THE CONTEXT OF A CURRICULUM INNOVATION

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ABSTRACT

This paper is focused on an evaluation of the context of an implementation of the Smart School Curriculum. It was aimed at defining the conditions of the environment of the school in which the curriculum took place; the preparedness of the teachers, the participants, and the parents involved; as well as the problems and the needs of the school. Two questionnaires were used to collect data from the teachers and students. The data was analysed using Quest (Adams & Khoo, 1996). The magnitude of effects (Carver, 1993; Cohen, 1988) was used to explore some of the results of Quest analyses. Data was also collected from interviews with the principal and selected teachers. Content analysis was used in analysing the qualitative data. The study found that with low familiarity of the curriculum documents, the teachers understood the first, second, and fourth objectives of the curriculum; and perceived that these three objectives were relevant to the needs of the school. It was also noted that the students with higher socio-economic status (SES) had a more positive view of the potentials of the school in achieving the curriculum objectives whereas less ICT-competent students had a higher perception of the ability of the school in achieving the objectives. To a small extent, the parents supported the curriculum implementation. The needs of the school before the curriculum implementation were the quality and quantity of hardware and software that was provided as well as human resources.

Introduction

The Smart School was one of the seven multimedia flagship applications established to propel efforts in making Malaysia a developed nation by the year 2020. The Ministry of Education Malaysia (MOE, 1997) defines the Smart School as "a learning institution that has been systematically *reinvented* in terms of learning-teaching practices and school management in order to prepare children for the Information Age" (p. 20). The objectives of the Smart School Curriculum are to help students achieve overall balanced development; to integrate knowledge, skills, values, and correct use of language, to state explicitly intended learning outcomes for different ability levels, to offer multidisciplinary, thematic, and continuous learning, and to foster the knowledge, skills, and attitudes appropriate for success in the Information Age.

This curriculum context evaluation was conducted at Kinabalu Secondary School Sabah (KSSS). The study was aimed at exploring and defining the context of the school in which the Smart School Curriculum took place. The conditions of the environment of the school in which the curriculum took place were explored. Additionally, the problems and needs of the school for the curriculum implementation were also identified.

Methodology

The evaluation of the context (Griffin, 1994; Stufflebeam, 1984) for the implementation of the Smart School Curriculum was based on the case study method (Stake, 1995; Yin, 1994). It involved 85 students and 23 teachers who participated in the curriculum implementation. A combination of quantitative and qualitative approaches was used in the study. Two sets of questionnaires were used to collect data from the teachers and students. The data was based on the Likert five-point scale ha was analysed using Quest (Adams & Khoo, 1996), an interactive computer analysis software which uses the *item response theory and* Rasch *partial credit model* (Hambleton & Swaminathan, 1985; Wright & Masters, 1982). Quest analyses mainly involve the interpretation of variable maps generated by the program based on fixed-response data of the students and the teachers. To complement generalisations from the quantitative method, data was also collected from open-ended items of the questionnaires, interviews with the principal and selected teachers. Content analysis was used for analysing the qualitative data. The findings of the study are presented in the following headings.

The Context of the Teachers

The Perception on the Smart School Curriculum Objectives

From the manager's point of view, the Principal was of the opinion that the Vision and Mission of KSSS concurred with the objectives of the Smart School Curriculum:

> If you look at the Smart School Curriculum [the Mission and Vision of the school] are surely suitable...
>
> Our mission is to acculturate students with modern technology and thinking skills to fulfil the needs of the nation. It means that we educate our students with culture of technology, so that every student is able to use sophisticated technology to

> retrieve information. They can think critically, meaning that they don't take others' opinion, but they think...
> Our vision is to reform towards excellent teaching and learning with technology. So we practise knowledge culture, loving, creativity, moral excellence, and spirituality. Sometimes, no matter who, when he has high knowledge culture, he must remember God; otherwise he will be drifted....

Figure 1 shows the variable map for items pertaining to the objectives of the Smart School Curriculum as perceived by 22 teachers. The thresholds of the items were clustered in three vertical columns according to three groups of responses to the five objectives of the Smart School Curriculum shown in Tables 1. These groups comprise responses to three main items: "I *understand* the goals of the Smart School Curriculum", "The goals of the Smart School Curriculum are relevant to the goals of the *National Philosophy of Education*", and "The goals of the Smart School Curriculum are relevant to the needs of the *school*".

