. Prosedur pengumpulan data melibatkan, pelajar menduduki ujian pra Respirasi Sel terlebih dahulu sebelum mengikuti rawatan menggunakan koswer secara individu atau berkumpulan sebelum diberikan ujian pasca. Rajah 6 merumuskan prosedur kajian.



Rajah 6: Cara alir prosedur pengumpulan data

Statistik deskriptif bagi skor min ujian pra dan skor min ujian pasca Respirasi Sel bagi strategi PMM dan PKMM ditunjukkan dalam Jadual 1. Dapatan tersebut membuktikan terdapat peningkatan markah ujian pasca bagi kedua-dua strategi iaitu sebanyak 11.41 bagi PMM manakala PKMM sebanyak 26.54. Secara relatif, skor min ujian pasca Respirasi Sel bagi strategi PKMM (Min=66.72) adalah lebih tinggi daripada PMM (Min=51.54).

Jadual 1: Min dan Sisihan Piawai bagi Skor Ujian Pra dan Ujian Pasca Respirasi Sel Mengikut Strategi

	Strategi Pembelajaran			
	PMM		PKMM	
	U.Pra	U.Pasca	U.Pra	U.Pasca
N	78	78	67	67
Min	39.13	51.54	40.18	66.72
S.P	16.18	15.50	20.17	14.74

Hasil dapatan analisis inferensi melalui ujian ANCOVA satu hala dengan menggunakan skor ujian pra sebagai kovariat dipaparkan melalui Jadual 2. Keputusan analisis tersebut menunjukkan wujud perbezaan signifikan pada skor min ujian pasca Respirasi Sel berdasarkan strategi pembelajaran dengan nilai $F(1, 142)=41.88, p=.001$ ($p<.05$). Oleh yang demikian, H_0 kajian ditolak. Hasil dapatan kajian mendapati skor min ujian pasca bagi strategi PKMM (Min=66.72) adalah lebih tinggi secara signifikan berbanding strategi PMM (Min=51.54).

Jadual 2: Keputusan ujian ANCOVA Satu Hala Bagi Skor Min Ujian Pasca Respirasi Sel berdasarkan Strategi Pembelajaran dan Skor Min Ujian Pra Respirasi Sel sebagai Kovariat

Variabel bersandar : Skor min Ujian Pasca Respirasi Sel

Sumber	Jumlah Kuasa Dua Jenis III	d.k	Min Kuasa Dua	F	Nilai-p	Eta kuasa dua
Model	17144.94 ^a	2	8572.47	45.99	.001	.65
Diperbetulkan						
Pintasan	43534.69	1	43534.69	233.57	.001	.22
Ujian Pra	8842.08	1	8842.08	47.44	.001	.52
Strategi	7805.11	1	7805.11	41.88	.001	.07
Ralat	26466.92	142	186.39			
Jumlah	540716.00	145				
Jumlah Diperbetulkan	43611.86	144				

Keputusan kajian mendapati strategi pembelajaran masteri dalam persekitaran koperatif telah dapat meningkatkan pencapaian pelajar secara signifikan dalam topik Respirasi Sel di samping mengurangkan perbezaan skor antara individu dalam kumpulan. Koswer kajian yang menggunakan komponen pembelajaran masteri telah dimulakan dengan persembahan animasi pengenalan kepada

topik Respirasi Sel yang mengaitkan pelajaran lepas dengan pelajaran yang akan diajar. Cara ini mampu menarik perhatian pelajar sekali gus meningkatkan kefahaman pelajar Objektif pengajaran yang ditekankan di awal pembelajaran menjadikan setiap pelajar sedar akan matlamat pembelajaran mereka. Jika pembelajaran masteri dilakukan secara koperatif, setiap ahli kumpulan akan memainkan peranan dan tanggungjawab bagi memastikan objektif pengajaran tercapai. Selain itu, pembelajaran juga lebih mudah apabila bahan pengajaran dimulai dengan konsep mudah kepada lebih sukar dan disusuli dengan contoh sekiranya melibatkan konsep penting. Ilustrasi konsep-konsep Respirasi Sel yang dipersembahkan dengan unsur animasi multimedia interaktif membolehkan pelajar menguasai dan memahaminya dengan lebih mudah. Dapatan ini disokong oleh Che Soh (2011) yang menyatakan elemen multimedia dalam pembelajaran Biologi yang melibatkan sel, berkeupayaan memberikan penjelasan yang tepat tentang proses-proses yang berlaku di dalam sel tersebut. Selain itu, perbincangan bersama rakan menggunakan bahan animasi pembelajaran Respirasi Sel telah mengukuhkan lagi konsep yang dipelajari.

