1.0 Introduction

The multiple educational evaluation models and definitions developed by evaluation theorists reflect the diversity of ideas and approaches towards educational evaluation. The diverse meanings and definitions of the evaluation concept includes viewing evaluation as an assessment of the worth or merit of some educational objects (Stufflebeam, 2000a, 2000b; Trochim, 2006); assessment of the achievement of objectives which is also known as the Tylerian view of evaluation (Madaus & Stufflebeam, 2000); and proving the success or failure of a programme. According to Madaus and Stufflebeam (2000) these are the conventional views of evaluation. As the field of evaluation continued to develop, Cronbach (1963) pointed out that the evaluation process should be focused on gathering and reporting information that could help guide decision-making in an educational programme and curriculum development. Nonetheless, while the models differ in many of their details, the decision to choose an evaluation model depends on a few important factors such as the evaluation questions, the issues that must be addressed, and the available resources (Madaus & Kellaghan, 2000).

This paper begins with clarifying the position of curriculum evaluation in the curriculum development model (Oliva, 1992). Curriculum process
evaluation focuses on instructional activities in the teaching and learning process. A study on the teaching and learning of Science in English (TeSME) programme was conducted in year 2005. In this evaluation study, the process dimension of the CIPP (Stufflebeam, 2000) forms the basic framework. The process-improvement evaluation aims to detect strengths and weaknesses in the instructional process and to suggest constructive feedback about how things might be improved.

2.0 Curriculum Evaluation

Curriculum evaluation is seen as a sub model and the final component in the curriculum process in Razali Arof’s (1991) and Oliva’s (1992) curriculum development model. Oliva’s (1992) curriculum model conceptualised four main components - curriculum goals, curriculum objectives, organisation and implementation of the curriculum, and evaluation of the curriculum. Figure 1 shows the feedback line in which information obtained in the evaluation component would provide useful data for each of the components of the Curriculum Model.

![Figure 1: Curriculum model with all feedback lines (Oliva, 1992: 478)](image)

Oliva (1992) points out that to consider students’ achievement in their cognitive, affective and psychomotor learning as the effectiveness of the curriculum is not accurate. This is because, according to Oliva (1992),
the primary purpose of curriculum evaluation is to determine whether the curriculum goals and objectives are being successfully carried out or not. In addition, Oliva (1992) asserts that in the course of the instructional process, there are other questions curriculum planners would like to know, too. Questions suggested by Oliva (1992:479) that are relevant in the context of this study are:

i. whether the curriculum is functioning while in operation

ii. if the best material is being used and following the best methods

iii. whether the programmes are cost-effective - whether we are getting the most for the money spent

(Oliva, 1992:479)

It is the consensus of most curriculum developers that once a developed curriculum is implemented in schools, appropriate evaluation procedures shall be devised to examine the effectiveness of the curriculum in achieving the aims, goals and objectives of the curriculum. Feedback obtained shall also include any unintended outcomes so that information about the curriculum can provide useful data to enable further modifications in the curriculum, if necessary. A new curriculum once implemented in schools is in progress until a time when the need arises it will not be terminated. Therefore, since a curriculum is ongoing, curriculum evaluation, teacher evaluation and programme evaluation are seen as the main components of process evaluation (Print, 1993).
2.1 Process Evaluation

Process evaluation aims to gather information to expound on the internal dynamics of how a programme operates. According to Print (1993:188), ‘Process evaluation examines the experiences and activities involved in the learning situation i.e. making judgements about the process by which students acquired learning or examining the learning experience before it has been concluded’. Concurrent with this view, Patton (1990) asserts that process evaluation focuses on how something happens. Thus, process evaluation includes the evaluation of instruction, the teachers’ teaching and the students’ learning (Patton, 1990). Teacher evaluation includes conducting evaluation on teachers’ instructional methods, student-teacher interaction, classroom interaction, teachers’ characteristics, teachers’ performance in the classroom and other dynamics of the teaching-learning situation. This type of evaluation is carried out with the intention to help teachers enhance their performance in the teaching and learning process (Print, 1993).