Table 1: Objectives of the Smart School Curriculum

No.	Objective
1	to help students achieve overall balanced development
2	to integrate knowledge, skills, values, and correct use of language
3	to state explicitly intended learning outcomes for different ability levels
4	to offer multidisciplinary, thematic, and continuous learning
5	to foster the knowledge, skills, and attitudes appropriate for success in the Information Age

Generally, the estimates of the teachers and the thresholds in the variable map show that the teachers' perceptions on the goals of the Smart School Curriculum were positive. The mean estimate of the teachers was found to be –0.25 with the standard deviation of 1.40 whereas the mean estimate of the items was –0.63 with the standard deviation of 0.69. The variable map, case details and the item details show that none of the 22 teachers responded to '1' (strongly disagree) or '2' (disagree) to any of the 15 items. The threshold position of 4.4 showed that the fourth objective (to offer multidisplinary, thematic, and continuous learning) of the curriculum was the most understood objective. As seen on the map, all except one teacher (95.5%) were above the threshold positions of items 2.4 and 4.4 implying that it is likely that they understood the second (to integrate knowledge, skills, values, and correct use of language) and the fourth objectives. The teachers' distribution against the item thresholds also implied that all except eight teachers (63.6%) are likely to agree that they understood the third objective (to state explicitly intended learning outcomes for different ability levels). The map also implied that

it was difficult for 16 teachers (72.7%) to agree that they understood the first objective (to help students achieve overall balanced development), while only 4 teachers (18.2%) are likely to understand the fifth objective (to foster the knowledge, skills, and attitudes appropriate for success in the Information Age).

On the relevance of the Smart School Curriculum and National Philosophy of Education (NPE), the distribution of the teachers against the second column of the item thresholds point towards the implications that it is likely that all except one teacher (95.5%) agreed that the second and the fourth objectives of the Smart School Curriculum were relevant to NPE, 16 (72.7%) of the teachers are likely to agree that the first and the fifth objectives of the Smart School Curriculum are relevant to the NPE, 14 (63.6%) of the teachers are likely to agree about the relevance of the third objective of the Smart School Curriculum with the NPE.

However, the comparison of the teacher distribution with the last column of the map in Figure 1 shows that teachers were generally not so agreeable that the goals of the Smart School Curriculum were relevant to the needs of the school (thresholds of 11.4, 12.4, 13.4, 14.4, and 15.4). It implied that only five (22.7%) of the teachers are likely to agree that the fifth objective are relevant to the needs of the school; six (27.3%) of the teachers are likely to agree that the first objective is relevant to the needs of the school, while 16 (63.6%) of them are likely to state that the second, third and forth objectives are relevant to the needs of the school.

It can be generalised in this subsection that teachers perceived well the objectives of the Smart School Curriculum. The teachers perceive that the curriculum was relevant to the needs NPE but, to a certain extent, less relevant to the needs of the school.

The perceptions of teachers on the Smart School Curriculum were considered to be related to the way in which they perceived the curriculum change, from the Secondary School Integrated Curriculum (KBSM) to the Smart School Curriculum. These perceptions are presented in the following subsection.

Teachers' Knowledge about the Curriculum Change

In the questionnaire for teachers, teachers were asked to state their degree of agreement about their knowledge regarding the changes in the following aspects: teaching and learning *culture, management* system, *assessment* system, *multimedia* technology, Local Area Network (*LAN*) to share information, Wide Area Network (*WAN*) with other organisations, preparation *of software,* emphasis on acquisition of *knowledge, thinking* skills across subjects, *specific* thinking skills in individual subjects, *value* inculcation, and integration of *computer* knowledge and skills in all subjects.

Quest analysis showed that the mean threshold of the items was at -0.28 (SD=0.18) and the mean estimate of the teachers was at -0.31 (SD=1.36), which is quite near the mean threshold of the items. In order to show the locations of all the teachers and the thresholds, the variable map of the items is reproduced in Figure 2.

Context Evaluation of Teachers

Item Estimates (Thresholds)
all on ob (N = 22 L = 15 Probability Level= .50)

		Understood (1-5)	NPE (6-10)	School (11-15)
	X			
	X			
2.0				
	X			
		5.5		
	X	2.5		
			10.5	
1.0		**5.4**		15.5
		1.5		11.5
	X			
			7.5	**15.4**
	X	**1.4**		**11.4**
				12.5 13.5
	XX			
.0	XXXXX			14.5
		3.5	8.5	
	X			**12.4 13.4**
			6.5	**14.4** 15.3
		3.4	**8.4**	
-1.0				
	XX	4.5	**6.4 10.4**	
		1.3	5.3	11.3 14.3
	XXX		9.5	
	XX			
		2.4 3.3	6.3 8.3	12.3 13.3
-2.0				
			9.4	
		4.4		
			7.4	
-3.0				
	X			

