

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

The purpose of this qualitative study is to understand the implementation of the 60:40 policy by thirty teachers in three regular day secondary schools. This is to get a feel of what was going on, so as to understand better the problem in the implementation of the policy.

The study of the implementation of the 60:40 policy at the selected secondary schools is done in an enquiry approach because it involves an interactive process to gather information from the participants. It touches on the understanding of the human behaviour and the intrinsic values inherent in the process of implementing the policy. It also involves the learning of the cultural and environmental situations of the organizations in which the policy is being implemented. It includes the understanding of the characteristics of the students who are studying the science and technology subjects. In order to gain a holistic understanding of the phenomenon in a particular environment the qualitative approach is chosen (Creswell, 2008, p. 476).

3.1 Rationale for choosing a qualitative approach

Five reasons are attributed to this choice:

1. The qualitative approach provides a more flexible way to describe cultural aspects of human behavior such as their values, beliefs, attitudes, the things they do and their emotions and human relationships.
2. The implementation of a policy is so complex and political that a quantitative approach cannot be used. It needs a qualitative approach to gain an insight of the intricacy of the matters involved in policy formation and implementation. This is

seen from the many models that have been applied to come out with a reasonable policy. In its implementation there is even more political intricacy especially between the policy formulators and the policy implementers.

3. Education is not a static thing; it evolves constantly in response to the changing human needs. In such a situation and circumstance, qualitative approach is more appropriate to relate to these dynamic situations.
4. The outcomes of a qualitative approach can open up the gates to other studies to discover more related issues, for example in a longitudinal research study where studies of human changes and development can be done over time or how to create a conducive environment from the existing facilities in the schools for the discovery learning of science and technology.
5. The use of real and measurable standards has created difficulties for the quantitative approach to be used.

3.2 The Research Methodology

The research methodology is the process of conducting the research to find out the things related to the purpose of the qualitative study. It is presented in eleven sequential stages in Figure 3.1. This chapter examines and describes the first seven stages of the methodological process. It begins with the development of the conceptual framework and then determines the issues that influence the implementation of the policy in order to come out with the research model. Next is the writing of the research questions so that clear conclusions can be drawn from the data collected. This is followed by adopting a strategy to go about answering the research questions i.e. looking for the research design such as the case study and selecting the tactics to be used to collect the data i.e. the research instruments such as the questionnaires, interviews and observation. Next is the analysis of the data, drawing conclusions and making recommendations.