Kajian ini mendapati strategi PKMM yang dijalankan secara berkumpulan dipimpin oleh satu sistem pengajaran yang terancang berbanding PMM yang dilaksanakan secara individu. Koswer PKMM dibangunkan mempunyai komponen ujian formatif berbentuk interaktif bagi setiap unit. Selepas mengikuti ujian formatif, langkah susulan dicadangkan sebelum beralih kepada unit seterusnya. Hal ini dapat meningkatkan kefahaman pelajar dan memudahkan struktur pengetahuan ini disimpan dalam ingatan jangka panjang. Pengesanan kesalahan yang mungkin wujud dalam kerangka pemikiran pelajar juga diberikan dalam bentuk maklum balas segera melalui animasi teks dan narasi suara. Pengesanan yang dibuat memudahkan pelajar mempertingkatkan kefahaman pelajar terhadap konsep yang gagal dikuasai dengan baik. Aktiviti pemulihan yang dipersembahkan dalam bentuk animasi grafik dan teks turut membantu pelajar lemah menguasai semula konsep-konsep yang belum difahami dengan betul. Penglibatan setiap pelajar dalam menjawab soalan ujian, melalui aktiviti pemulihan dan pengayaan bagi semua unit, memberi peluang kepada pelajar mendalami topik Respirasi Sel yang dipelajari secara menyeluruh. Oleh itu, skor pencapaian lebih tinggi ditunjukkan oleh pelajar selepas menggunakan strategi PKMM.

RUMUSAN

Hasil dapatan kajian membuktikan bahawa satu intervensi yang menggabungkan pendekatan pembelajaran masteri dan koperatif dalam persekitaran multimedia interaktif mampu meningkatkan pencapaian pemikiran aras tinggi dalam kalangan pelajar. Kajian ini telah memberi pencerahan kepada para pendidik, formula mereformasikan pengajaran berorientasikan guru kepada pengajaran berorientasikan pelajar merentasi kurikulum. Pengaplikasian unsur multimedia

interaktif bersama strategi pembelajaran koperatif masteri memberi pengalaman belajar yang signifikan, memperbaiki pemahaman dan kemampuan dalam mengaitkan pengetahuan dalam situasi baru. Selain itu, diharapkan hasil dapatan kajian ini dapat menambah keyakinan guru terhadap kaedah pembelajaran menggunakan komputer dan peranan guru hanya sebagai fasilitator.

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KAJIAN KEBERKESANAN PRINSIP MOMENTUM-IMPULS BAGI MATA PELAJARAN FIZIK SPM