Viewing curriculum as a process (Mednick, 2006; Smith, 2000), it is essentially observing what actually happened and how these elements interacted to make meanings within the classroom (Smith, 2000). Inside the classroom there are a number of elements such as teachers, students, classroom environment and knowledge which are constantly interacting with each other (Huitt, 2003). Figure 2 depicts McIlrath and Huitt’s (1995) and Huitt’s (2003) model of instructional process which identifies the major categories of variables that are related to school achievement.
Huit (2003) explains that the category of Teacher Behaviour consists of all the actions a teacher would make in the classroom and includes three additional subcategories: Planning, Management, and Instruction. Planning refers to the preparations a teacher does to interact with students in the classroom. Management refers to class control and Instruction is the activity used by the teacher in guiding student learning. Student behaviour includes all of the actions students would make in the classroom.

Consequently, curriculum process evaluation intends to delineate, obtain and provide useful information (Stufflebeam, 2002) about what is going on in the classrooms so that decision alternatives can be made to maintain or to modify or even to eliminate the instructional strategies. In the CIPP model, Stufflebeam (2000b) notes that process evaluation is an...
ongoing check on a programme’s implementation which has three main objectives:

i. to detect or predict defects in the procedural design or its implementation during stage

ii. to provide feedback about the implementation of the planned activities

iii. to maintain a record of the procedure as it occurs.

In short, process evaluation aims to monitor, document and assess programme activities. Hence, this study was focused on the classroom process component. In relation to this study the process evaluation of the Revised Lower Secondary Science Curriculum taught in English will investigate the implementation at the school level. The study investigates if the instructional methods used in the classroom conform to the learning objectives, learning activities and learning outcomes as stipulated in the Curriculum Specifications handbook produced by the Ministry of Education, Malaysia. Procedural barriers, unintended outcomes, unanticipated issues that may arise in the particular situation will also be identified.
In summary, based on the discussion above, Figure 3 shows the relationship between the component ‘Curriculum process evaluation and Instructional Evaluation” in a curriculum process evaluation. Instructional evaluation focuses on the activities in the teaching and learning process. During instructional evaluation, the examination of the teacher’s performance, teacher’s teaching-learning strategies, students’ learning opportunities, learning activities and learning experiences in class, and the teaching materials used are the main variables in providing useful feedback for improvement.

3.0 Purpose Of The Evaluation

The following section is the argument for doing an evaluation study on the implementation process of the TeSME programme. Patton (1990) advocates that ‘implementation evaluation’ (Patton, 1990:104) is imperative for monitoring and getting feedback about the programme as to whether it is running effectively or not and what kind of intervention is
needed before evaluating the outcomes of the implemented programme. Evaluators need to know what produced the observed outcomes in order to decide on what intervention ought to be taken to improve the programme. Hence, implementation evaluation informs researchers what is going on in the programme, how the programme has developed, and how and why the programme has or has not deviated from the objectives as planned (Patton, 1990).

In the context of this study, the focus was on the planned Lower Secondary Science Curriculum and its implementation in schools using English as the medium of instruction. During planning at the instructional level, teachers are expected to interpret the curriculum plan to create the instructional plans. The teachers themselves specify the instructional objectives and hence, decide methods of delivery and teaching strategies that are suitable for their learners. Moreover, Sowell (1996) asserts that the instructional curriculum that is actually used in classroom often varies from the planned curriculum due to various factors such as student responses or the learning environment. Hence, the study sought to evaluate the instructional process in the classroom and the learning experiences of the students as anticipated in the goals and objectives of the planned curriculum.

The study also investigated the unintended outcomes that might arise in the instructional process. According to Sowell (1996) the experiential curriculum is the one perceived, experienced and internalised by students. The experiential curriculum is in consonant with Doll’s (1992) ‘unplanned, informal and hidden curriculum’. Ornstein and Hunkins (2004:12) assert that
the unplanned, informal curriculum deals with social-psychological interaction among students and teachers, especially their feelings, attitudes, and behaviours.

The purpose of the process evaluation is to identify and monitor continuously various elements of programme operation. The process evaluation approach provides information about what is actually occurring and to determine why certain events are happening and what the impacts of the programme are on the people involved and on the educational institution. Similarly, Parlett and Hamilton’s illuminative model (cited in Madaus & Kellaghan, 2000; Patton, 1990 & Pang, 2005) primarily concerns about the description and interpretation of an innovation. It involves three main stages: the observation of on-going events, transactions and background information; then making further inquiries to refine data collected and lastly, to seek underlying principles, spot patterns of cause and effect and suggest alternatives to the planned activities. Therefore, in the evaluation of the teaching of Science in English, the illumination of unintended outcomes would be useful for the improvement of the implementation.