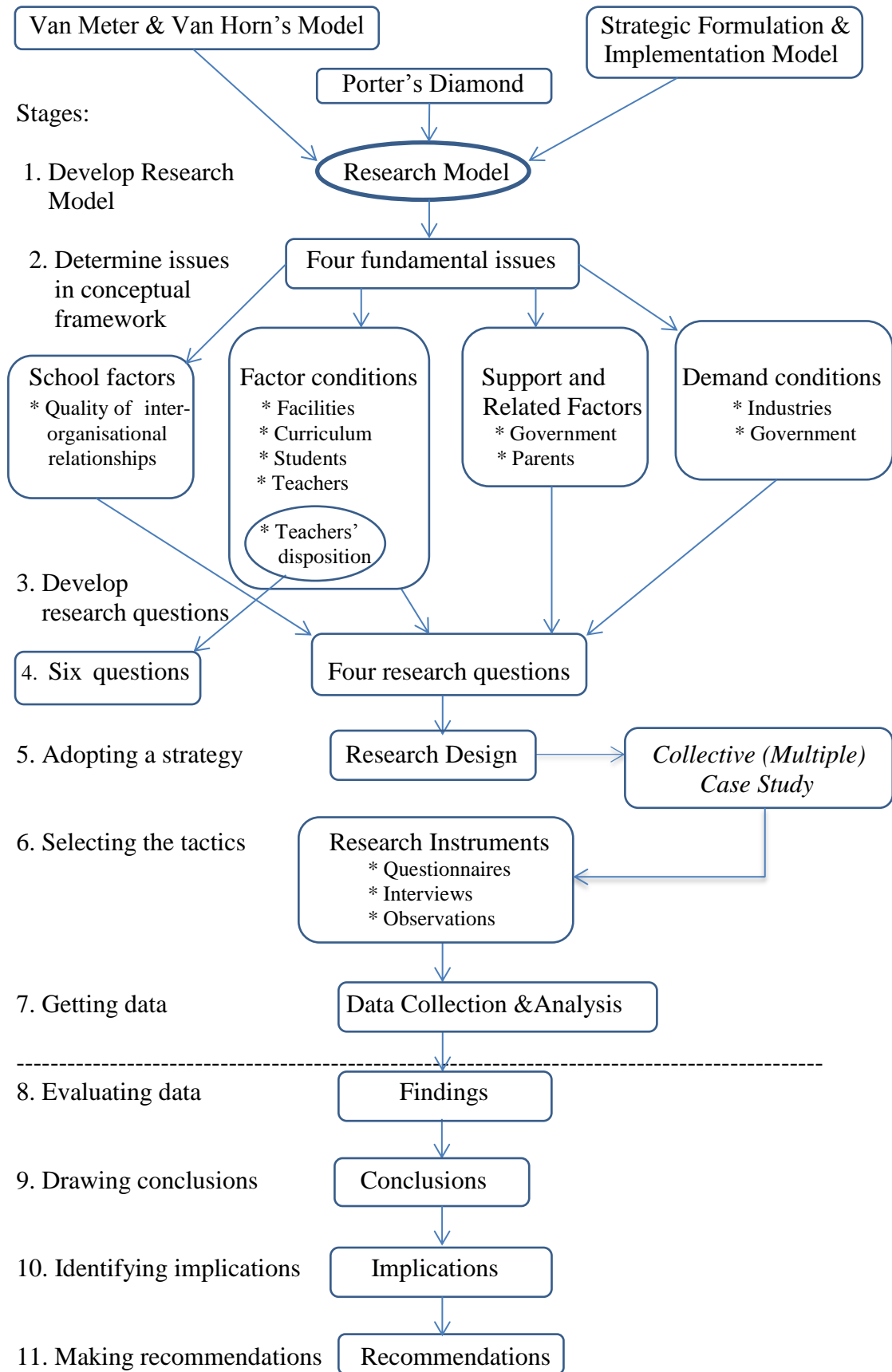


Figure 3.1 Research Methodological Process

3.2.1 The development of the Research Model (Stage 1)

The development of a research model was a prerequisite so that the research study could be done in an orderly and coordinated manner and more importantly it provided the direction and scope on what information to gather to achieve the purpose of the research study (Uma Sekaran, 2000, p. 102).

After looking at a few models especially the Van Meter and Van Horn's model of the policy implementation process, the Porter's diamond for competitive sustainability and the strategic formulation and implementation model for control and remedial systems, the research model was conceived and developed from these three models. The basic model was the Van Meter and Van Horn's model and it was integrated with the Porter's diamond and the strategic planning and implementation model.

The Van Meter and Van Horn's model was in a way patterned to the strategic model starting with real and measurable objectives and standards; the examination of the resources required for the implementation process and the internal strengths and weaknesses (the characteristics of the schools and the implementers); the matching of the external factors such as political, social and economic with the internal situations and circumstances and the inter-organisational relationships between the policy makers and the implementers. The Porter's diamond provided the conditions for the sustainability of the implementation of the policy such as the factor conditions (interorganisational relationships), school factors (facilities and resources, leadership, flexibility, teamwork, culture and structure), demand conditions (opportunities for jobs, research and development, economic growth) and the support and related factors (from the Government and parents). From the strategic planning and implementation model the feedback-control system was incorporated to complete the model.

The research model provided the framework for the study to be done. It enabled a logical process by which the understanding of the implementation of the 60:40 policy

was attained and by which the appropriate strategy for the policy implementation was formulated (Uma Sekaran, 2000, p. 102). The research model (Figure 3.2) presented below was portrayed in page 26.

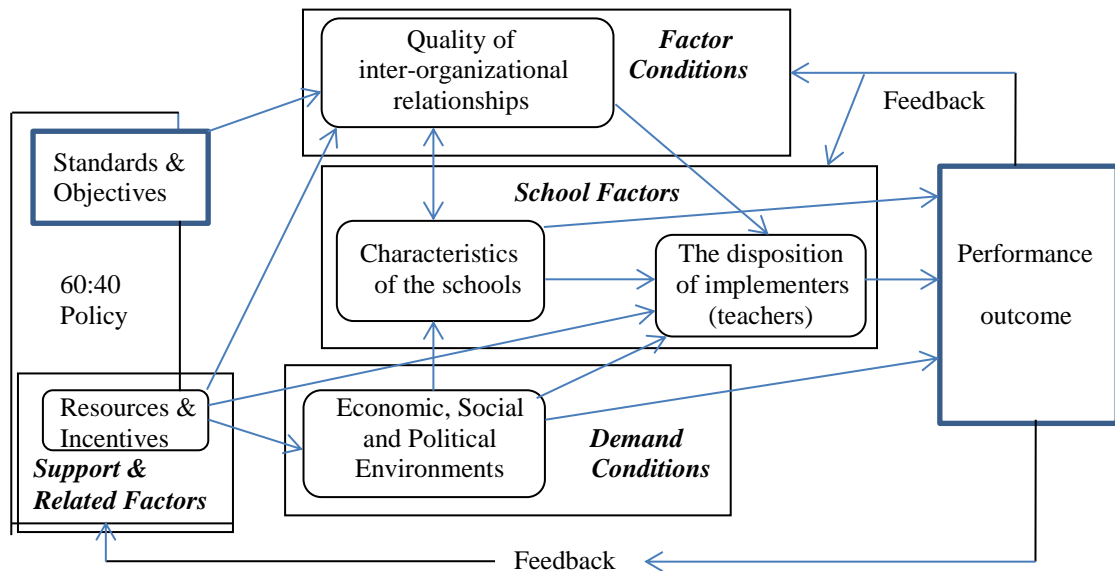


Figure 3.2: Research Model for Implementation of the 60:40 Policy

3.2.2 Determination of issues in the Research Model (conceptual framework) (Stage 2)

The next stage involved establishing the fundamental issues in the conceptual framework. Four fundamental issues: school factors, factor conditions, supporting and related factors and demand conditions, were identified and these led to the establishment of the research questions (Stage 3). The idea was to narrow down a broad topic to specific areas for the study to be done. In this way it helped to identify distinct factors or situations that influenced the implementation of the policy (Creswell, 2008, p. 70).

