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AUTHOR Abu Bakar, Kamariah; Tarmizi, Rohani Ahmad
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ABSTRACT

An assessment of the professional needs of science teachers was conducted in order to aid in the development of more effective preservice and inservice teacher training programs in Malaysia. A modified version of the Teacher Need Assessment Questionnaire was administered to 78 science teachers. Data analysis indicated that the top 25 perceived needs were mainly related to self-improvement. The five items rated as highest priority included: being creative in science instruction, updating knowledge in the application of science and technology in everyday life, updating knowledge of innovations in science instruction, updating knowledge in evaluating teaching effectiveness, and understanding the goals of the syllabus. Implications for teacher preparation in preservice and inservice programs are discussed. (JRH)

Teacher Preparation Concerns: Professional Needs Of Malaysian Secondary School Science Teachers

Kamariah Abu Bakar
Rohani Ahmad Tarmizi

Faculty of Educational Studies
Universiti Pertanian Malaysia
43400 UPM Serdang, Selangor
Malaysia

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TEACHER PREPARATION CONCERNS: PROFESSIONAL NEEDS OF MALAYSIAN SECONDARY SCHOOL SCIENCE TEACHERS

KAMARIAH ABU BAKAR
ROHANI AHMAD TARMIZI
Faculty of Educational Studies
Universiti Pertanian Malaysia

Abstract

In 1989, the nationally centralized Integrated Curriculum for Malaysian Secondary Schools (KBSM) was implemented. Integrated education is a strategy to relate the elements of knowledge, skills, language and values into all subjects, including science. In the process, it is hoped that the boundaries of disciplines be softened.

After about five years of implementation, an assessment of science teacher professional needs is deemed necessary. The establishment of the professional needs of these teachers would be helpful for the development of more effective preservice and inservice teacher training programs in Malaysia. In order to accomplish this a modified version of Teacher Need Assessment Questionnaire (Abu Bakar, 1984) which was modified from the Science Teacher Inventory of Needs (STIN - Zurub & Rubba, 1983) was used as an instrument for this study.

The instrument consists of five categories, namely, A: Diagnosing and Evaluating Learners for Science Instruction; B: Planning Science Instruction; C: Delivering Science Instruction; D: Managing and Administer Science Instruction; and E: Science Teacher Self Improvement. A coefficient alpha reliability estimates of 0.9913 and a split-half equal length Spearman-Brown coefficient of .9745 were obtained on the instrument.

In Malaysia, there are four categories of National Secondary Schools. They are the National Secondary Schools, The National Type Secondary Schools (Chinese), and two which are National Religious Secondary Schools (one controlled by the state and the other is directly controlled by the Ministry of Education). This study focussed on the science teachers from the latter category of schools.

A total of 78 science teachers were cluster sampled from 18 (about 50%) National Religious Secondary Schools responded in a recent survey. Data analysed indicated that the science teachers perceived that they needed four of six items in Category A, five of six items from Category B, twenty one items from a total of thirty two from Category C, nine of thirteen items from Category D, and 22 of 23 items from Category E. The top twenty five perceived needs were mainly (88%) for self improvement. It was found that the five items rated as highest needs were 'to be creative in science instruction', 'to update one's knowledge in the application of science and technology in every day life', 'to update one's knowledge of innovations in science instruction', 'to update one's knowledge in evaluating teaching effectiveness' and 'to understand the goals of the syllabus (in mastering the scientific skills in order to apply problem solving)'. Further analysis of items perceived needed by the science teachers are discussed in the paper. All the perceived needs suggest implications for teacher preparation both for preservice and inservice.

These findings may be generalized to the other types of schools in Malaysia considering that the same science curriculum is used in the schools, the science teachers attended similar preservice and inservice courses, and similar facilities and equipment are provided by the government. However, a national survey is felt necessary to provide inputs towards improvement of teacher preparation.

TEACHER PREPARATION CONCERNS: PROFESSIONAL NEEDS OF MALAYSIAN SECONDARY SCHOOL SCIENCE TEACHERS

KAMARIAH ABU BAKAR [1]
ROHANI AHMAD TARMIZI
Faculty of Educational Studies
Universiti Pertanian Malaysia

Introduction

As one of the newly industrialized countries of Asia, Malaysia is giving priority to the development of human resources covering the wholistic self in all aspects, namely, intellectual, physical, emotional, spiritual, social, behaviour-wise, aesthetic, economy, science and technology (Noordin, 1993:79). It is to this end that the Nation's educational development is generally heading, particularly in the field of science and technology.

In 1989, the nationally centralized Integrated Curriculum for Malaysian Secondary Schools (KBSM) was implemented. Integrated education is a strategy to relate the elements of knowledge, skills, language and values into all subjects, including science. In the process, it is hoped that the boundaries of disciplines be softened.

A full swing of five years had lapsed and the group of students who started Form I (equivalent to Grade 7 in the

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United States) Science in 1989, now had graduated from secondary schools. As for the teachers, most of them would have had at least three years teaching the new Integrated Science syllabus with some having about two years teaching other science subjects such as Chemistry, Biology, Physics and Additional Science.