The Patton’s Utilization-Focused Evaluation (1997) emphasises the use of the evaluation findings which orchestrates with the fundamental concern of this study. Patton’s motto is to ‘focus on intended use by intended users’ Patton (1997:20). This evaluation research was designed to gather information about the classroom process and to use the evaluation findings for making improvements in the classroom teaching and learning process. Hence, a feedback session in the form of an oral presentation for
the Science teachers in the school was carried out where I shared the findings, showed some theories and video clips about teaching techniques that could be applied in the classrooms. This approach is also consistent with the generic goals of evaluation which is to provide “useful feedback” to a variety of audiences (Trochim, 2006).

Evaluation research does not aim to discover new knowledge like basic research and it does not aim for truth or certainty like the basic sciences. It aims to study the effectiveness with which existing knowledge is used to inform and guide practical action to help improve the quality of a programme. Clarke (1999:12) cites Chen’s (1996) fourfold typology which explains that process-improvement evaluation aims to detect strengths and weaknesses in programme processes, with a view to making recommendations for altering the structure, or adjusting the implementation, of a programme. Consequently, this process will help staff identify implementation problems and to make formative evaluation decisions to rectify the activities concerned (Stufflebeam, 2000b, 2003).

Therefore, my role in this evaluation research is to investigate the teaching of Science in English in the lower secondary classes with the specific intention of weighing up their strengths or weaknesses and providing feedback about how things might be improved. In order to find out how, what and why the teachers were teaching the way they do in their Science classrooms, a qualitative approach was used.
4.0 **Methodology**

A qualitative evaluation research was undertaken to investigate the teaching and learning of Science in English. Holliday (2002:24) says, ‘Getting into qualitative research is very often about grasping opportunities which address a good idea or longer-standing preoccupation’. Qualitative research allows one to find out the social realities in the natural settings. Qualitative researchers feel that human behaviour is always bound to the context in which it occurs and therefore, behaviour must be studied holistically, in context, rather than being manipulated. By employing qualitative methods in this educational research, it enables me to investigate teachers’ and students’ attitudes, beliefs and preferences and to investigate the setting (i.e. in the classroom). My intention was to observe the science teachers make meanings in their science lessons i.e how the science teachers are coping with their task and why they are adopting the instructional strategies in their natural setting (i.e. the science classroom). This concurs with the characteristics of qualitative research emphasized by Bogdan and Biklen (2003:42) - ‘naturalistic, inductive and the concern with process and meaning’.

Then, I wanted to talk to the teachers in order to understand their reasons and beliefs in their instructional methods in science classes. Holliday (2002:1) says that ‘qualitative research presents a statement about reality and social life that has to be continually argued and reaffirmed’. Similarly, Patton (1990:420) asserts that qualitative methods are used to look for ‘What actually happens to people in the program? What they say about what happens to them?’
4.1 Participants

The participants of this research were five lower secondary Science teachers and their students. Four men teachers and a lady teacher willingly agreed to allow me to observe and to video record them teaching in their respective Science classes for a period of approximately six months. They gave full cooperation in the semi-structured interviews and discussions which were conducted individually. The students were interviewed using semi-structured interview protocol. The other participants involved were the Head of Science and Mathematics Department, the Principal and three English language teachers.

4.2 Instruments

The data were obtained through video recording the Science lessons, field notes, document analysis, semi-structured interviews and opinion questionnaires for the participants and students. Consent from the five main participants was obtained through an agreement made in a consent form. The teachers and students were assured that their participation is kept anonymous.

5.0 The Findings

This case study provides an in-depth understanding of how, what and why the lower secondary Science teachers were teaching Science in English in the rural school context. Although the findings are not representative of all the other lower secondary Science teachers in the rural schools in Sabah, nevertheless, the study has shed light on issues identified in a rural school context.
SUMMARY OF RESEARCH FINDINGS

Figure 4: The Dynamics of a Science Classroom in a Rural School in Sabah

The flow chart in Figure 4 begins with the research questions that ask if the science teaching and learning instructional methods conform to the teaching methods that are suggested in the Science Curriculum Specifications handbook prepared by the Ministry of Education, Malaysia. Here the results show that it did not. Therefore, is it because of the use of English language that has resulted in teachers using particular teaching methods? In the findings, the teachers use a lot of bahasa Malaysia to teach in their Science class. English language was only used for giving simple instructions in class and when the teacher was reading the text in the textbook or the LCD screen. The findings reveal that the lessons observed in this case study were ‘traditional’ in nature that includes lecturing, telling
and using worksheets to conduct a Science lesson. The lessons observed did not portray characteristics of effective Science lessons that were enacted by research studies conducted by researchers such as Tytler (2001), Muijs and Reynolds (2001) and Weiss, Pasley, Smith, Banilower and Heck (2003). Even though the teachers did employ multiple semiotics resources in their Science teaching and learning process, there were no observations on students engaged in active participation in science investigations. Therefore, students were not encouraged to express their own ideas and pose questions, and students were not challenged to develop higher order thinking skills and to think laterally.