Each X represents 1 teacher

Figure 1: Variable map of the goals of the Smart School Curriculum

Context Evaluation of Teachers

Item Estimates (Thresholds)
all on ch (N = 23 L = 12 Probability Level= .50)

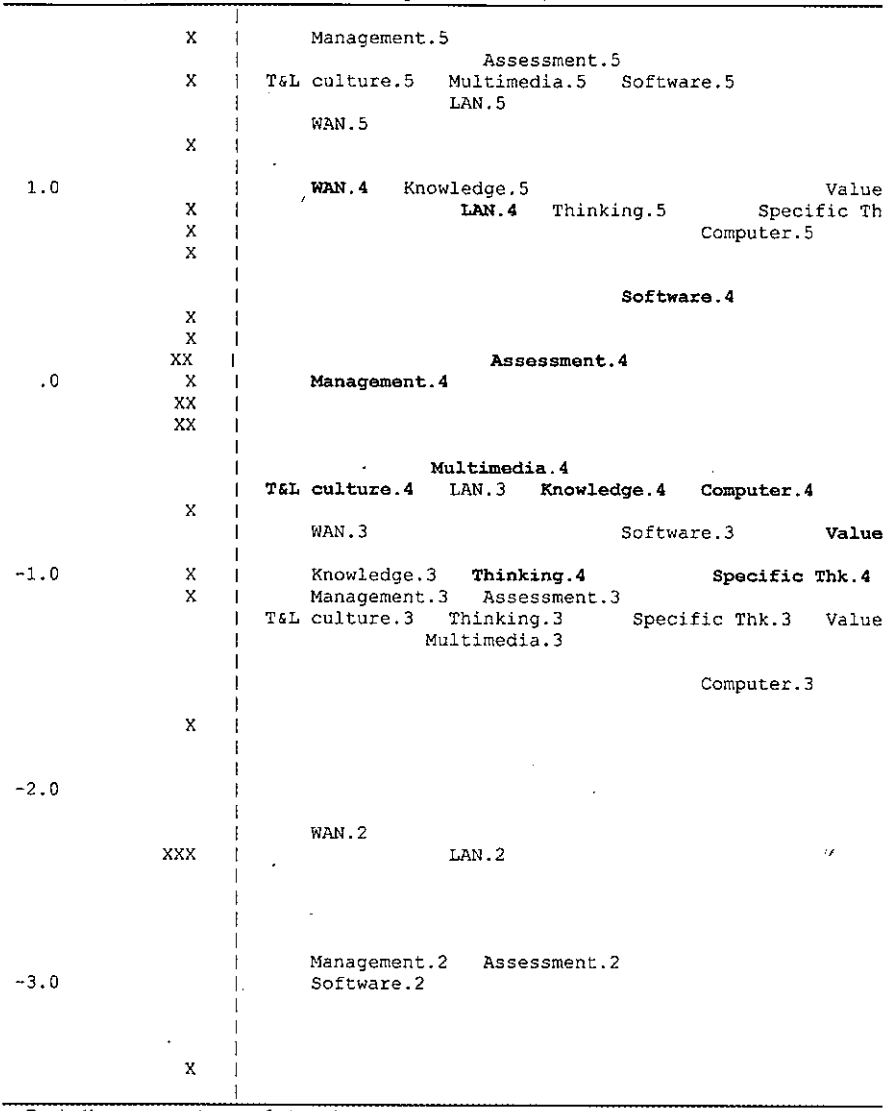


Figure 2: Variable map of teachers' knowledge of the changes in curriculum

The variable map shows that comparing to the teacher distribution, the thresholds for the response '4' (agree) for all the 'curriculum change' items were on the higher levels of the map. This implies that generally it is difficult for the teachers to accept that they were aware of the changes in the curriculum change.

As discussed earlier, most of the teachers agreed that the objectives of the Smart School Curriculum were in line with the NPE and the school needs. Teachers interviewed stated that the curriculum could be seen as an extension of the Secondary School Integrated Curriculum (KBSM), and a way of realising the NPE. For example Teacher 4 said that the goal of the National Philosophy of Education was built-in and it was added with a bit of emphasis on IT. This was echoed by Teacher 2 who said that the curriculum objective is to help student to achieve the holistic individual. With the same view, Teacher 9 said that the curriculum is to produce students who are knowledgeable, morally, physically and spiritually balanced. Teacher 10 echoed that the curriculum goals are actually based on physical, emotional, spiritual and intellectual developments.