The first issue was related to the existing school factors that influenced students to study science and technology subjects. The research question is: *“How have the school factors influenced students to study science and technology subjects?”*

The second issue was the quality of inter-organisational linkages between the policy making body and the implementing body. The research question is: *“What are the prevailing factor conditions that helped to enhance students’ interest towards the study of science and technology in the secondary schools?”*

The third issue referred to the supports given by the government to the secondary schools to implement the policy and the parental support to encourage their children to study science and technology subjects in the secondary schools. The research question is: *“What are the support and related factors prevailing in the secondary schools to enhance the students to study science and technology?”*

The fourth and last issue was the prevailing human resource demand conditions in the industries and the public sector to create opportunities for employment for the science and technology students and graduates. The research question is: *“What are the prevailing demand conditions in the industries and government sector that provide the impetus for students to join the science and technology stream in the secondary schools?”*

3.2.3 The Six Questions (Stage 4)

The next stage focused on the matter relating to the disposition or response of the teachers to the implementation of the policy. It was to identify the issues to be raised with the teachers at the interviews. A different set of questions was required. This led to stage 4 in the research methodological process – the six questions. The disposition of the teachers touched on the intrinsic values inherent in the teachers such as their understanding, acceptance, rejection or neutrality and the intensity of their reactions to the implementation of the policy. Six questions were conceived to gather information about the teachers’ disposition to the policy implementation because this aspect of the information could not be obtained from observation or questionnaire. It touched on the

cognitive aspect that was embedded in the mind of the person for example the person's confidence or motivation to the implementation of the policy. The six questions were derived from items 7 to 12 of Part A of the questionnaire for teachers. The six open-ended questions (identified as six questions in stage 4 in Figure 3.1) were:

- (1) Is it feasible to encourage more students to study S/T in the secondary schools?
- (2) What is your state of readiness (intensity) towards the 60:40 policy?
- (3) Should the teaching of S/T be strongly emphasized in secondary schools?
- (4) Is the study of S/T at secondary schools crucial for the success of the policy?
- (5) Are you confident that the policy will come true?
- (6) Do you believe that the policy is critical for the country to become a developed nation?

These questions attempted to reaffirm the understanding, appreciation, expectancy and intensity of the implementers towards the policy and its implementation. They became the central aspect in the interview instrument with the teachers. A copy of the interviews with the teachers can be found in Appendix C.

3.2.4 The Research Design (Stage 5)

The research design referred to the strategy that would be used to find the answers to the research questions. The *multiple case study* was selected as the strategy to attain the information for the implementation of the policy by the teachers.

The case study is principally a qualitative approach for an exploratory study to be done because nothing much is known about the implementation of the 60:40 policy at the secondary schools (Creswell, 2008, p. 476 & Uma Sekaren, 2000, p.123).

Figure 3.3 shows three schools selected for the case study. Three similar secondary schools were selected as the sites to gain an understanding of the policy implementation process within the context of the schools. Each school represented a case for solving the same phenomenon (Creswell, 2008, p. 477).

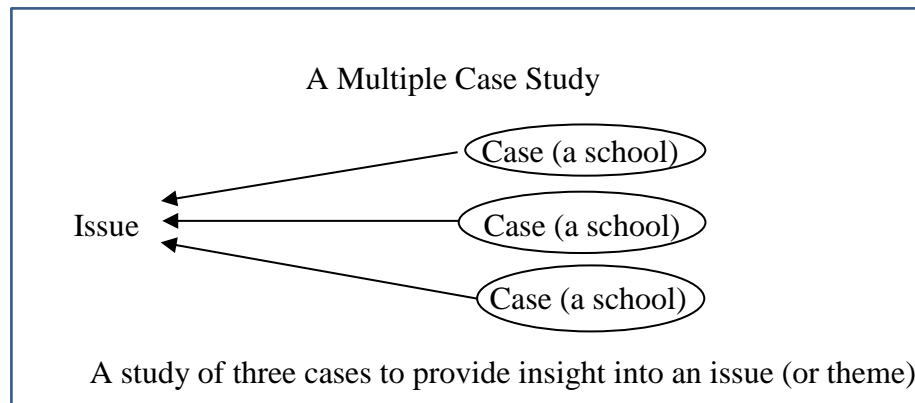


Figure 3.3: A Multiple Case Study

Robson (2002, p. 178) defines a case study as “a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence.” The case study enables the generation of answers to the question ‘why?’ as well as the ‘what?’ and ‘how?’ questions. It also uses various methods to collect the data (Saunders, Lewis & Thornhill, 2003, p. 93).

The study of each case is actually exploring a similar situation involving the implementation of the policy in three different places. Each school has a culture-sharing group such as teachers or students for the study to take place. Having the same thing done in three different places, ensures the quality of the findings which involve “describing the activities of the selected group members” (Gay, Mills & Airasian, 2006, p.445). It is basically to understand the ways or the things the group of people does with regard to the implementation of the 60:40 policy in the secondary schools.

Using more than one school for the study is also a form of substantiation and support of a case. This is the advantage of a multiple case study as it enables a comparative insight of an issue being explored such as the implementation of the 60:40 policy in three different sites (Creswell, 2008, p. 477). Another advantage is that more than one method to collect the data can be applied in order to reinforce the evidence gathered.

3.2.5 The Research Instruments (Stage 6)

More than one type of instruments was required to ensure the quality of the qualitative research. Observation, interview and questionnaire were the instruments used to collect the primary data and as 'multiple sources of evidence'. This multiple-methods approach enhanced the quality of the study and ensured the findings to be as authentic as possible.

This triangulation approach provided a more complete picture of what was being studied and cross-checked the information gathered. Even the questionnaire for the students was part of this triangulation aspect and was used to crosscheck the responses of the teachers.

(1) Questionnaires

A questionnaire was developed for the teachers with regard to the four issues in the model. The questionnaire had 4 parts. Part A was about the appraisal of the 60:40 policy at the secondary schools (12 items) while Part B covered the contextual aspects in the secondary school for the study of science and technology (13 items). On the other hand Part C dealt with the problems encountered in encouraging secondary school students to study science and technology (26 items) while Part D touched on the school environment and leadership (57 items).