Sufficient time have lapsed for teachers to realize how well they have fared in trying to achieve the philosophy, goals and aims of the science subjects they taught. Therefore, it is felt that an assessment of the teachers' professional needs is deemed necessary.

A perceived need is the felt discrepancy between what a person wants and what he or she has (Burton & Merrill, (1977); Zurub, 1982). Thus, perceived professional needs of Science teachers refer to the need to fulfill ones' profession well. In order to gather information on professional needs of science teachers, many studies had used inventories of science teachers' needs (Moore, 1975, 1977, 1978 in Texas; Rubba, 1980, 1981 in Illinois; Baird, et al. 1994 in 8 states). In Malaysia, apart from a 1984 national survey of 1162 secondary science teachers' needs (from 130 schools - Abu Bakar, 1984), no other research has been reported on such assessment. However, it must be noted that assessment of teachers' needs may have been conducted but not reported, by the Curriculum Development Center (CDC), Ministry of Education, solely for the purpose of conducting inservice programs.

With a scenario of a new curriculum being implemented there are bound to be new needs. Thus this study sought to assess the needs of secondary science teachers teaching in one type of school (The National Religious Secondary schools). It also looked at factors that influenced the professional needs of these teachers, problems faced by the teachers, and level of satisfaction towards their instructional skills.

Sampling Procedure

In Malaysia, there are four categories of National Secondary Schools. They are the National Secondary Schools, The National Type Secondary Schools (Chinese), and two which are National Religious Secondary Schools (one type is controlled by the different states and the other type is directly under the Ministry of Education). This study focussed on the science teachers from the latter category of schools.

A total of 78 science teachers, cluster sampled from 18 (about 50%) National Religious Secondary Schools, responded in this survey. The number of useable returns accounted for 74.3% of the total number (105) of science teachers from the sampled schools.

Instrumentation

The instrument used for this study evolved from the Science Teacher Inventory of Needs (STIN) developed by Zurub and Rubba (1983). The STIN consists of 76 items organized into seven categories of teachers' needs. The seven categories are: A: Specifying Objectives for Science Instruction (7 items); B: Diagnosing and Evaluating Learning (10 items); C: Planning Science Instruction (7 items); D: Delivering Science Instruction (18 items); E: Managing Science Instruction (10 items); F: Administering Instructional Facilities and Equipment (8 items); and G: Improving One's Competence as a Science Teacher (16 items). Each item is followed by a 5-point Likert scale of "NF, 1, 2, 3, 4" where NF = not familiar with the task, 1 = no need, 2 = little need, 3 = moderate need, and 4 = great need. The internal reliability of STIN was .95 determined by using the coefficient alpha and the split-half methods with the latter adusted by the Spearman-Brown formula (Abu Bakar, 1984).

The STIN was revised based on the philosophy, goals and aims of the new KBSM. The evolved version eliminated Category A (Specifying Objectives for Science Instruction) from the original STIN. Category A was eliminated since with the implementation of the Integrated Science Curriculum, it is a requirement that teachers write specific objectives for every class lesson. Therefore, teachers (who were involved in the

content validation process during the preliminary discussions) felt that it was a routine procedure and had suggested elimination. After much deliberations, Categories E and F were combined so as to suit the nature of work in the present school setting. As a result, the new instrument constitutes Category:

A: Diagnosing and Evaluating Learning (6 items);

B: Planning Science Instruction (6 items);

C: Delivering Science Instruction (32 items);

D: Managing and Administering Science Instructional Facilities and Equipments (13 items); and

E: Self Improvement of Science Teachers (23 items).

Each item is followed by a 5-point Likert scale of "NF, 1, 2, 3, NR" where NF = not familiar with the task, 1 = no need, 2 = moderate need, 3 = great need, and NR = not relevant to the science instruction. The coefficient alpha reliability estimates of the instrument was found to be .9913 and a split-half equal length Spearman-Brown coefficient of .9745 was also obtained.

Data Collection Procedure

Data collection was done in May 1994 when the researchers and others acknowledged on page 1 (see footnote) went to administer the questionnaires to the sampled schools. For

schools which were not too far away from the University, the questionnaires were collected by the researchers. Questionnaires which were not completed by teachers when the researchers went to collect them at the respective schools, were mailed back to the researchers.

Results of the Study

Demographic Findings

The respondent of this study consists of 78 science teachers from 18 schools which made up 74.8% of the total number of religious schools in Malaysia. Table 1 shows frequencies and percentages of respondents on selected demographic variables.

From the Table it showed that majority of the respondents were female teachers which made up 68.4% of the total respondents. Their age varies from 22 years to 47 years with a majority of them (43.4%) aged between 20 to 30 years. A total of 60.3% were graduate teachers whilst there were as many as 39.7% nongraduate teachers. The latter group comprised of either Temporary teachers, those with Certificate in Teacher Education or with a Diploma in Science and Education. From the tabulation, 72.4% of the respondents were Science majors whilst 23.7% were Non-science and 3.9% were Applied Science majors.