While elaborating the Smart School concept, the Principal voiced his excitement with the curriculum and took the trouble to explain the *bestari* (smart) concept. He said that the Smart School concept is something supportive of the learning of the students. He further elaborated that it is important is to be *bestari* (smart) in education or students' learning, *bestari* in environment, *bestari* in discipline and *bestari* in the use of technology in supporting teaching aids. He also stressed that *bestari* should be view globally and not only limited to the use of computer. He quoted inculcation of virtues as well as development of thinking and learning skills as examples of *bestari.* The Principal also saw the change from the conventional curriculum to the Smart School Curriculum as a paradigm shift. One of such shifts, in his view, is the shift from teacher-centredness to student-centredness.

It is concluded in this subsection that teachers perceived the Smart School Curriculum as an extension of the existing KBSM. The change was considered an evolution rather than a reform.

Teachers' Experience

The teachers were divided into two groups, namely: the inexperienced group (less than 5 years) and the experienced group (at least 5 years). The estimates for all the teachers and their groupings were obtained from the case details of all teachers and their groups. These are summarised in Table 2.

Table 2: Teachers' context scores for experience groups

Group	N	Mean	SD
Inexperienced (in)	11	-0.84	1.46
Experienced (ex)	12	0	0.91
All teachers	23	-0.15	0.93

From the table, the estimate for very experienced teachers (0) was found to be higher than that for inexperienced teachers (-0.84). To compare these groups, the effect sizes (ES) (Carver, 1993; Cohen, 1988) were calculated using the formula:

$$ES = \frac{x_2 - x_1}{s_p}$$

where x_1 and x_2 are the means of the estimates of the respective groups and s_p is the pooled standard deviation of the groups which is computed from

$$s_p^2 = \frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1 + n_2 - 2}$$

where n_1 and n_2 are the sample sizes and s_1 and s_2 their corresponding standard deviations (Glass, McGaw & Smith, 1981).

The effect size between the estimates for inexperienced teachers and experienced teachers was found to be 0.90, which is considered large. Based on this, it is concluded that the difference between the curriculum context scores of teachers with more than five years of experience were much higher than the context scores of their peers who were junior to them.

Document Familiarity of Teachers

The Smart School Curriculum policy from the Ministry of Education Malaysia was expressed through four policy documents, namely *Smart Schools in Malaysia: A Quantum Leap, Smart School Flagship Application: The Malaysian Smart School: A Conceptual Blueprint, The Smart School Implementation Plan,* and *The Smart School Homepage.*

Out of the total possible maximum score of 20, teachers' familiarity with these documents was found to be low, with the mean of 6.21 and median of 5. Using half of the possible maximum score as the cut-off point, the teachers were divided into two groups: the low document familiarity group (score of less than 10) and the high document familiarity group (score of 10 or more). Table 3 below summarises the estimates for these groups from the person details generated by Quest.

Table 3: Teachers' context scores for document familiarity groups

Group	n	Mean	SD
Low (lo)	22	-0.20	0.95
High (hi)	3	-1.03	2.51
All teachers	25	-0.17	0.94

The mean of the high document familiarity group was found to be higher than that of the low document familiarity group. The comparison of mean scores of these groups resulted in the large effect size of 0.88. This confirmed that the estimates of the high document familiarity group were much lower than that of the low document familiarity group. It is therefore concluded that teachers who are more familiar with the Smart School Curriculum had higher perception on the context of the curriculum.

Teachers' Information and Communication Technology Competence

The responses of nine items in the teachers' questionnaire were totalled to compute the information and communication technology (ICT) competence of the teachers. The mean and median of these ICT competence scores was found to be 23.32 and 23 respectively. Teachers with the ICT competence scores of 23 and below were grouped as low ICT competence group while those with total scores of more than 23 were grouped as high. The result of Quest analysis summarised in Table 4 shows that the mean estimates for the high group was marginally higher than that of the low group.

Table 4: Teachers' context scores for ICT competency groups

Group	n	Mean	SD
Low (lo)	14	-0.64	0.97
High (hi)	11	-0.55	0.77
All teachers	25	-0.07	0.94

The effect size of the difference in mean was 0.10, which is considered negligible. It showed that there was no difference between the means of ICT competence between these two groups of teachers. It can be summarised here that there was no difference in the perception of teachers on the context of the Smart School Curriculum implementation based on their ICT competency.