A questionnaire was also developed for the 100 student participants. It had 3 parts. Part A was related to personal and family background details (12 items) while Part B touched on the factors that encouraged students to further their science and technology education (10 items). Part C pertained to the students' valuation of the teaching of sciences and technology (10 items).

A review of the questionnaires by teachers and students

Prior to the use of the questionnaires by the selected teachers and students, three teachers and five students in Form 4 were given the respective questionnaires to do a 'review' of the items with respect to their readability, clarity and ease of response. Instructions or items that were equivocally stated were identified and rectified.

(2) Interview

An interview is defined as a purposeful discussion between two or more people (Kahn & Cannel, 1957, cited in Saunders et al, 2003, p. 245). It provides a method to gather valid and reliable data that are relevant to the research questions and objectives i.e. with regard to the implementation of the 60:40 policy at the three secondary schools.

After the analysis of the questionnaire data, the interview was used in order to understand the reasons of the decisions the participants had taken and for their attitude and opinions (Irving Seidman, 1998, p. 4). For this reason the questions were open-ended and the order and logic of questioning were flexible. This also allowed further questions to be used to explore the responses in order to validate findings from the questionnaire and to be consistent with the purpose of the study. The interview was done on a one-to-one basis and face-to-face. However the weakness of the interview was the possibility of the filtering or summarizing of the information by the interviewer or the interviewee providing information that the interviewer wanted to hear. This weakness was kept in mind during the interview with the teachers as the consequence of such a development would affect the credibility of the data.

(3) Observation

Information gathered from observation constituted the primary data and it avoided the risk of collecting biased information from other people (Gay et al, 2006, pp. 413-414).

Observation was a useful tool to gather data about the physical lay-out of a place such as a class room and the science laboratory. Observation of the participants at the interviews provided useful information about the perception and attitude of the participants from their bodily expression or gestures.

3.2.6 Getting the primary data (Stage 7)

Gaining access to the sites

The approvals to gain access to the sites to conduct the research study were first obtained from the Ministry of Education, the State Education Department and the three head teachers of the selected schools. Permissions were also obtained from the selected participants such as the teachers and the students. The following steps were followed:

- Initially visits were made to 5 regular day secondary schools. After the second visit to five schools, a decision was made to select three regular day secondary schools. The three schools were selected because the head teachers, teachers and the administration people were responsive, cooperative and environmentally friendly.
- The head teachers of the three schools were approached and the purpose of the visit was made known to them with the letter of approval from the Ministry of Education.
- Appeals were made to the head teachers to help identify the teachers and students for the study. Only science and technology teachers with 10 or more years of teaching experience in the subjects were to be selected. The students were selected from the Form 4 S/T classes according to the letter from the Ministry of Education.
- The head teachers helped to prepare time tables to meet the teachers with the dates and time schedules of 40 to 60 minutes for each interview to be held.

- The head teachers also allocated places to meet the teachers for the interviews.
- The head teachers were given the two sets of questionnaires to be distributed to the selected teachers (30) and students (100) and to collect them back after two weeks.

(1) The bases for choosing three regular day secondary schools are:

1. There are 20 such schools in the town of Seremban. The selection of three schools is equivalent to 15% of the available schools and this is statistically acceptable as it is above the 10% level.
2. The head teachers and teachers in these three schools are supportive and responsive to the request to have the research study done in their schools and are willing to provide the necessary assistance.
3. Where the policy is known to prevail.
4. Where socio-economic content, geographical area and stage of implementation of the policy can be taken into consideration.

These three schools are reflective of about 90% of the 2,285 (2006) secondary schools in the country (Table 1.3, p.15). The remaining 10% of the secondary schools are made up of the technical, religious, fully residential, special model, special education and sports schools. These regular day secondary schools provide education for most of the secondary school students in the country. They offer several packages of subjects at the upper secondary school level such as science, arts, applied arts, besides elective subjects like technical (technical drawing and engineering drawing), vocational and religious subjects.

Table 3.1: Characteristics of the Three Secondary Schools

Characteristics	Schools		
	A	B	C
1. Status: stream	S/T	S/T & Arts	S/T & Arts
2. Location in the town	Western area	Eastern area	Southern area
3. Student population	1400	2600	2400
4. S/T teachers	29	31	21
5. Students in Form 4	240	500	340

Location factor of the sites is considered important to minimize differences among the schools in term of the social, economic and cultural environments. The three selected schools are located within the town of Seremban and they are about 7 kilometers from each other. They are operating on a double session basis with the upper secondary school level in the morning and the lower secondary school in the afternoon. The characteristics of the three secondary schools are summarized in Table 3.1.

(2) The Samples

Two types of participants were chosen from each of the three secondary schools: the teachers teaching science and technology subjects and students studying science and technology subjects in Form 4.

Table 3.2: Information about the teachers and their participation in the 60:40 Policy

Schools: SMK	A	B	C	%
1. Number of S/T teachers	10	10	10	100
2. More than 10 years of teaching	10	10	10	100
3. More than 10 years of teaching S/T	10	8	8	87
4. Knowing the 60:40 policy	10	10	10	100
5. Knowing the policy for more than 10 years	9	8	4	70
6. Involved in the policy programme	5	4	3	40

Table 3.2 shows the characteristics of the 10 teachers selected for the study in each school. All the teachers in the three secondary schools have at least 10 years of teaching experience while 26 (87%) of them have more than 10 years of teaching science and technology subjects. They know the policy while 21 of them (70%) have known of the policy for more than 10 years. They have learnt of the 60:40 policy from

their schools, the press and other people. 28 teachers (93%) have acquired such information from their schools while 2 teachers (7%) learnt of the policy only from the press. 12 teachers (40%) have participated in the said policy programme.