TABLE 1: DEMOGRAPHIC INFORMATION OF THE RESPONDENTS

Variables	Frequency	Percent
Gender		
Males	24	31.6
Females	52	68.4
Age		
21 - 30	33	43.4
31 - 40	37	48.7
41 - 50	6	7.9
Academic Qualification		
Non-Bachelor Degree	31	39.7
Bachelor Degree	47	60.3
Major Subjects		
Science	58	76.3
Non-science	18	23.7
Minor Subjects		
Science	31	69.6
Non-science	21	40.4
Teaching Experience		
less than 5 yrs.	25	32.9
5 - 10	29	38.2
11 - 16	15	19.7
17 - 22	6	7.9
greater than 22 yrs.	1	1.3

The data also showed that 59.6% of the science teachers took Science as a minor subject while others minor in non-science subject. The respondents' years of teaching experience were varied, ranging from 5 to 22 years with more than a third (38.2%) having 5 - 10 years of teaching experience. A majority (71%) however have less than ten years of teaching experience.

Professional Needs of the Science Teachers

The second part of the questionnaire dealt with items perceived as needed by the science teachers in the course of teaching science. Respondents were asked to designate their level of needs to items listed in the five categories. The following tables elicit items designated as professional needs ranking from most needed to least needed according to the categories.

A. Diagnosing and Evaluating Learners for Science Instruction

This section focused on the professional needs of science teachers in making diagnosis and evaluation in science instruction. Items were ranked according to the frequency of combined 'moderate needs' and 'great needs' responses, as can be seen in Table 2.

TABLE 2: PROFESSIONAL NEEDS IN DIAGNOSING AND EVALUATING LEARNERS IN SCIENCE INSTRUCTION

No.	Item	Professional Needs							
		1		2		3		2+3	
		Freq.	(%)	Freq.	(%)	Freq.	(%)	Freq.	(%)
A6	Use performance record to diagnose science learning.	19	(26.0)	32	(43.8)	22	(30.1)	54	(73.9)
A5	Interprete performance record to determine student readiness for science instruction.	22	(30.1)	28	(38.4)	22	(30.1)	51	(69.9)
A1	Design assessment item which validly assess science instruction.	20	(31.3)	26	(40.6)	18	(28.1)	44	(68.7)
A2	Arrange informal assessment situations in science teaching.	24	(31.6)	34	(44.7)	18	(23.7)	52	(68.4)
A4	Use assessment data to detect students with learning difficulties.	26	(34.2)	20	(26.3)	30	(39.5)	50	(65.8)
A3	Use variety of oral questions to determine student ability.	29	(38.3)	18	(23.7)	29	(38.2)	47	(61.9)

1 = No Need
2 = Moderate Need
3 = Great Need

It was found that all of the items constructed were needed by almost two-thirds to three-quarters of the respondents. This indicated that science teachers indeed required help in this category. The most prominent needed item for this category is 'Using performance record in diagnosing problems in science learning' followed by 'Interpreting performance record in determining learners readiness for science instruction'.

Additional information showed that several respondents had problems in 'construction of questions related to topics presented', 'determining the validity and accuracy of the constructed questions' and 'inadequate time to construct good questions'. About 6% responded that item 'design assessment questions that validly assess science instruction' was not familiar. This indicated that such activity was not conducted in science instruction. However, since this is a very important aspect, it can be implied that training of teachers should incorporate such aspect. Hence, science teachers should be made aware of the importance of such procedure.

B. Planning For Science Instruction

Planning is an essential component in the course of achieving effective and meaningful lessons. Well thought plans and careful planning however acquire several pertinent

considerations of professional needs of the science teachers. The following are items related to planning of science instruction which are deemed necessary in the course of becoming professional teachers. The items were ranked order according to most needed to least needed. In general, the findings showed that more than two-thirds of the respondents (66.3% - 74.3%) stated 'great need' and 'moderate need' for all items in this section. This indicated that science teachers from the sampled schools required assistance in planning for science instruction. Among the six items questioned, item 'Arrange the physical environment appropriate for science instruction' was ranked most needed (74.3%). This was followed by item 'Prepare instructional materials appropriate for science instruction' (73.4%), 'Use information on student readiness for planning science instruction' (72.0%), 'Select appropriate instructional strategies for science instruction' (71.2%), 'Understand the requirements of the science syllabus' (71.1%) and the least needed item was in 'Selecting ready-made teaching materials for science instruction' (66.3%). The following table indicated various level of needs elicited by respondents on the planning of science instruction.