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ABSTRAK

Kajian ini dijalankan untuk mengkaji keberkesanan penggunaan Prinsip Momentum-Impuls (PMI) dalam pengajaran dan pembelajaran (PdP) Fizik tingkatan empat bagi topik Momentum Linear dan Perlanggaran. Responden kajian melibatkan 54 orang pelajar tingkatan empat aliran sains Sekolah Berasrama Penuh Integrasi Rawang dengan kumpulan rawatan 27 orang pelajar dan 27 orang lagi adalah kumpulan kawalan. Kumpulan rawatan diajar menggunakan modul PMI yang diperoleh daripada laman web "The Physics Classroom" dan kandungannya telah disahkan oleh dua orang guru pakar fizik. Modul ini dipilih kerana susunan kandungan yang baik, bahasa yang mudah difahami, bersifat interaktif dan berkaitan dengan topik sebelumnya iaitu graf gerakan linear dengan penggunaan pita detik. Konsep 'luncuran' yang terdapat dalam modul ini dapat memberikan pemahaman yang lebih jelas tentang kaitan momentum dan impuls serta kebanyakan latihan yang diberikan berbentuk kualitatif aras tinggi (menganalisis dan mengevaluasi). Kumpulan kawalan pula diajar menggunakan buku teks fizik tingkatan empat berdasarkan huraian sukatan pelajaran fizik sedia ada. Alat kajian yang digunakan ialah Ujian Keberkesanan Penggunaan Prinsip Momentum-Impuls (UKPPMI) yang telah diujirintis dengan nilai alpha Cronbach, $\alpha = 0.996$. Data dianalisis dengan berbantuan perisian SPSS dan Microsoft Excel. Analisis Statistik Deskriptif menunjukkan min pencapaian kumpulan rawatan ialah 69.67 dengan SD skor 16.946. Manakala, min pencapaian kumpulan kawalan ialah 48.07 dengan SD skor 13.806. Ini menunjukkan pencapaian kumpulan rawatan adalah lebih tinggi berbanding dengan kumpulan kawalan. Tambahan pula, soal selidik keberkesanan penggunaan modul PMI ke atas kumpulan rawatan mendapati sebanyak 65.4% responden bersetuju bahawa penggunaan modul PMI memberi kesan positif dan pemahaman yang lebih baik mengenai topik Momentum Linear dan Perlanggaran. Dapatan kajian memberi implikasi bahawa penggunaan PMI dicadangkan dalam PdP bagi topik Momentum Linear dan Perlanggaran.

Kata kunci: Momentum, Impuls, Pendidikan Fizik, Prinsip Momentum-Impuls (PMI)

PENGENALAN

Daya impuls dan impuls adalah konsep fizik yang dipelajari semasa di tingkatan empat mengikut Huraian Sukatan Pelajaran Mata Pelajaran Fizik yang ditetapkan oleh Pusat Perkembangan Kurikulum Kementerian Pendidikan Malaysia. Pada umumnya, konsep ini agak mudah untuk difahami oleh pelajar tetapi pelajar mengalami kekeliruan dalam memberikan huraian mengenai aplikasi kedua-dua konsep tersebut. Mengikut Achmad Samsudina, et al. (2014), impuls merupakan konsep abstrak yang ada dalam matapelajaran fizik oleh itu pelajar sukar untuk memahami konsep impuls ini menyebabkan salah faham konsep.

Menurut buku teks Fizik Tingkatan Empat, daya impuls didefinisikan sebagai kadar perubahan momentum manakala impuls ialah perubahan momentum. Rumus yang berkaitan dengan kedua-dua konsep juga sangat jelas untuk pelajar fahami. Rumus bagi daya inipuls ialah kadar perubahan momentum manakala rumus bagi impuls ialah perubahan momentum.

$$\text{Daya Impuls, } F = \text{Kadar Perubahan momentum} \\ = (mv - mu)/t$$

$$\text{Impuls, } Ft = \text{Perubahan Momentum} \\ = mv - mu$$

Takrifan ini adalah sama bagi kebanyakan buku rujukan fizik SPM di Malaysia. Buku rujukan Fizik Fokus 4U Physics SPM terbitan Pelangi (2013) menyatakan bahawa maksud daya dan daya impuls adalah sama iaitu kadar perubahan momentum manakala impuls pula ialah kuantiti daya didarabkan dengan masa seperti rumus berikut iaitu

$$\text{Impuls} = F \times t = mv - mu.$$

Manakala, menurut Oxford Dictionary of Physics (2009), simbol bagi Impuls ialah J iaitu hasil darab daya, F dengan masa, t . Jika daya ialah pembolehubah, impuls ialah pengkamiran bagi Fdt dari t_0 sehingga t_1 . Impuls bagi daya yang bertindakbalas bagi tempoh masa yang tertentu ialah bersamaan dengan perubahan momentum yang dihasilkan semasa tempoh tersebut, sebagai contoh $J = m(v_1 - v_0)$, andaikan jisim (m) manakala halaju dari v_0 ke v_1 tidak berubah.