Table 3.3 Information about the participating students

1. <u>Gender/School</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Total</u>
Male	33	15	11	59
Female	-	22	19	41
<u>Total</u>	<u>33</u>	<u>37</u>	<u>30</u>	<u>100</u>
2. <u>Race</u>				
Chinese	19	5	1	25
Indian	8	22	1	31
Malay	4	3	31	38
Others	2	4	-	6
<u>Total</u>	<u>33</u>	<u>34</u>	<u>33</u>	<u>100</u>
3. What made you opt for the S/T stream?				
a. Self-interest	25	30	28	83
b. Parents' advice	16	13	18	48
c. Parents' preference	9	10	10	29
d. Peer influence	10	9	8	27
e. Decided by the school	6	1	8	15
f. Advice from school counsellor	4	5	5	14
g. Information from media & internet	9	12	9	30
h. Information from education exhibition	10	12	16	38
4. Family income per month				
a. RM500 or below	3	2	1	6
b. RM501 - RM1500	8	8	11	27
c. RM1501 - RM2500	6	6	2	14
d. RM2501 - RM3500	4	2	5	11
e. RM3501 - RM4500	2	3	2	7
f. RM4501- RM5500	1	1	2	4
g. RM5500 above	9	13	9	21

Table 3.3 presents the 100 participating students from the three selected schools. It shows that 41% of the students are girls studying science and technology subjects. Most of the students studying science and technology subjects are the Malays, followed by the Indians, Chinese and others. It also shows that the majority of the students studying the science and technology areas are based on their own interest while parental advice is secondary. For the next influencing factor, is the information from media and education exhibition. The schools appear to play a little influencing role on the students to study

science and technology subjects. Basing on family incomes, it is found that the students are equally represented from the three income groups i.e. the high, middle and low. The students come from different educational backgrounds of the parents. The professional backgrounds of the parents do not show a strong influence on the students to study science and technology subjects in the secondary schools. Generally most of the students (85%) have the ambition to further their education in science and technology.

Getting information using questionnaires

The final versions of the two types of questionnaire were given to the head teachers to be distributed to the 30 selected teachers and the 100 selected students. The sets of questionnaire for the teachers and students can be found in Appendix A and Appendix C respectively. The answered questionnaires from the teachers and students were returned two weeks later.

Getting data from interviews with the teachers

First it involved the building of an informal relationship with the participants as well as looking into the convenience and accessibility of the participants. For example, after the return of the questionnaires from the participants it was decided to hold the interviews with the teacher participants as soon as possible. The interval between the two events should not be too wide in order to ensure that the teachers would still remember the answers they gave in the questionnaire. This was because the interview involved a further exploration of their feelings, values and beliefs from what they already knew. Arrangements were made with the head teacher in each school to come up with the schedule to interview the selected teachers and to identify suitable places for the interviews to be held in the school. Interviews with the teachers were held when the head teacher in each school came up with the interview schedule.

Interviews with the teachers were conducted in places of convenience to the teachers for example at the teachers' meeting room, in the science laboratory and in one instance at the canteen. They were done in accordance with the schedules provided by the head teachers of the schools. However there were times when flexibility was allowed to meet the needs of the teachers.

A short ice-breaking was necessary at the beginning of the meeting with each teacher. This was to get into his or her confidence and to create a friendly and relaxing environment. An appreciation of thanks was given to the teacher for agreeing to the request for access and for agreeing to the meeting. This was followed by a brief explanation of the purpose of the research and the assurance that the information from the teacher would remain confident and anonymous. The teacher was informed that he/she had the right not to answer any question. The teacher was also asked for permission in the manner the answers were to be recorded and to confirm the amount of time available for the interview.

During the interviews the teachers were free to talk and what they said were recorded as accurately as possible since the teachers did not like what they said to be tape recorded. Each interview was a long process of recording and thought provoking session. It also allowed for reflection. It lasted for more than 60 minutes in some instances. This usually happened when the teachers had free teaching intervals and they became responsive. There was more listening to the teachers than talking except when asking questions. Each teacher was allowed to see the matter or issue asked so that he/she could provide the answers close to the issue and to prevent crowding of unrelated answers. When there was any uncertainty or unclear answer, feedback was used. It provided a better understanding of the teachers' knowledge and perception relating to the implementation of the policy.

The time span for each interview ranged from 40 minutes to 60 minutes. It also depended on the teacher's willingness and expectation of the interview. There were occasions, quite often, only one teacher was interviewed for the day and this kind of interview took more than 60 minutes. There were two occasions when the same teachers was interviewed but in different days. The recording of the information from the teacher was a time consuming job. Before each interview was over, a review of the recording was done with the participant.

The good things about the interviews were that useful information could be obtained when it was not possible from observation or even questionnaire and that more detailed personal information was disclosed, and that better control over the types of information was possible. On the other hand, the disadvantages of interview (as cited by Creswell, 2008, p.226) were that some of the respondents were not spontaneous with their answers and others gave crowded answers. In such situations, the researcher had to seek clarifications from them. It was possible that the presence of the interviewer affected the respondents. It was found to be good to keep the interview within 40 minutes to prevent biasness from creeping in but this depended on the situation whether there was objectivity in the discussion.

Observation

Observing the interviewees also provides some inkling of their moods, attitudes and feelings from their facial expressions. However the cognitive aspect of human nature could not be seen by observation. What a person said or acted could be heard or seen but the true cognitive process of the person could not be captured. It was a tedious way to gain primary information. In order to have an idea about a science laboratory, the interviews in two schools were held in the science laboratories which are in fact classrooms with bigger tables and chairs for students to sit around them. The tables and

chairs could be moved around as and when required. The laboratory was a quieter place than the teachers' meeting room where other teachers were stationed outside it as their places of work.