TABLE 3: PROFESSIONAL NEEDS IN PLANNING SCIENCE INSTRUCTION

No.	Item	Professional Needs							
		1		2		3		2+3	
		Freq.	(%)	Freq.	(%)	Freq.	(%)	Freq.	(%)
B6	Arrange the physical environment appropriate science instructionns.	19	(25.7)	36	(48.6)	19	(25.7)	55	(74.3)
B5	Prepare instructional materials appropriate for science instruction.	20	(26.3)	36	(47.4)	20	(26.3)	56	(73.7)
B1	Use student readiness data to plan for science instruction.	21	(28.0)	28	(37.3)	26	(34.7)	54	(72.0)
B3	Select appropriate instructional strategies for science instruction.	21	(28.8)	23	(31.5)	29	(39.7)	52	(71.2)
B2	To understand the requirements of the syllabus (the acquisition of scientific skill for problem solving).	22	(28.9)	19	(25.0)	35	(46.1)	54	(71.1)
B4	Select commercially prepared instructional materials for science instruction.	26	(33.8)	35	(45.5)	16	(20.8)	51	(66.3)

1 = No Need
2 = Moderate Need
3 = Great Need

Several respondents further detailed their problems regarding selection of appropriate instructional strategies. Respondent indicated that they faced difficulties in topics

such as earth science, electronics, electricity, vectors, atom, electron, mass, electrolysis, and radioactivity which were mainly from physics and chemistry components. However only one biology topic 'Mendel's Theory' was considered difficult for the religious science teachers. This indicated that the least problem among science teachers was planning for biology components in science instruction.

Respondents also indicated that they needed assistance in the preparation of models, transparencies, charts and computer packages suitable for science instruction. Other forms of assistance elicited were in the preparation of science bulletin boards, science magazines for the schools, science modules and miniature science gardens. In addition respondents reported that too many topics were to be covered in the syllabus and inadequate science facilities posed obstacles in their professional developments.

C. Delivery of Science Instruction

This section dealt with perceived needs in delivering science instructions. Table 4 showed items of different levels of perceived needs. There were altogether 32 items which were perceived needed by more than 50% of the respondents. More importantly, 11 items were perceived 'great need' by 75% of the respondent.

The highest ranked item was 'Use regional resources to support science instruction'. This was followed by three items concerning strategies during science instructions; 'Use appropriate strategy for mixed ability students' (84%), 'Use computer in delivering science instruction' (83.2%) and 'Employ cooperative learning strategy in science lessons' (82.3%). The following seven items were perceived needed by three-quarter of the respondents. The items were 'Teach study skills to students' (79.5%), 'Employ value clarification in science instruction' (79.1%), 'Employ simulation technique in science instruction' (78.9), 'Conduct remedial lessons in science instruction' (78.7%), 'Arrange field-trips in teaching science' (78.4%), 'Teach students in acquiring problem solving skills' (75.7%), 'Employ variety of activities in science lessons' (75.6%) and 'Demonstrate science manipulative skills' (75.0%).

TABLE 4: PROFESIONNAL NEEDS OF SCIENCE TEACHERS IN DELIVERING SCIENCE INSTRUCTION

No.	Item	Professional Needs							
		1		2		3		2+3	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%
C24	Use regional expert resources to support science instruction.	7	(9.9)	45	(63.4)	19	(26.8)	64	(90.2)
C27	Use of appropriate strategy in teaching mixed ability students.	12	(16.0)	35	(46.7)	28	(37.3)	63	(84.0)
C26	Use computer in delivering sicence instruction.	11	(16.2)	30	(44.1)	27	(39.7)	57	(83.2)
C9	Employ cooperative learning strategy in science instruction.	11	(17.7)	35	(56.5)	16	(25.8)	51	(82.3)
C32	Employ study skill to students.	16	(20.5)	41	(52.6)	21	(26.9)	62	(79.5)
C10	Employ value clarification in science instruction.	14	(20.9)	39	(58.2)	14	(20.9)	53	(79.1)
C19	Employ simulation techniques in science instruction.	15	(21.1)	45	(63.4)	11	(15.5)	56	(78.9)
C28	Conduct remedial lesson.	6	(21.3)	38	(50.7)	21	(28.0)	59	(78.7)
C18	Arrange field trip for science teaching.	16	(21.6)	42	(56.8)	16	(21.6)	58	(78.4)

No.	Item	Professional Needs							
		1		2		3		2+3	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%
C8	Teach students in acquiring problem solving skill.	19	(24.4)	35	(44.9)	24	(30.8)	59	(75.7)
C22	Employ variety of activities in science instruction.	19	(24.4)	31	(39.7)	28	(35.9)	59	(75.6)
C5	Demonstrate science manipulative skills.	18	(25.0)	34	(47.2)	20	(27.8)	54	(75.0)
C1	Motivate students to learn science.	16	(25.4)	24	(38.1)	23	(36.5)	47	(74.6)
C14	Employ integrated strategy in science instruction.	19	(26.0)	33	(45.2)	21	(28.8)	54	(74.0)
C12	Use modules in science instruction.	18	(26.5)	33	(48.5)	17	(25.0)	50	(73.5)
C7	Employ problem solving in science instruction.	21	(26.9)	36	(46.2)	21	(26.9)	57	(73.1)
C6	Use inquiry teaching strategy in teaching science.	22	(28.9)	31	(40.8)	23	(30.3)	54	(73.1)
C29	Employ enrichment strategy in science instruction.	21	(27.6)	30	(39.5)	25	(32.9)	55	(72.4)
C13	Employ team teaching in science class.	20	(27.8)	38	(52.8)	14	(19.4)	52	(72.2)
C23	Use audio-visual aids effectively in science lessons.	22	(28.6)	20	(26.0)	35	(45.5)	55	(71.5)
C25	Use regional resources for science teaching.	23	(30.3)	35	(46.1)	18	(23.7)	53	(69.8)
C31	Manage time in science lessons.	24	(31.2)	24	(31.2)	29	(37.7)	53	(68.9)