Penggunaan istilah daya impuls hanyalah terdapat di Malaysia. Kebanyakan buku-buku fizik luar negara tidak memberikan penjelasan mengenai daya impuls secara spesifik tetapi menggunakan istilah daya atau daya berkesan atau impuls bagi satu daya (*Impuls of a force*). Buku-buku tersebut lebih memberikan penekanan terhadap konsep momentum, impuls dan prinsip momentum-impuls (Nor Lelawati Hassan, 2014).

Griffith & Browning, (2001) memberikan penjelasan terhadap impuls, momentum dan prinsip momentum-impuls iaitu "*Momentum and impulse are most useful for evaluating events such as collisions, where powerful forces act briefly to produce striking changes in the motion of objects. The impulse-momentum principle state that the change in momentum is equal to the impulse. This is the different way as stating Newton's second law. The impulse, the product of the average force and the time interval that it is applied, allows us to predict the change in momentum of the object. Large impulse yield large changes in momentum.*"

Manakala Hewitt, (2008) memberikan penjelasan mengenai momentum, impuls konsep impuls mengubah momentum. Penjelasan yang diberikan lebih terperinci dan melibatkan tiga kes untuk topik "impuls mengubah momentum". Kes pertama ialah meningkatkan momentum, kes kedua ialah mengurangkan momentum dalam masa yang panjang dan kes ketiga ialah mengurangkan momentum dalam masa yang singkat.

Huraian Sukatan Pelajaran (HSP) Fizik Tingkatan Empat lebih menekankan konsep daya impuls berbanding konsep impuls. Sebanyak tujuh hasil pembelajaran yang melibatkan daya impuls manakala satu hasil pembelajaran sahaja yang perlu dicapai oleh pelajar yang berkaitan dengan impuls. Ini menyebabkan pelajar lebih fokus terhadap konsep daya impuls berbanding impuls.

Seterusnya, buku teks Fizik Tingkatan Empat adalah buku yang menjadi sumber rujukan utama guru dan pelajar semasa proses pengajaran dan pembelajaran (PdP) di dalam kelas. Segala isi kandungan buku teks adalah berdasarkan huraian sukatan pelajaran fizik. Jadi, penekanan konsep impuls sangat kurang jika dibandingkan dengan konsep daya impuls. Begitu juga terhadap penggunaan prinsip momentum-impuls, tidak diberikan penekanan.

Istilah daya impuls dan impuls itu sendiri memberikan kekeliruan kepada para pelajar terutamanya konsep dan aplikasi. Para pelajar juga mengalami kekeliruan antara daya impuls dan daya berkesan, walhal kedua-dua daya ini adalah sama.

Oleh yang demikian kajian ini dilakukan untuk mengetahui keberkesanan pengajaran dan pembelajaran dengan menggunakan istilah impuls dan daya impuls serta konsep daya impuls (kumpulan kawalan) berbanding dengan sesi pengajaran dan pembelajaran yang menggunakan istilah daya berkesan dan prinsip momentum-impuls. (kumpulan rawatan).

Topik momentum, impuls dan daya impuls dipilih memandangkan soalan fizik kertas 2 kod 4531/2 peperiksaan SPM tahun 2012, Bahagian C, nombor 11 iaitu mengenai istilah ambil lajak atau '*follow trough*' menunjukkan kekeliruan dalam kalangan pelajar dalam memberikan jawapan mengikut konsep fizik yang dikehendaki.

Analisis ke atas 137 sampel jawapan para pelajar aliran sains yang menduduki peperiksaan SPM 2012 bagi mata pelajaran fizik kertas 2 kod 4531/2 di beberapa buah sekolah di Johor menunjukkan hanya 13 sampel yang

memberikan jawapan mengikut konsep impuls dan perubahan momentum manakala 124 sampel lagi telah menjawab menggunakan konsep daya impuls, perubahan tenaga dan lain-lain lagi.

Jadual 1 menunjukkan analisis item soalan Fizik Kertas 2 Peperiksaan Pertengahan Tahun Tingkatan 4 di sebuah sekolah menengah harian yang dijalankan pada tahun 2012.