The use of observation was not given much emphasis because of the fear of biasness when the interview involved the long period of meeting with the teacher. On the other hand biasness could also come from the respondents and for this reason open-ended questions were good to help reduce the problem. This was done by putting the question in a different situation e.g. what would it be liked if the country were not developed? Instead of asking "Do you like a developed country? It was good to keep the contact with the respondents within a reasonable time frame such as 40 minutes to reduce the problem of biasness which could be a threat to the validity of the results. There was not much of a problem related to biasness with the teachers who were experienced and knowledgeable and had strong views of things around them and they knew well of what they were saying to the questions asked.

(3) Ending of data collection

The process of data collection stopped when it became clear that little information of relevance could be gained from further engagement with the data source. The whole process of getting the approvals and gathering the information took more than four months.

(4) Analyzing the data

The data gathered was analyzed for themes/categories and then interpreted according to the meaning of the information for each school. A cross-case analysis was then conducted to identify common and different themes/categories among the three cases. After the completion of the analysis of the data, a report was written consistent with the

design of the research model and the research questions. This aspect of the activity known as the findings is found in the next chapter which involves stage 8 in the research methodological process.

3.3 Reliability and Validity in the Qualitative Research

The information gathered from the qualitative study has to be credible and reliable. This is to ensure that the information obtained remains valid for the purpose of usage.

3.3.1 Reliability

According to Gay et al, (2006), reliability in qualitative study is referred to as the degree to which the research data consistently measured whatever they measured. Normally this refers to the instruments used in qualitative research. For example the same questionnaire is provided to all the participants even when the data collection is done at different times. All the 30 teacher participants received the same questionnaire. The same thing happened to the 100 students. This was to ensure that the answers gathered from teachers and students were consistent with the items in the instruments.

In the case study, the obtained data from the three schools were records of events acted by the particular groups of teachers and students at the particular time or situation and the findings could not be applied to another group or to a larger population (Gay et al, 2006, p. 407). If the same events were to occur again but then the time and environment could have changed, the reliability of the collected data still could not be applied to the new situation.

This was because the purpose of the case study was to understand what was happening and why but not what happened after that. It was not to look for the ultimate truths or solutions to problems that could be transferred from one setting to another setting (population). As a consequence the strength of qualitative research in this case

was not based on generalizability which referred to the application of findings in one setting to another setting.

As for the interviews with the teacher participants the same research questions were applied to each of the participants. This was to ensure that reliability was maintained.

3.3.2 Validity

In qualitative research validity refers to two aspects: trustworthiness and understanding. According to Guba (1981) trustworthiness of a qualitative research relates to four criteria: “credibility, transferability, dependability and confirmability” (cited in Gay, Mills & Airasian , 2006, p. 405). In the case study, transferability was an issue because the findings were good only at the particular situation, to the particular group of people and location. Therefore credibility, dependability and confirmability were more relevant. Therefore validity here implied credibility, dependability and confirmability.

Validity in this case referred to the extent to which the data collected could ‘fit’ what had been looked for. Therefore what was gathered and what was intended supposed to fit. As the case study was more concerned about the realities of the situation for example how the 60:40 policy was being implemented in the secondary schools but was not concerned of what was intended (which was an implicit knowledge). Therefore in the case study external validity was more important than the internal validity. The external factors in the environment were more valuable than the implicit factors. For example the facilities for teaching were more important than what the teachers thought. The teaching of science should be related to the characteristics of the students to bring about learning of the subject by the students but not what the teacher wanted to teach.

In order to ensure external validity the selection of the schools was done to minimize differences in terms of location or the selection of the participants for example

teachers with at least 10 years of teaching experience in science and technology were selected and that the students were from the same cohort or same age group and doing the same subject study. The same data collecting instruments were used on the members in the same group and the use of multiple instruments or triangulation in relation to three similar groups was a way to ensure validity.

However for getting information about the disposition of the teachers towards the 60:40 policy involved more than just the questionnaire or the external factors. It dealt with implicit knowledge of the teachers as implementers of the policy. This was because the quality of the teachers determined the success in the implementation process (Van Meter and Van Horn, 1975 and Figure 1.5, p. 10). In this situation interviews and observation were used. Interviews however played a more essential role than observation in dealing with implicit knowledge embedded in the human mind. This was where the development of the six big questions was deviated from the other four research questions. In this aspect internal validity became important. It is apparent that the research model designed for the study required the examination of the external and internal validities of the information gathered. It emphasized that the human effort as a variable played the imperative role in the successful implementation of a policy that could not be done by machines. Therefore the disposition of the teachers actually became the central role in the implementation of the 60:40 policy in the secondary schools. In this situation internal validity was an important thing. Therefore in this case study, both aspects (external validity and internal validity) were important.

3.3.3 Ensuring credibility in the research study

In the case study credibility was an important issue. This was because the researcher actually played the central role as the integrator and interpreter of data. He had to be very careful to ensure that he did not analyze and interpret data according to his own

feelings or preferences. It was necessary that opinions were substantiated, all data gathered included those that were not expected or difficult to explain and the information provided by the participants was inclusive of their basis. He had to remain objective to ensure the quality of his research study and to be trustworthy (Gay, Mills & Airasian, 2006, pp. 111 & 480). Gay, Mills & Airasian (2006, p.480) have suggested that the six questions provided by I. Dey (1993) be applied to check the quality of the data:

1. Are the data based on one's own observation or is it hearsay?
2. Is there corroboration by others of one's observation?
3. In what circumstances was an observation made or reported?
4. How reliable are those providing the data?
5. What motivations might have influenced a participant's report?
6. What biases might have influenced how an observation was made or reported?

