IDENTIFYING FACTORS THAT WOULD PROMOTE STUDENTS' POSITIVE ATTITUDE TOWARD SCIENCE

BY

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ABSTRACT

Scientific literacy is essential to survive in this technological world, but it appears that scientific literacy is not of high priority for many students. This research project was undertaken to identify factors influencing urban secondary school students' attitude toward science. A princple components factor analysis of the factors influencing science attitudes revealed eleven factors labelled 'self-concept', science self-concept', 'sources of science knowledge', 'computer anxiety', 'computer attitudes', 'parents' science attitudes', 'peer group science attitudes', 'social effects of science', 'science curriculum', 'science learning activity', and 'students' attitude toward science'. Crosstabulations using Chi Square and Spearman Correlation computations revealed significant relationships between students' attitude toward science with students' science self-concept, computer attitudes, computer anxiety, perceived parents' attitude toward science, science learning activity, learning activities on computers, and students' favorite subjects. Results indicate that 66.7 % of the students had parents who graduated from universities or other higher institutions of learning. Just over 30 % of these students indicate any interest to engage in science if they were to further their studies, yet many plan to enter a science-related career.

APPROVAL PAGE

TITLE OF PROJECT PAPER: IDENTIFYING FACTORS THAT WOULD PROMOTE STUDENTS' POSITIVE ATTITUDE TOWARD SCIENCE

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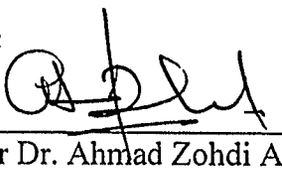

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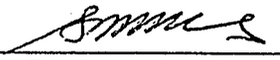

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DECLARATION

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. Other sources are acknowledged by reference notes and a bibliography is appended.

Date 31/10/97 Signature .....

Name: RAJA RAFIDAH HANIM BT
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Dedicated to my husband Wan and my children Nurul Hidayah, Mohamad Najmuddin, Aishah, Sakinah, and Nabilah.

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CHAPTER 1

INTRODUCTION

1.1 Background of the study

Malaysia is at the moment enjoying a healthy economic growth. With the presence of computer networking, telecommunication and a government mega project Multimedia Super Corridor (MSC), Malysia is not far behind from other countries in its participations in global economy. Unfortunately, the development of education in this country is not keeping up with the rapid change and development especially in the industrial sector. Due to the rapid growth rate in the industrial sector, our country is now facing an acute shortage of skilled labour to fill up the vacant positions created. To add to the problem, it has been reported by the Education of Ministry that, over the years, our students' academic performance and attitudes in the science subjects are heading generally in a negative direction. The Sijil Pelajaran Malaysia (SPM) recorded a 1.3% decline in the performance of the Science paper from 72.7% in 1994 to 71.45% in 1995. There has been a decline in interest in subjects like Science and Maths (key subjects required to attain adequate skills for the industrial sector jobs). In fact registration in the science stream has dropped dramatically over the last three years. On 13 January 1997, TV3 reported that the number of students entering the science stream after the Penilaian Menengah Rendah (PMR) for 1997 is only 21%. This is not very encouraging

considering the fact the Ministry of Education had set a target enrolment of 60% for the science stream by the year 2000. According to the Minister of Education, the situation is very critical and does not reflect the government's ultimate goal of a science conscious society, gearing toward a developed industrial nation (Berita Harian, 8 March 1996, p: 6). Scientific literacy is essential to survive in this technological world, but it appears that scientific literacy is not of high priority for many students (Atwater and Wiggins, 1995, p: 665).

According to the Curriculum Development Centre of the Ministry of Education (PPK), science teachers in school face problems of inadequate laboratories, insufficient science equipments and lack of skilled assistants in managing the science classes. Furthermore the new syllabus, Kurikulum Bersepadu Sekolah Menengah (KBSM) has reduced the number of pure science and science periods from five to four periods per week. This means that the science teachers have to cover the syllabus within a shorter period of time. This has resulted in an adverse effect on the students especially the average and weaker students who have difficulty in understanding the science concepts and principles (Interview with PPK official on 31 January 1997). This may contribute towards a decline in attitudes toward science among students.

According to the Research Centre for Science and Mathematics, RECSAM (1986), computer literacy and computer-based education are very much in the minds of education planners and decision-makers in the region. The ever decreasing cost of

computers and software has given rise to their increasing availability and application in schools. Many educational decision makers are faced with the difficult task of formulating policies pertaining to the introduction of computers into schools. At the school level research is needed to provide information to administrators and teachers to assist them in developing sound applications for computers in their schools. Research can provide insights into such aspects as new roles for teachers, new programme offering on computer education, and planning for and managing computers in schools (RECSAM, 1986).