Jadual 1: Analisis Item Peperiksaan Pertengahan Tahun Tingkatan 4 Tahun 2012

No Soalan	Topik	Bil Pelajar (Y)	Bil Pelajar Jawab Betul (>50%) (X)	%Betul	IK = $\frac{X}{Y}$	Tafsiran Item
1	Introduction to Physics	134	46	34.33	0.3433	Sederhana
2	Analysing Motion graphs	134	42	31.34	0.3134	Sederhana
3	Momentum	134	99	73.88	0.7388	Mudah
4	Linear Motion	134	49	36.57	0.3657	Sederhana
5	Inertia	134	81	60.45	0.6045	Sederhana
6	Anaylsing Forces in equilibrium	134	5	3.73	0.0373	Terlalu sukar
7	Impulsive Force	134	59	44.03	0.4403	Sederhana
8	Safety Features in vehicles	134	64	47.76	0.4776	Sederhana

(Noor Izyani, 2012)

Menurut jadual 2.4, topik "Impulsive Force" menunjukkan bilangan peratus pelajar jawab betul ialah 44.03% dan item ditafsirkan sederhana. Oleh itu, tahap sederhana menunjukkan penguasaan konsep fizik bagi topik tersebut adalah sederhana di kalangan para pelajar. Kajian perlu dilakukan bagi meningkatkan penguasaan konsep ini ke tahap tafsiran mudah.

METODOLOGI

Kajian yang dilakukan adalah menggunakan reka bentuk kuasi-eksperimen, di mana kumpulan rawatan dan kumpulan kawalan dipilih secara *purposive* berdasarkan ciri-ciri yang setara berasaskan skor ujian Pra dan lain-lain ciri yang sesuai. Reka bentuk ujian yang digunakan ialah "Reka bentuk Ujian Prapasca Bagi Kumpulan-Kumpulan Tidak Seimbang" (Piaw, 2006). Pelajar diuji sebanyak dua kali ujian untuk pemboleh ubah bersandar iaitu pencapaian Fizik. Ujian pertama ialah praujian dan ujian yang kedua ialah pascajuan. Kajian ini mengambil masa lima minggu untuk intervensi.

Rekabentuk eksperimen kumpulan kawalan-rawatan pra-pasca ujian adalah seperti Rajah 1. Rekabentuk ini menggunakan sistem notasi Campbell dan Stanley (1963) yang diubahsuai.

Kumpulan Eksperimen (rawatan)	=	A1	B	A2
Kumpulan Kawalan	=	A1		A2

Petunjuk:

A1 = Ujian Pra (pencapaian UKPPMI sebelum rawatan diuji)

A2 = Ujian Pos (pencapaian UKPPMI selepas rawatan diuji)

B = Pembolehubah bebas (rawatan yang digunakan)

Rajah 1: Rekabentuk Eksperimen "kumpulan kawalan-rawatan pra-pasca ujian"

Pembolehubah-pembolehubah dalam kajian ini terbahagi kepada pembolehubah bersandar iaitu pencapaian fizik daripada ujian pra dan ujian pasca, manakala pembolehubah bebas ialah penggunaan prinsip momentum-impuls (PMI) dalam pengajaran dan pembelajaran.

Sampel kajian terdiri daripada 54 orang pelajar aliran sains tingkatan empat daripada sebuah sekolah berasrama penuh yang dipilih dan diagihkan secara rawak kepada dua kumpulan iaitu kumpulan rawatan dan kumpulan kawalan. Kedua-dua kumpulan adalah homogen kerana diajar oleh seorang guru fizik yang sama dan berpengalaman mengajar fizik selama 10 tahun dan berpengalaman dalam menanda kertas dua SPM Fizik. Kedua-dua kumpulan dikatakan homogen kerana mempunyai standard yang sama dari segi markah pencapaian fizik bagi Peperiksaan Setara Pertengahan Tahun Sekolah Berasrama Penuh. Kumpulan rawatan adalah terdiri daripada 27 orang pelajar manakala 27 orang pelajar lagi terdiri daripada kumpulan kawalan.