6.0 Implications

This research investigated why things were going on the way they were and whether the practices observed need improvement. Through conducting a case study, I was able to produce detailed information of classroom teaching and learning process. I began the study with broad questions but as the classroom observation progress new themes and new knowledge of variables gradually unfolded. The main aim is not so much about finding out how things really are but to see how teachers interpret and perceive the teaching and learning of Science in English in their classroom. Although a single case study cannot provide a sound basis for an effective instructional approach to integrate English language and science content learning, this study and other similar findings elsewhere would suggest a practical guide for teachers to teach science literacy skills and the contents simultaneously. More importantly, Fullan (1991:132) points out
that it is essential that the introduction of an innovation to the teachers should begin from ‘the concrete to the abstract, from practical procedures and activities to a discussion of underlying principles, rather than the other way round as is the more frequent order’.

Firstly, Science teachers in the rural school lack professional development exposure in teaching Science in English. Therefore, classroom observations and video recordings methods should be used so that all the Science teachers would have an opportunity to critically view and comment on their instructional processes during subject department meetings. Through open discussions based on observations and video recordings, teachers would be able to learn from each others strengths and weaknesses. As Fullan (1991:131) advocates that the degree of a successful change in schools is ‘strongly related to the extent to which teachers interact with each other and others providing technical help’. In addition, viewing video recordings of best practices and reinforcing with collegial discussions will also enlighten teachers the effective ways of dealing with students from different backgrounds.

Secondly, a review of instructional approaches for teaching Science in English to English language learners can be adapted for the teaching and learning context in this case study. More importantly, it aims to extract the practical ideas that can be adapted to the current situation in this case study, giving respect to generally accepted principles of effective teaching and learning Science. Based on the characteristics of the teachers, students and school environment in this case study, an integrated approach of rigorous science instruction and explicit instruction of academic literacy is
deemed necessary. Supported by theories, research findings and the realities of the instructional situation, some practical recommendations are made for improvement in the teaching and learning of Science in the rural school. These recommendations focused on the basics of integrating science instruction with language instruction in the following aspects:

i. Teaching the linguistic structures of science

ii. Using Multiple Science Semiotics Resources

iii. Using bahasa Malaysia

Consideration of the cultural and linguistic experiences that students bring to science learning helps teachers to plan their instructional methods to suit the students’ needs. Lack of this understanding, thus applying sub-standard instructional approaches in classroom teaching may hinder efforts taken to achieve this goal. This study has also brought awareness to the teachers about teaching Science based on Lemke’s way to ‘talk Science’ (Lemke, 1990) in a Science classroom using the multiple semiotic resources: linguistics, visuals, gestures and experiments. Therefore, instructional approaches and ways to make learning science more meaningful that were identified hopefully would not only generate an effective classroom atmosphere in a rural setting but also improve the general level of achievement for the majority of the students in Sabah.

7.0 Conclusion

The main purpose of this study is to look into what was happening in the science classrooms in a rural school and how were the Science teachers executing their duties in line with the new policy change of using English to
teach Science in their context. At the same time, the research investigated why things were going on the way they were and whether the practices observed need improvement. Ellis (2004) clearly delineates the gap between theory and practice in the classroom. The main aim is to make research accessible to practitioners. In relation to this study, my hope is to look for practical pedagogical solutions for science teachers teaching in their classroom. Therefore, we must first engage in conceptual evaluation in order to identify research problem (Ellis, 2004: 35). In order to find the best classroom practice, there is a need to investigate the teaching and learning process in the classroom, listen to teachers’ and students’ views. Hence, a qualitative case study approach was chosen because the intention of this research matches aptly with the two major elements of case studies. This study also brings awareness to educators that classroom research is an important activity for teachers to improve their instructional approaches.
REFERENCES