According to RECSAM (1986), computers have already had a significant influence on both the general aims and objectives of education as well as classroom teaching and learning. Policy makers, educators, employers and parents have increasingly taken the position that the goals of formal education should allow for the acquisition of basic skills in using computers and the development of positive attitudes towards their productive roles in society (RECSAM, 1986). Many schools have introduced computer learning activities into their school curricula via separate computer awareness curricula or as part modification to existing curricula. In addition, computers are being more widely used as a tool for the teaching and learning of the existing subject matter. Computer-based drill and practice, tutorials, simulations and the rest are now becoming part of the teaching repertoire (RECSAM, 1986). Computer-based learning may contribute to improving students' attitudes toward science.

In line with our Prime Minister , Datuk Seri Dr Mahatir Mohamad's aim of providing education of international quality and status, the Education of Ministry has set a new target, that is the implementation of the Smart School throughout Malaysia by the year 1999 whereby all schools will be provided with computers (Radio 4 News, 31 January 1997). The Smart School concept embraces the use of information technology components such as multimedia and computer-aided learning facilities. Pupils will be taught to be innovative, creative and develop an analytical mind (Azran Aziz, New Sunday Times, 17 November 1996). This may help to improve students' attitude toward science.

1.2 Purpose Of The Study

This research project was undertaken to study factors that influence the attitudes of students toward science subjects. The determinants are divided into five broad categories. The first category, internal attributes, comprises the subscales general self-concept, science self-concept, computer anxiety, computer attitude, favorite subject, and attitude toward science. The second category termed significant others comprises the subscales peer groups' attitude toward science, and parents' attitude toward science. The third category, external variables, consists of the subscales science curriculum, science learning activity, and learning activities on computers. The fourth category, educational and career plans, consists of the subscales science educational plans, and career plans.

The fifth category, family variables consists of the subscales father or guardian's educational level, family income, and parents' occupation.

1.3 Research Hypotheses

The research hypothese are:

H1: There is a significant relationship between students' attitude toward science and parents' educational level.

H2: There is a significant relationship between students' attitude toward science and family's income.

H3: There is a significant relationship between students' attitude toward science and parents' career.

H4: There is a significant relationship between students' attitude toward science and the number of science courses that students choose to take.

H5: There is a significant relationship between students' attitude toward science and their choice of career.

H6: There is a significant relationship between students' attitude toward science and general self-concept.

H7: There is a significant relationship between students' attitude toward science and science self-concept.

H8: There is a significant relationship between students' attitude toward science and computer anxiety.

H9: There is a significant relationship between students' attitude toward science computer attitude.

H10: There is a significant relationship between students' attitude toward science and their favorite subjects.

H11: There is a significant relationship between students' attitude toward science and parents' science attitudes.

H12: There is a significant relationship between students' attitude toward science and peer groups' science attitudes.

H13: There is a significant relationship between students' attitude toward science and science curriculum.

H14: There is a significant relationship between students' attitude toward science and science learning activities.

H15: There is a significant relationship between students' attitude toward science and learning activities on computers.

H16: There is a significant relationship between students' attitude toward science and perceived performance in the science subjects.

H17: There is a significant relationship between students' attitude toward science and actual performance in the science subjects.

1.4 Significance Of The study

Apart from the research carried out by RECSAM in 1986, on computers in education and that, by the Curriculum Development Centre of the Ministry of Education in 1996, on interfacing, no scientific and empiral study have been carried out (to the best of the researcher's knowledge) on the relationship between computer usage and attitude toward science. This is an important research because of the government's commitment of introducing computer literacy and usage in Smart Schools. The study proposed by the researcher is directed toward providing some information that can be used by educators as a basis for the formulation of sound policies and making well considered decisions

regarding the introduction of computers to schools, with due consideration to the teaching of science. The problem of our students lack of interest in science present a strong justification for research in the areas of attitudes, motivation, science learning and career goals of urban secondary school students who use computers and those who don't. Before treatment studies can be useful , studies characterizing this population of students must be conducted. This research project is undertaken to characterize urban secondary school students with high and low attitudes toward science.

1.5 Statement Of limitations

Limitations of this study are as follows:

(I) This study is only meant to identify factors that influence students' attitudes toward science and the relationship between students' attitude toward science and science performance.Oher variables such as school climate, science class climate, social effects of science, school location, and the rest are not considered, However, their influence cannot be ignored.

(ii) This study is limited to Form Four pure science students in two urban schools in Selangor only.

(iii) Accuracy of the study is dependent upon how truthful and honest the students are in answering the questionaire.

(iv) The monthly test covering the same topic which is used to measure students' performance is assumed to be evaluated according to the same standard between the schools.

(v) The criteria which are used to measure social economic status are father's or guardian's occupation, parents' level of education, and family's monthly income only.