Kedua-dua kumpulan diajar topik yang sama iaitu topik berkaitan impuls dan momentum tetapi kumpulan kawalan diajar menggunakan huraian sukatan pelajaran (HSP) sedia ada manakala kumpulan rawatan diajar menggunakan HSP berdasarkan PMI. Ujian pra diadakan seminggu sebelum intervensi sementara ujian pasca dijalankan sebaik sahaja pelajar tamat proses pengajaran dan pembelajaran (PdP) menggunakan HSP berdasarkan PMI.

Modul PMI yang digunakan dalam PdP kumpulan rawatan adalah diperolehi daripada laman web "*The Physics Classroom*" dan telah disemak oleh dua orang guru pakar fizik. Modul ini dipilih memandangkan ianya mudah difahami dan interaktif. Selain itu, modul ini juga mengaitkan konsep momentum-impuls dengan topik yang dipelajari oleh pelajar sebelumnya iaitu graf gerakan linear dan rajah pita detik bagi graf gerakan linear. Latihan yang diberikan dalam modul ini kebanyakannya berbentuk kualitatif aras tinggi iaitu menganalisis dan mengevaluasi selari dengan *standard* yang ditetapkan Lembaga Peperiksaan Malaysia memandangkan para pelajar amat lemah dalam memberikan penerangan mengenai sesuatu konsep. Selain itu, modul PMI ini tidak menggunakan istilah daya impuls atau "*impulsive force*" sebaliknya menggunakan istilah daya berkesan.

Dua instrumen telah digunakan dalam kajian ini pertama ialah set soalan ujian berkaitan topik momentum dan impuls. Ujian ini dikenali sebagai Ujian Keberkesanan Penggunaan Prinsip Momentum-Impuls (UKPPMI). Kedua ialah Set Soal Selidik Keberkesanan Penggunaan Prinsip Momentum-Impuls (SSKPPMI) yang mengandungi item-item bagi mengukur keberkesanan penggunaan PMI dalam PdP kumpulan rawatan.

Set soalan UKPPMI telah disemak oleh dua orang guru pakar fizik dan dua orang guru berpengalaman mengajar matapelajaran Fizik di sekolah menengah lebih 10 tahun. Sebanyak 20 orang responden telah dipilih secara rawak digunakan untuk menjalankan kajian rintis. Setelah diujirintis didapati kebolehpercayaannya ialah $\alpha = 0.996$. Manakala nilai koefisien Pearson bagi setiap soalan adalah tinggi dan julat nilai antara penilai-penilai adalah kecil. Ini menunjukkan keseragaman markah yang diberikan oleh penilai-penilai bagi setiap soalan.

DAPATAN KAJIAN DAN PERBINCANGAN

Perbezaan Skor Pencapaian Mata Pelajaran Fizik

Merujuk Jadual 2, ujian kenormalan yang dijalankan menunjukkan semua data ujian pra-pasca bagi kumpulan kawalan-rawatan berada pada aras signifikan $t > .05$. Maka ini menunjukkan hipotesis nul ditolak dan wujud perbezaan yang signifikan antara skor pencapaian ujian pra-pasca bagi kumpulan kawalan-rawatan tersebut. Data Kolmogorov-Smirnov dirujuk kerana jumlah sampel kurang daripada 100 sampel.

Jadual 2: Ujian Kenormalan

Kolmogorov-Smirnov

Kumpulan	Df	Ujian Pra	Ujian Pasca
		Sig	Sig
Kawalan	27	.200	.200
Rawatan	27	.200	.129

Data untuk bahagian ini diperolehi daripada maklumat bahagian II UKPPMI. Analisa Statistik deskriptif ke atas min dan sisihan piawai atau *standard deviation* SD skor bagi ujian pra-pasca kumpulan kawalan-rawatan ditunjukkan seperti dalam Jadual 3.