No.	Item	Professional Needs							
		1		2		3		2+3	
		Freq.	(%)	Freq.	(%)	Freq.	(%)	Freq.	(%)
C4	Demonstrate science process skill.	22	(32.1)	28	(35.9)	25	(32.1)	53	(68.0)
C16	To relate science topic to Islamic principles in science instruction.	24	(32.4)	19	(25.7)	31	(41.9)	50	(67.6)
C3	Demonstrate a science concept.	26	(33.3)	30	(38.5)	22	(28.2)	52	(66.7)
C2	Conduct a science laboratory session.	27	(35.1)	16	(20.8)	34	(44.2)	50	(65.0)
C21	Employ peer tutoring in science teaching.	28	(35.9)	34	(43.6)	16	(20.5)	50	(64.1)
C20	Conduct group discussion during science instruction.	28	(36.4)	28	(36.4)	21	(27.3)	49	(63.7)
C17	Relate science lessons with environment/ everyday life.	29	(37.2)	21	(26.9)	28	(35.9)	49	(62.8)
C15	Integrate moral values in science instruction.	29	(37.7)	20	(26.0)	28	(36.4)	48	(62.4)
C30	Reinforce understanding at appropriate instances.	31	(39.7)	22	(28.2)	25	(32.1)	47	(60.3)
C11	Employ individualized instructional strategies in teaching science.	34	(44.7)	33	(43.4)	9	(11.8)	42	(55.2)

1 = No Need
2 = Moderate Need
3 = Great Need

D. Managing and Administering Science Instructional Facilities and Equipment

Table 5 compared perceived needs for science teachers in managing and administering science instructions. Findings showed that approximately 52% to 84.8% of the respondents indicated needs to these items. More than 75% of the science teachers maintained that they needed assistance in eight of the total items. The item cited perceived as needed by most of the respondents was 'Organize facilities in the science laboratory' (84.8%) followed by 'Prepare inexpensive teaching materials' (81.1%). On the other continuum, respondents cited least in need of assistance on 'Maintaining classroom discipline' (52.7%). Further details about the items are presented in the following table.

TABLE 5: PROFESSIONAL NEEDS IN MANAGING AND ADMINISTERING SCIENCE INSTRUCTION

No.	Item	Professional Needs							
		1		2		3		2+3	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%
D6	Organize facilities in a science laboratory.	11	(15.3)	31	(43.1)	30	(41.7)	61	(84.8)
D9	Construct simple science laboratory equipment.	14	(18.9)	44	(59.5)	16	(21.6)	60	(81.1)
D1	Identify sources of free and inexpensive science instructional materials.	14	(19.2)	42	(57.5)	17	(23.3)	59	(80.3)
D5	Utilize computers for management of science instruction.	14	(20.3)	31	(44.9)	24	(34.8)	55	(79.9)
D13	Maintain live organisms for science instruction.	15	(20.8)	44	(61.1)	13	(18.1)	57	(79.2)
D4	Supervise a 'para professional' such as a lab assistant in the science classroom.	15	(21.1)	40	(56.3)	16	(22.5)	56	(78.8)
D8	Maintain science laboratory equipment.	15	(21.4)	28	(40.0)	27	(38.6)	55	(78.6)
D12	Select supportive materials for the teaching of science.	17	(23.0)	33	(44.6)	24	(32.4)	57	(77.0)
D1	Manage budget for science instructions.	18	(28.1)	26	(4.06)	20	(31.3)	46	(71.9)
D7	Set up a laboratory supply.	20	(29.0)	26	(37.7)	23	(33.3)	49	(71.0)

No.	Item	Professional Needs							
		1		2		3		2+3	
		Freq.	(%)	Freq.	(%)	Freq.	(%)	Freq.	(%)
D10	Select appropriate science equipment for students learning.	26	(36.1)	23	(31.9)	23	(31.9)	46	(63.8)
D2	Maintain students' safety in the science laboratory.	30	(39.5)	17	(21.8)	29	(38.2)	46	(60.0)
D3	Maintain good discipline in the science laboratory.	36	(47.4)	10	(13.2)	30	(39.5)	40	(52.7)

1 = No Need
2 = Moderate Need
3 = Great Need

Other needs revealed by the respondents (from the open ended question) were to acquire more relevant and sophisticated teaching aids, get more cooperation among science teachers, acquire more adequate facilities and obtain support from trained laboratory assistants.

Respondents also cited items that they felt were not relevant to their teaching responsibilities. The items were 'Manage school science budget', ' Supervise laboratory assistants', and 'Select laboratory equipment and apparatus for student use'.