When it involves ethical issues, it was difficult at times to remain ethical but then it was necessary to ensure the creditability of qualitative research. There was so much of contact and interaction with the participants in the research settings that the researcher had to be careful to avoid conflict or harm. This was because a conflict could affect the success of the qualitative research. It could destroy a trusting relationship and the true information could not be obtained. From then on much prejudice existed and the caring attitude no longer prevailed. It could then become difficult to carry on with the study. Therefore the participants were met only when absolutely necessary and for clarification of related matters.

3.4 The Limitations of the study

Gay et al (2006) have defined a limitation to be some aspect of the study where the researcher finds a negative effect on his study and in which he has no control e.g. less

than ideal sample size and length of the study. In other words, limitations are influences that the researcher cannot control. For the study, the Ministry of Education only allowed the student participants to be selected from the Form 4 classes but not the students in the Form 5 or Form 6 classes. It was also not possible to really fixed a rigid timeframe to complete the study because of other uncontrollable factors like public or school holidays or the participants became indisposed due to sickness or maternity leave or had gone overseas or some urgent works that had cropped up or to attend meetings. There was nothing that a researcher could do when 28 out of 30 selected teacher respondents were female. The researcher had no alternative but to let the tides flowed but the essential thing was to ensure that in the end the information required for the study was obtained. Other limitations were due to the nature of the research itself such as:

* Generalization limitation

This is related to the inability to generalize results to other populations. The qualitative research has adopted the case study that is exploratory in nature and tailored to the needs of one population. It is difficult to transfer the findings to other populations or to draw general or far reaching conclusions from the findings of a qualitative study. This is because the findings depended heavily on the knowledge and interpretation of the researcher and it is questionable whether another researcher replicating the same qualitative study will achieve the same results. He can have different interpretation, asking different questions or change the design, halfway through or based on the perceptions of the participants' needs. In the case study, the findings cannot be transferable to other situations or circumstance due to differences in time, place, settings, context or people (Gay et al, 2006, p.407).

* Theoretical limitation.

This is due to the inability of the report to explain the phenomenon being studied in relation to the theory (Gay et al, 2006, p. 403). For example in the case study situation, it is found that the way the teachers taught the science subjects to the students is fundamentally to complete the syllabus and prepare them for the government examinations. This is because of the constraint of teaching time. This has confronted the theory of teaching and learning of science in schools to be done in a discovery method or Jerome S. Bruner's hypothesis that "any subject can be taught effectively in some intellectually honest form to any child at any stage of development." This is not because the teachers are not aware that their approach has gone haywire but because they are constrained by time factor and the examinations programmed by the Examination Syndicate in the Ministry of Education. These are factors that the teachers have no control. Therefore it is difficult to explain the phenomenon in relation to the theory of teaching and learning.

* Methodological limitation

Yet another form of limitation is the methodological limitation. This is very much related to the uncontrollability of the ideal sample size or the length of study to be taken. It can also be due to the lack of available reliable data or biasness due to self-reported data where the researcher has to take what others said at face value or due to selective memory or telescoping (recalling events that occurred at one time as if they occurred at another time) or attribution (taking positive events as your own doing but negative events to external forces) or even exaggeration of events than what is actually reported from the data.

* Evaluative limitation

This is related to the inability to be objective enough to report the data in an unbiased way instead making judgments and evaluations of data.

* Situational limitations

There are situations in the site where limitations occurred. For example the selection of the schools for the study is fundamentally to attain the required information to achieve the goals of the study. This is particularly essential to an exploratory study where the collection of information depended greatly on the participants in the site. The head teacher and the teachers in the school have to be supportive and cooperative to the needs of the researcher. If the head teacher is not interested to provide the necessary assistance to the researcher, the teachers too would act in the same manner. The teachers would ask whether the permission of the head teacher has been obtained or whether he/she is aware of the situation. This implies that they need to be notified by the head teacher. This is the culture of the school and it cannot be avoided or controlled by the researcher. It is better for the researcher to look for other schools where the environment is researcher friendly. In fact the researcher should have an understanding of the education system in the country in order to be better acquainted with the situations in the schools.

Another example is the meeting with two teachers at the interviews. These teachers have the habit to say “You know” at the beginning, in the middle or at the end of the conversation. This is the culture the teachers acquired in the schools and there is nothing the researcher can do about it. They frustrate you but you cannot do that to them because you want their information. It is advisable to check the background of the teachers who have been selected for the study. This will provide you with a better understanding of the teachers.

* Description limitation

The results are confined to describing the phenomenon under study and there is no room for predicting future behaviour.

* Instinctive limitation

There are no universal guidelines on how to carry out a case study and the researcher has to depend on his instincts and abilities and judgment.

3.5 Summary

The fundamental purpose of the research study was to examine the implementation of the 60:40 policy in the three selected regular day secondary schools. Four research questions were developed to provide the direction and scope to gather the information to achieve the purpose of the research study. Six research questions were also formulated to gather information about the disposition of the teachers towards the policy implementation. The research design selected was the multiple case study to help to attain an insidious understanding about the implementation of the 60:40 policy and its outcomes in the three selected schools. The selected participants were 30 teachers and 100 students from the three schools.

Questionnaires and interviews were the principle instruments used to collect the data. The other instrument was observation.

The collected data were then analyzed and sorted out into similarities and differences and classified into codes or categories and main categories according to their relationships

It was important to ensure that the data collected had reliability and validity and the research report had the credibility to withstand the scrutiny of the research community. The limitations of the research study were those related to generalization, theoretical,

methodological, situational, evaluative, ethical, descriptive and instinctive. Ethical issues also played a critical role in ensuring the success of qualitative research and ethics played an important role before, during and after the research inquiry.