Jadual 3: Skor pencapaian pelajar Ujian Pra-Pasca Kumpulan Kawalan-rawatan

		rawatan					
Kumpulan	N	Min				<i>Adjusted Mean</i>	Δ^*
		Uian Pra		Ujian Pasca			
		Min	SD	Min	SD		
Kawalan	27	43.44	13.163	48.07	13.806	48.14	1.405
Rawatan	27	39.52	14.553	69.67	16.946	69.75	
Jumlah	54	41.48	13.858	58.87	15.376		

Nota.* Δ , saiz berkesan (SB) = (Adjusted Mean kumpulan rawatan - adjusted mean kumpulan kawalan) / pooled SD iaitu 15.376)

Berdasarkan Jadual 3, nilai saiz berkesan ialah 1.405 memberikan nilai saiz berkesan yang ketara. Ini menunjukkan, tahap pemahaman para pelajar kumpulan rawatan lebih tinggi berbanding tahap pemahaman para pelajar kumpulan kawalan. Kesimpulannya, penggunaan prinsip momentum-impuls dan istilah daya berkesan dalam HSP fizik adalah berkesan dalam meningkatkan penguasaan para pelajar bagi topik momentum dan impuls.

Satu kuantiti yang menarik untuk dikenalpasti ialah gandaan normal $\langle g \rangle$, ditakrifkan sebagai perubahan skor dibahagikan dengan kenaikan maksimum yang mungkin.

Bagi kumpulan kawalan yang menggunakan HSP sedia ada, $\langle g \rangle = 0.08$ dan bagi kumpulan rawatan yang diimplementasikan dengan HSP baharu menggunakan prinsip momentum-impuls, $\langle g \rangle = 0.4985$ atau dibundarkan menjadi 0.50. Nilai $\langle g \rangle$ telah digunakan untuk mengenalpasti keberkesanan PdP di dalam kelas. Hake (1998) menyatakan bahawa nilai $\langle g \rangle$ adalah lebih sesuai (berbanding nilai sebenar atau skor purata ujian pasca) untuk mengukur keberkesanan PdP di dalam kelas adalah sebagai bukti empirikal yang menunjukkan korelasi antara nilai $\langle g \rangle$ dengan skor ujian pra adalah rendah.

Ujian Soal Selidik Keberkesanan Penggunaan Prinsip Momentum-Impuls (SSKPPMI)

Set Soal Selidik Keberkesanan Penggunaan Prinsip Momentum-Impuls (SSKPPMI) mengandungi item-item yang mengukur keberkesanan penggunaan PMI dalam PdP kumpulan rawatan.

Jadual 4: Analisa item bagi SSKPPMI Kumpulan Rawatan

Item		Min	Mod	SD
1	Istilah Impuls dan Daya Impuls mengelirukan saya.	3.38	4	1.098
2	Impuls dan momentum merupakan dua istilah fizik yang sangat berkait rapat antara satu dengan yang lain.	3.81	4	0.491
3	Istilah daya impuls tidak memainkan peranan penting dalam pemahaman konsep fizik saya.	3.23	3	0.815
4	Istilah daya impuls perlu dihapuskan dan hanya menggunakan istilah daya supaya tiada lagi kekeliruan antara istilah impuls dan istilah daya impuls.	4.15	4	0.675
5	Impuls dan Daya Impuls adalah dua konsep fizik yang berbeza.	3.58	4	0.987
6	Daya dan Daya Impuls adalah dua konsep fizik yang berbeza.	3.50	4	1.030
7	Impuls dan momentum merupakan dua konsep fizik yang sangat berkait rapat antara satu dengan yang lain.	3.88	4	0.431
8	Prinsip Impuls-momentum adalah prinsip baharu bagi saya.	4.08	4	0.744
9	Prinsip Impuls-momentum haruslah dilaksanakan bagi pengajaran dan pembelajaran Fizik tingkatan 4.	4.27	4	0.533
10	Prinsip Impuls-momentum memberikan kefahaman yang lebih jelas mengenai konsep momentum dan impuls.	4.04	4	0.599

Berdasarkan Jadual 4, kesemua item untuk setiap kategori iaitu istilah, konsep dan prinsip menunjukkan mod pada skala 4 iaitu setuju, hanya terdapat dua item sahaja iaitu item ketiga pada kategori istilah dimana mod pada skala 3 iaitu tidak pasti dan item keenam.