E. Science Teacher Self-Improvement

In general, for this category, majority of the respondents (78% - 93.9%) showed that all of the self-improvement items were perceived needed in their professional development. Hence it can be reiterated here that majority of respondents felt a need in improving themselves in particular, to update one's knowledge, strategy and skills related to science instructions. This result strengthened perceived needs revealed from earlier discussion of the Religious Secondary School science teachers' professional needs. In a positive light, they also indicated perceived need to work towards a degree in science education.

It was found that seven items from this category were perceived needed by almost 90% of the respondents. The items were ' Update one's knowledge in physics' (93.9%), 'Update knowledge of uses of science/technology' (93.6%), 'Update one's scientific skills in physics' (92.6%), ' Obtain information on innovations in science instruction' (92.3%), 'Being creative in science instruction' (90.9%), 'Update one's knowledge on cooperative learning' (90.9%) and 'Update one's knowledge/skills in earth science/geology' (90.5%). Table 6 detailed the items perceived needed by the science teachers in ranked order.

TABLE 6: PROFESSIONAL NEEDS FOR SELF-IMPROVEMENT

No.	Item	Professional Needs							
		1		2		3		2+3	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%
E5	Update one's scientific knowledge in physics	4	(6.1)	36	(54.5)	26	(39.4)	62	(93.9)
E10	Update one's knowledge of man's utilization of science/technology.	5	(6.4)	35	(44.9)	38	(48.7)	73	(93.6)
E9	Update one's scientific skills in physics.	5	(7.4)	40	(58.8)	23	(33.8)	63	(92.6)
E15	Obtain information on innovations in science instruction.	6	(7.8)	35	(45.5)	36	(46.8)	71	(92.3)
E14	Being creative in science instruction.	7	(9.1)	29	(37.7)	41	(53.2)	70	(90.9)
E18	Update one's knowledge in cooperative learning.	6	(9.1)	42	(63.6)	18	(27.3)	60	(90.9)
E8	Improve one's scientific skills in earth science/geology.	6	(9.5)	39	(61.9)	18	(28.6)	57	(90.5)
E11	Update one's knowledge on careers related to science.	8	(10.3)	44	(56.4)	26	(33.3)	70	(89.7)
E17	To conduct modular teaching.	6	(10.9)	35	(63.6)	14	(25.5)	49	(89.1)

No.	Item	Professional Needs							
		1		2		3		2+3	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%
E4	Update one's knowledge in earth science/ geology.	7	(11.1)	36	(57.1)	20	(31.7)	56	(88.8)
E13	Update one's knowledge on science curriculum.	9	(11.8)	37	(48.7)	30	(39.5)	67	(88.2)
E16	Improve one's thinking skills.	10	(13.0)	36	(46.8)	31	(40.3)	67	(87.1)
E6	Update one's scientific skills in biology.	9	(13.6)	35	(53.0)	22	(33.3)	57	(86.3)
E22	Update one's knowledge about gifted children.	11	(14.3)	45	(58.4)	21	(27.3)	66	(85.7)
E21	Improve one's academic qualification in science education.	11	(14.5)	34	(44.7)	31	(40.8)	65	(85.5)
E2	Update one's knowledge in biology.	10	(15.2)	32	(48.5)	24	(36.4)	56	(84.9)
E7	Update one's scienctific skills in chemistry.	10	(15.2)	33	(50.0)	23	(34.8)	56	(84.8)
E12	Update one's knowledge on society issue related to science.	12	(16.0)	36	(48.0)	27	(36.0)	63	(84.0)
E1	Update one's knowledge to evaluate own teaching.	13	(16.9)	28	(36.4)	36	(46.8)	64	(83.2)
E23	Update one's knowledge on weak performing students.	14	(19.4)	35	(48.6)	23	(31.9)	58	(80.5)

No.	Item	Professional Needs							
		1		2		3		2+3	
		Freq.	(%)	Freq.	(%)	Freq.	(%)	Freq.	(%)
E3	Update one's scientific knowledge in chemistry.	13	(19.7)	27	(40.9)	26	(39.4)	53	(80.3)
E20	To conduct action research in the classroom.	16	(21.9)	43	(58.9)	14	(19.2)	57	(78.1)
E19	Improve one's communicative skills.	17	(22.1)	32	(41.6)	28	(36.4)	60	(78.0)

1 = No Need
2 = Moderate Need
3 = Great Need

F. The Critical Professional Needs

This section dealt with items that were categorized as critical. These were items perceived as 'great need' by more than a third (36.4% - 53.2%)) of the respondents. Listed in Table 7 were the top 26 critical items ranked from highest to lowest need.

From the data displayed it can be generalized that science teachers perceived great need in their professional development in three broad categories namely, update one's scientific knowledge in various science discipline, improve

instructional skills and laboratory management and update one's information on self-improvement.