Teachers' Perception of Preparedness

The estimate of teachers' perception of the preparedness of teachers, students, non-academic staff, and parents from the items were calculated to be –0.56, with the standard deviation of 0.44. To differentiate the perceptions of teachers who stayed on as Smart School Curriculum teachers against those who left the Smart School Curriculum team, the estimates of these two groups were computed and shown in Table 5.

Table 5: Teachers' perception of preparedness for left/stayed groups

Group	n	Mean	SD
Teachers who had left	17	-0.62	0.43
Teachers who stayed	8	-0.84	0.60
All teachers	25	-0.56	0.44

The mean estimates showed that teachers who stayed on in the curriculum team had lower perception of preparedness. However, the effect size of this difference was found to be small (ES = 0.45). This finding indicates that teachers who stayed on during the study period had slightly lower perception on the context of the curriculum implementation, compared with teachers who left the curriculum implementation team.

The Context of the Student

Gender Difference of Students

Table 6 shows the mean estimates of context scores for students who are grouped according to gender, which were obtained from the case details of Quest output.

Table 6: Students' context scores in gender groups

Group	n	Mean	SD
Male	32	0.58	0.61
Female	51	0.54	0.58
All	83	0.81	0.58

The table shows that there seems to be a slightly higher mean of estimates for female students compared to the male. The effect size (0.07) shows that the difference is negligible. It is concluded that there is no difference between the boys and the girls' perception on the context of the curriculum implementation.

Socio-economic Status of Students

From the case details of Quest output, the mean estimates of context scores for student socio-economic status (SES) groups were tabulated in Table 7.

Table 7: Students' context scores in SES groups

Group	n	Mean	SD
High	48	0.67	0.59
Low	37	0.51	0.66
All	85	0.83	0.61

It is noted that the mean estimate for students with higher SES was higher than that of their peers from lower SES. However, with the effect size of 0.26, the difference was considered small. This indicates that students with higher SES had higher perception on the context of curriculum implementation.

ICT Competence of Students

The ICT competence of the students was measured by seven items in the students' questionnaire. Students were asked to respond whether they were competent in seven tasks such as using computers, word processing, using an electronic spreadsheet, using a presentation software, surfing the world-wide-web, and making a program. Students who were able to do at least four of the tasks were classified as having high ICT competence while those who were able to do less than four were classified to have low ICT competence. Table 8 shows the mean estimates of context scores for students based on ICT competency.

Table 8: Students' context scores in ICT competency groups

Group	n	Mean	SD
High (≥4)	18	0.42	0.70
Low (<4)	67	0.73	0.58
All	85	0.83	0.61

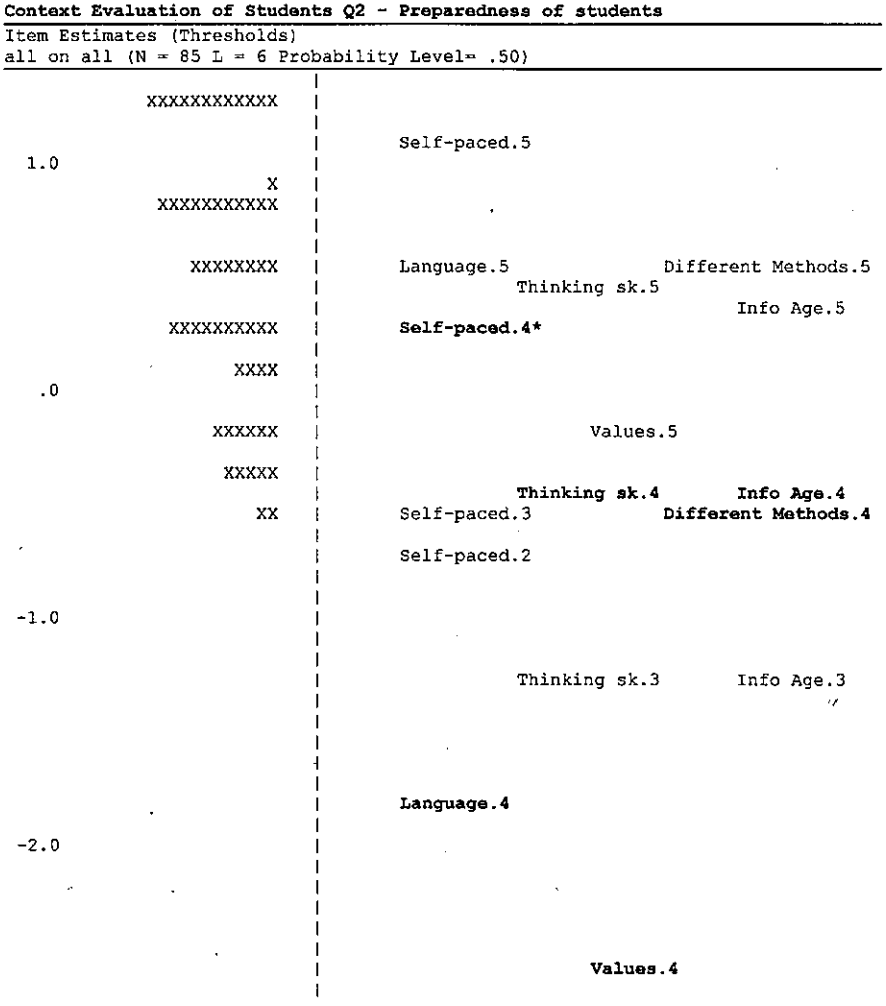
The mean estimate for students with higher ICT competence was lower than that of their peers with lower ICT competence. To compare the difference of the context score, the effect size was calculated. With the effect size of 0.51, the difference is considered to be medium. This shows that students who were more competent in ICT had moderately lower perception on the context of the curriculum implementation.