(vi) Items in the questionaire does not cover all aspects of students' attitude toward science subjects.

1.6 Operational Definitions

1.6.1 Attitude Toward Science

According to Evans (1965), attitude will shape an individual's pattern of behavior. Attitude is not determined when a child is born but is learned. Attitude is dependent on the environment upon which a child is brought up and the type of

upbringing that he receives. The importance of attitude is dependent upon the importance of the object of reference (Evans, 1965).

According to Katz (1966), attitude is something that has an influence on an individual's value on a symbol or object, whether he likes it or not. Attitude consists of affective and cognitive elements that is, attitude is something that arises from an individual's feelings, beliefs or thoughts toward a psychological object (cited in Adnan, 1985).

The term attitude is viewed differently by different researchers. According to Fernald (1985) "..... is a predisposition to react in a certain way, a readiness components of attitude is sometimes said to be thinking and reacting in a certain manner ." As such, if science is a predisposition to react, then there exist an 'attitude toward science'. For this research, it is described as a learned, predisposition, tendencies or inclinations to respond fairly consistently in an unfavorable or favorable manner.

1.6.2 Achievement

Karlinger (1973) defined academic performance as the score or grade obtained in a standard test or examination. It can also be stated as a teacher's evaluation toward a student's performance in class (Lee, 1980). According to Urdang (1976), achievement is dependent upon a student's ability to obtain good grades in a subject (Zalina, 1988).

Achievement usually means level of efficiency achieved in academic or school. So there is no better way to evaluate knowledge and achievement than through examinations. (Lim, 1989). Operationally, achievement in education in this study refers to marks obtained in a standard monthly test for Form four science students that was produced by a particular school and the marking scheme had been standardized.

1.6.3 Social Economic Status

Ting Chew Peh (1985) defined social class as a group of individuals who are in the same position in terms of political power, wealth, income, rank and work or relationship with sources of production (Ting, 1985). Generally, a class is a group of individuals who have the same characteristics in several criteria and are in the same level of position in society. Warner and Lunt (1942) in measuring social class, had used six main criteria that is work, total income, source of income, type of housing, living district and level of education (cited in Sharifah Alwiah, 1985). Kahl (1957) on the other hand, had used seven dimensions that is, work, property, social interaction with others, awareness of own class, value orientation, and power or ability to control the action of others (cited in Lim, 1989). According to Philip Kotler (1996), a person's social class is indicated by a number of variables, such as occupation, income, wealth, education, and value orientation, rather than by any single variable. Operationally, family variables selected in this study are parents' occupation, family income, and parents' educational level.

CHAPTER 2

REVIEW OF LITERATURE

2.1 Introduction

In this chapter, a review of literature concerning research studies on the relationship between students' attitude toward science and some independent variables such as social economic status, educational and career plans, internal attributes, significant others, and external variables, and achievement in science are discussed. This is then followed by literature concerning research studies on the relationship between students' attitudes toward science and computer usage. Finally an overview of research on computer education in Malaysia is given.

2.2 Social Economic Status

According to Lim (1989), social economic status is known to influence students' attitude and plays a role in the formation and change in students' attitude. This is shown by Fitt (1956) in New Zealand (cited in Lunn, 1972), Coster (1958) in the United States (cited in Lunn) and a study by Lunn (1972). By the time a child steps into school, the family has left a strong influence and mark on the child's values, attitudes, beliefs and behavior. School authorities and the teachers are not actually dealing with raw materials

but with children that have been socialized in their respective homes (Sharrock, 1970). The family's impact is so strong that pupils are said to bring their families to school. This can be seen from the culture and self-concept that is embedded in the child before the child enters school. Sub-culture is learned directly from the parents and the surrounding family, whereas self-concept is formed and expanded through interaction and the relationship with family members and neighbours. Both these factors will be the basis for attitude building in school later (Taylor, 1976).

Families with different social economic status are bound to experience different opportunities in life, exhibit different behaviors, live varied lifestyles, and have different attitudes, values, ideology and beliefs. This will have an effect on students' attitudes (Lim, 1989). Students from a low social economic status will enter school bringing along with them handicaps brought about by inadequate conditions such as limited cognitive skills, lack of motivation, low ego expansion and behavior which is not quite accepted to school (Sharifah Alwiah, 1985). This will place these students at a disadvantage compared to their peers from a higher SES. On the other hand, students from a high SES are in a better position with regards to culture and material. Their parents who are better educated and draw a higher income are able to own homes which are more comfortable, provide guidance, motivation and attention toward their children's academic performance and attitudes. These children will have a more positive attitude toward school and show an academic performance which is more encouraging (Lim, 1989). Lim's study is actually based on a study reported by Lunn (1972). Lunn had conducted a study on 2,000