Specifically, the most critical/pertinent needs cited by the respondents was to be creative, innovative and critical in their instructional activities. Respondents also indicated that they need to update their knowledge in chemistry, physics, biology and uses of science/technology for everyday life. Related to instructional activities, emergent needs in preparation and utilization of teaching aids, teaching problem solving skills, providing different types/modes of questioning technique and inculcation of moral values in science instruction were cited.

TABLE 7: THE TOP TWENTY-SIX ITEMS: THE CRITICAL/PERTINENT PROFESSIONAL NEEDS

Item	Freq. of great need	%
Being creative in science instruction.	41	53.2
Update one's scientific knowledge of man's utilization of science/technology.	38	48.7
Obtain information on innovations in science instruction.	36	46.8
Update one's knowledge to evaluate own teaching.	36	46.8

Understand the requirements of the syllabus (acquisition of scientific skills for problem solving).	35	46.1
Use of teaching aids effectively in science lessons.	35	45.5
Conduct science laboratory lessons.	34	44.2
Relate science topic to Islamic principles in science lessons.	31	41.9
Organize facilities in a science laboratory.	30	41.7
Work toward graduate degree in science education.	31	40.8
Improve one's thinking skills.	31	40.3
Select appropriate instructional strategies for science instruction.	29	39.7
Use computer in science instruction.	27	39.7
Update one's knowledge in science curriculum.	30	39.5
Maintain discipline in classrooms.	30	39.5
Use assessment data to detect students with learning difficulties.	30	39.5
Update one's scientific knowledge in chemistry.	26	39.4
Update one's scientific knowledge in physics.	26	39.4
Maintain science laboratory equipment.	27	38.6
Maintain students' safety in the science laboratory.	29	38.2
Use variety of oral questions to determine students' ability.	29	38.2

Use appropriate strategy in teaching students of mixed ability.	28	37.3
Motivate students to want to want to learn science.	23	36.5
Inculcate moral values in science instructions.	28	36.4
Improve one's communication skills.	28	36.4
Update one's scientific knowledge in biology.	24	36.4

Factors Influencing Professional Needs

For the objective on factors that influenced the professional needs of the science teachers, it was found that two factors, namely, age and teaching experience, had some bearing on the professional needs. The Chi-square analyses showed that younger teachers and teachers with less teaching experience needed significantly more help than their counter parts. It was found that teachers between 22-33 years old indicated more need to improve their professionalism in eight items out of 80 items, as listed in Table 8, compared to 34-47 year olds (median being 33 years). More teachers (with 1-7 years experience) indicated they needed help compared to those with 8-24 years experience (7 years being the median). Teachers with less experience indicated that they needed help in three items as listed in Table 9. Thus, items 'Select commercially made materials for science instruction' and

'Motivate students to be interested to learn science' seemed to be congruent for the younger teachers with less teaching experience. As for the other items, there seemed to be no significant difference between needs for the particular items by the different groups.

TABLE 8 : INFLUENCE OF AGE ON LEVELS OF PROFESSIONAL NEEDS

Items		22-33yrs. %	34-47yrs. %	X^2	Sig.	N
Identify students with learning problems	NN	13.3	20.0			
	N	45.3	21.3	5.370	.020	75
Intepret students' performance records	NN	12.5	16.7			
	N	48.6	22.2	4.097	.043	72
Select commercially made materials for science instructions	NN	11.8	21.1			
	N	47.4	19.7	8.302	.004	72
Prepare teacher made instructional materials for science instruction	NN	9.3	16.0			
	N	50.7	24.0	5.614	.018	75
Motivate students to be interested to learn science	NN	6.5	17.7			
	N	50.0	25.8	7.234	.007	62
Use an inquiry teaching strategy in teaching science	NN	10.8	17.6			
	N	47.3	24.3	4.798	.029	74
Employ individualized instructional strategies in teaching science	NN	20.3	24.3			
	N	39.2	16.2	4.875	.027	74
Use area/regional resources to support science instruction	NN	12.2	18.9			
	N	47.3	21.6	5.683	.017	74

NN = No Need N = Need

TABLE 9 : INFLUENCE OF TEACHING EXPERIENCE ON LEVEL OF PROFESSIONAL NEEDS

Items		1-7yrs. %	8-24yrs. %	X^2	Sig.	N
Select commercially made material for science instruction	NN	12.0	22.7	4.872	.027	75
	N	40.0	25.3			
Motivate students to be interested to learn science	NN	6.6	19.7	5.982	.014	61
	N	44.3	29.5			
Employ cooperative learning strategy science instruction	NN	3.3	15.0	6.414	.011	60
	N	48.3	33.3			

NN = No Need N = Need

Levels of Satisfaction and Exigency

The science teachers were asked to give their opinions on their level of satisfaction towards their instructional skills. From the responses, it was found that majority of teachers (80%) were satisfied with their instructional skills, inclusive of about 7 respondents (9.3%) who were very satisfied. However, 15 teachers (20%) indicated that they were less satisfied with their skills.

On a question asking teachers about the level of exigency to improve on their instructional needs, majority (93.5%)

indicated that they needed help with about 35% of teachers indicating very high need. However, only 5 teachers (6.5%) attested to not needing help. From the above information, it could be concluded that even though science teachers were satisfied with their instructional skills, however, most of them felt that they still needed help to improve their instructions.