Item tiga ialah "Istilah daya impuls tidak memainkan peranan penting dalam pemahaman konsep fizik saya" mungkin mengelirukan sampel. Tetapi, item keempat iaitu "Istilah daya impuls perlu dihapuskan dan hanya menggunakan istilah daya supaya tiada lagi kekeliruan antara istilah impuls dan istilah daya impuls" menunjukkan mod pada skala 4 iaitu setuju. Ini secara tidak langsung dapat membantu pengkaji memberikan tafsiran kepada item tiga. Item tiga perlu diubahsuai seperti berikut "Istilah daya impuls tidak memainkan peranan penting dalam pemahaman konsep fizik saya tetapi digantikan dengan istilah daya atau daya berkesan".

Item seterusnya yang dapat dikesan memberikan dapatan yang menunjukkan sampel kurang memahami pernyataan yang diberikan atau mengalami kekeliruan konsep ialah pada item keenam "Daya dan Daya Impuls adalah dua konsep fizik yang berbeza." Item ini adalah item negatif yang sepatutnya memberikan mod pada skala 1 atau 2 iaitu sangat tidak setuju atau tidak setuju. Tetapi dapatan memberikan mod pada skala 4 iaitu setuju. Item ini juga perlu diubahsuai menjadikan item positif sama seperti item ketiga iaitu "Daya dan Daya Impuls adalah dua konsep fizik yang sama."

KESIMPULAN

Analisis Statistik Deskriptif menunjukkan min pencapaian kumpulan rawatan ialah 69.67 dengan SD skor 16.946. Manakala, min pencapaian kumpulan kawalan ialah 48.07 dengan SD skor 13.806. Ini menunjukkan pencapaian kumpulan rawatan adalah lebih tinggi berbanding dengan kumpulan kawalan. Pencapaian min skor Fizik kumpulan rawatan dalam ujian pasca UKPPMI lebih tinggi berbanding kumpulan kawalan iaitu sebanyak 21.6. Dapatan ini juga disokong menggunakan SSKPPMI yang menunjukkan bahawa sebanyak 65.4% responden bersetuju penggunaan modul PMI memberi kesan positif dan pemahaman yang lebih baik mengenai topik Momentum Linear dan Perlanggaran. Responden bersetuju dengan penggunaan istilah daya atau daya berkesan menggantikan daya impuls dan penggunaan prinsip momentum-impuls dilaksanakan dalam PdP Fizik tingkatan 4 di sekolah.

Ini memberikan kesimpulan bahawa wujud perbezaan yang signifikan pada min skor ujian pasca di kalangan para pelajar dalam mengikuti sesi pengajaran dan pembelajaran yang menggunakan:

- i) Istilah impuls dan daya impuls (kumpulan kawalan) dibandingkan dengan sesi pengajaran dan pembelajaran yang menggunakan istilah daya berkesan menggantikan daya impuls. (kumpulan rawatan).
- ii) HSP fizik berkaitan konsep impuls dan daya impuls (kumpulan kawalan) dibandingkan dengan sesi pengajaran dan pembelajaran yang menggunakan HSP fizik berkaitan prinsip momentum-impuls (kumpulan rawatan).

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Jurnal Pemikir Pendidikan (Journal of Educational Thinkers) is a peer-reviewed journal devoted to the publication of original papers, serves as a forum for practical approaches to improving quality in issues pertaining to education and its related fields. Journal of Educational Thinkers aimed to develop as a journal with a focus on emerging issues pertaining to education. The journal is published in English and Malay language and it is open to authors around the world regardless of their nationality. It is currently published once a year i.e., in December.

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Journal of Educational Thinkers aims to provide a forum for high quality research related to education. Areas relevant to the scope of the journal include: Science Education, Mathematics Education, Teaching English as Second Language, History Education, Geography Education, Economics Education, Educational Management, Educational Psychology, Educational Sociology, Educational Philosophy, Educational Technology, Language Instruction, Curriculum and Instruction, Physical and Health Education, and its related fields.

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