3.6 Epistemology of Qualitative Research

The whole episode of the 60:40 policy can be unfolded in a form of an epistemology. Epistemology is basically about the acquisition of knowledge. In like manner the successful achievement of the 60:40 policy requires the understanding and acquisition of knowledge about the roles of many elements that influence the formation and outcome of the policy. The possible elements are the schools, teachers, students, parents, communities, private organizations such as industries, universities and colleges, policy formulators and implementers, governments at federal and state levels and other organizations or bodies such as the teachers union and parents-teachers associations. All these elements are participating in a cohesive and coordinated manner and acting to support each other to bring about the expected paradigm shift.

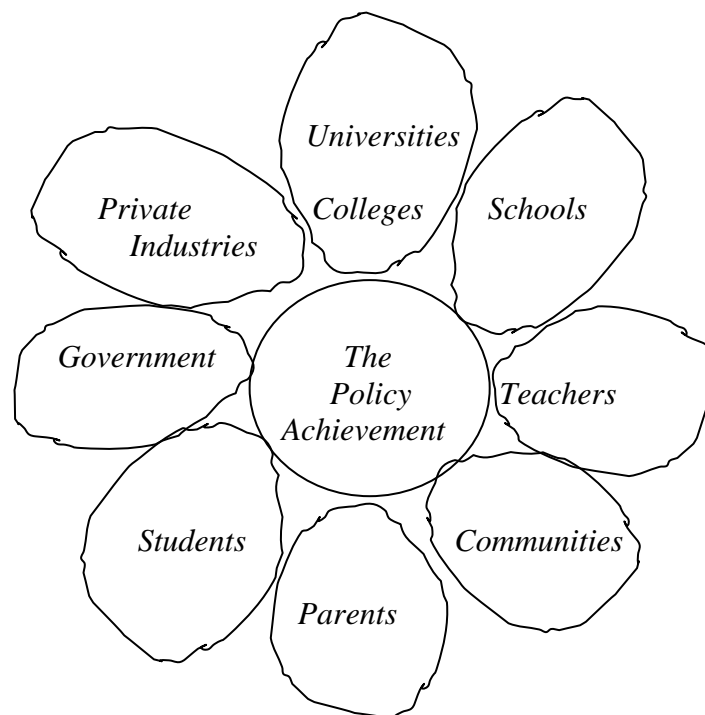


Figure 3.4: The Perfect Flower

The whole development can be likened to a flower that is unfolding itself (Figure 3.4). Each petal of the flower represents an element of knowledge of a situation or matter that is being acquired and learnt as the policy is being implemented and in the process advances a step closer to the desired outcome of the policy. The petals are unfolding in a sequential and coordinated manner over a certain timeframe and behold when all the petals are unfolded a perfect flower dangles before the eyes. The centre of the flower resembles the achievement of the 60:40 policy and a new horizon has emerged.

However, in reality conditions and situations do not remain stagnant. In this era of globalization and information communication technology (ICT) advances, the world has become a competitive landscape and conditions in terms of politics, economics, technology and culture change rapidly and unexpectedly in many countries. In like manner, industries and organizations face the pressure to change in terms of their strategies, structures and cultures from elements in their external environments. This is because there is intense competition in the industries. The firms in any industry are attempting to outperform each other by becoming more creative and innovative in order to gain competitive advantage or to maintain their competitive position. More goods and services become available and consumers have more choices to select from to meet their specific needs. The products and services are of better quality and prices have remained competitive, thereby benefiting the consumers. For firms to compete successfully they require the right type of human resource to bring about the necessary changes in order to become the first movers and to lead other firms in the industry. The demand on the education system to produce creative and innovative citizens for the country is even greater now than before. This has been the constant concern of the governments in the developed countries in particular Japan and United States of America.

The implementation of the 60:40 policy is also subjected to changes of the elements (such as the schools, teachers, students, parents, communities, private organizations such as industries, universities and colleges, policy formulators and implementers, governments at federal and state levels and other organizations or bodies such as the teachers union and parents-teachers associations) in the environments. The elements can change in terms of number and the rate at which they change. Any of these developments can create a state of uncertainty to the achievement of the said policy. When more elements start to change or the rate of change becomes more rapid then a greater state of uncertainty will be felt. Therefore it is imperative to study the state of the environment before deciding to implement the strategic actions or strategic thrusts to achieve the said policy. If this is not done then what has been planned is implemented could become out-of-time and redundant.

Depending on the state of uncertainty and deductive reasoning of what has been observed of the number of related events and experiences, the changes to be made to the implementation of the said policy can be fine tunings, incremental adjustments or drastic (transformational) changes. Therefore it can be seen that there must be given the flexibility in the implementation of the said policy because of the dynamic nature of the environment. There is no one universal path to the achievement of the 60:40 policy. Therefore the implementers of the policy must act like transformational leaders who constantly study the internal and external environments and create the visions and strategies and cause to bring about the necessary changes to ensure the achievement of the 60:40 policy. The style of leadership in the schools is expected to be different from corporate organizations. Schools are service oriented establishments to educate the citizens in the country while corporate organizations are to provide goods and services to the consumers and in return they make some profits. The objectives of the schools are different from those of the corporate world. As a consequence the style of

implementation that is practised in the schools to achieve the 60:40 policy will be expected to be more unique than what is seen in the profit oriented corporate organisations. This is because the success or failure of the implementation of the said policy depends more on the close collaboration and team work among the teachers.