Problem Faced by Science Teachers

Findings on open responses to ascertain problems encountered by science teachers fall into three categories, namely, problems related to delivering instruction, problems related to students, and problems related to the teachers themselves. Problems categorized under 'Problems related to delivering instruction' were those cited by teachers as: lack of basic facilities like apparatus and laboratories, lack of teaching aids for instance computers, lack of qualified laboratory assistants, lack of cooperation from laboratory assistants, lack of support from various people like the principals and other teachers. Some teachers mentioned that they faced shortage of time to cover the vast materials specified in the curriculum.

Teachers also faced problems related to students. They noted that their students lack exposure in scientific

knowledge, were unmotivated to learn science, and were not competitive among themselves. Some of the listed problems related to the teachers themselves were lack of inservice courses offered, lack of teaching experience, lack of support from parents and society, lack of teachers (in some schools), having difficulty in relating Islamic principles to science, and lack of current information to update one's knowledge.

Discussion and Conclusions

The perceived professional needs of Malaysian Science teachers from the National Religious Secondary Schools were four of six items in Category A, five of six items from Category B, twenty one items from a total of thirty two from Category C, nine of thirteen items from Category D, and 22 of 23 items from Category E. The prominent perceived needs were mainly in Category E: Self Improvement of Science Teachers.

The five items rated as of highest needs were 'To be creative in science instruction', 'To update one's knowledge in the application of science and technology in every day life', 'To update one's knowledge of innovations in science instruction', 'To update one's knowledge in evaluating teaching effectiveness' and 'To understand the goals of the syllabus (in mastering the scientific skills in order to apply problem solving)'. Of all the above mentioned needs , only

'To update one's knowledge of man's utilization of science/technology' was congruent with the top five items perceived by science teachers under the old curriculum (Abu Bakar, 1984). However, if the top twenty five items were compared, only some of the items perceived needed then were mentioned as needed now and this reflects the changing philosophy, goals, and the vision of the country.

Younger teachers and teachers with less teaching experience need significantly more help than their counter parts in certain professional need items. Teachers between 22-33 year old indicated more needs to improve their professionalism in the identification of students with learning problems, in interpreting students' performance records, in selecting and preparing instructional materials, in motivating students to learn science, in employing inquiry and individualized instructional strategies, and in the use of local resources, than teachers between 34-47 years old. Teachers with 1-7 years experience need more help in selecting commercially made materials for science instruction, in motivating students and in employing cooperative learning strategy compared to those with 8-24 years experience. Thus, young teachers with less teaching experience seemed to need more help in selecting instructional aids and motivating students to be interested to learn science.

The prominent perceived professional needs which exist amongst the secondary science teachers have implications for science teacher training not only at the in-service level but also at the pre-service level. The respective areas designated as prominent perceived professional needs should be further emphasized during future pre-service training of secondary science teachers. These areas should also be focused on for in-service activities.

Most teachers were generally satisfied with their instructional skills since the teachers were trained in science or areas related to science. However, almost all teachers (except for 5 out of the total sample) felt that they still needed help to improve their instructions. Teachers who have a strong background in science and well equipped with the different teaching strategies will be able to impart the knowledge more effectively and confidently. Confidence would project high professionalism and with a repertoire of strategies to use, teachers would be able to motivate students to like science especially when there is a current decline in students wanting to pursue the disciplines of science. The latter fact has been cited in Zin and Lewin (1993).

Problems faced by teachers in relation to science instruction were those allied with lack of facilities and support from different people at the schools, and lack of

opportunities to update one's knowledge. Better support from all sectors are needed if teachers were expected to do a better job of handling the science knowledge and skills in their instruction. As for the students, teachers found them to be neither motivated to learn science nor wanting to be competitive.

The lack of knowledge in science, lack of motivation to learn science and lack of competitiveness amongst students may be as a result of the previous 'Man and Environment' syllabus taught at Standard 4 - 6 (equivalent to grades 4 - 6 in the United States), which has, since December 1994 been replaced by the new Science for Primary Schools. The former syllabus evolved from a mix-bag of science, health science, history, geography and civics subjects, taught by 'general' teachers. The problems of delivery arose when the science components were unattended to, possibly because of lack knowledge and confidence amongst the teachers. If science is not made interesting to students at the primary level, it may be difficult for secondary teachers to change the set attitudes towards science brought by students to the secondary schools, thus may lead to the dwindling number in science majors later at the upper secondary level.

The number of useable returns received were 74% of science teachers at almost 50% of the total number of National Religious Secondary Schools. This high values enable the

writers to place confidence in the generalizability of the prominent perceived professional needs of the other science teachers in the same school type. However, the findings of this research may be generalized for the other types of schools in Malaysia considering that the same science curriculum is used in the schools, the science teachers attended similar preservice and inservice courses, and similar facilities and equipment are provided by the government. However, a national survey is felt necessary to provide inputs towards improvement of teacher preparation.

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