The Preparedness of the Students

Students were asked whether they were prepared to work towards education with the following characteristics as stated by the Ministry of Education: involves critical and creative *thinking* skills (Item 1), infusion of *moral* values (Item 2), *Language* competency (Item 3), *self-paced* learning which takes care of individual capability,

interest, and needs (Item 4), learning with *different methods* such as project work and visits (Item 5), and preparing students to succeed in the *Information Age* (Item 6).

From the item detail and case detail files generated by Quest, the vast gap between the mean case estimate and mean item threshold shows the high preparedness of the students towards the kind of education in the list. The student distribution and the item thresholds in the variable map in Figure 3 show that



* The response '4' (agree) for all the items are in **bold**

Figure 3: Variable map of the preparedness of the students

except for self-paced learning (Item 4), all students were prepared to work towards the kind of education characterised in items 2, 3, and 5. It also implies that all except two students were prepared to work towards Items 1 and 6.

It is concluded in this subsection that the students were prepared to work towards the kind of education that infuses *moral* values, emphasises l*anguage* competency, provides learning with *different methods*, involves critical and creative *thinking* skills, and prepares students to succeed in the *Information Age.*

The Involvement of the Parents

The involvement of the parents was obtained from the fixed-responses of eight of the students' questionnaire. In these items students were asked the extent of involvement of their parents in the following areas which are suggested by the Smart School Curriculum Blueprint: *monitored* the student's learning progress (Item 1), *guided* the student's learning (Item 2), *motivated* the student in learning (Item 3), *advised* the student in learning (Item 4), involved in *teaching* and learning in school (Item 5), involved in *activities* such as sports and parent-teacher association (Item 6), communicated with the school using the *internet* (Item 7), and bought *books* or reference materials (Item 8).

From the item detail and case detail files generated by Quest, the vast difference between the mean case estimate (0.89, SD=0.81) and mean item threshold (-0.26, SD=0.68) shows the active involvement of the parents in the children's learning activities. The comparison of student distribution against the item thresholds of response '4' (agree) in variable map in Figure 4 implies that all students agree that their parents monitored (Item 1) and advised their learning activities (Item 4). Using similar comparison, the following implications can be derived from the map: all except four students (95.0%) are likely to agree that their parents gave *guidance* to their learning (Item 2) and *motivation* to their learning (Item 3), 92.0% of the students are likely to agree that their parents bought them reference *books* and materials (Item 8), 84.7% are likely to say that their parents involved themselves in *teaching* and learning in school (Item 5), 62.4% are likely to say that their parents took part in *activities* such as sports and parent-teacher association (Item 6). However, the map implies that only 14.1 % of the parents are likely to communicate with the school using the *Internet* (Item 7).

Since socio-economic status (SES) and parents involvement in their children's education is a matter of interest to many, a comparison of involvement of parents from high SES and low SES was made. From the case details of Quest output, the mean estimates of parent involvement scores for student SES groups are tabulated in Table 9.

Table 9: Parents' involvement in SES groups

Group	N	Mean	SD
High	48	0.97	1.04
Low	37	0.36	0.80
All	85	0.89	0.81

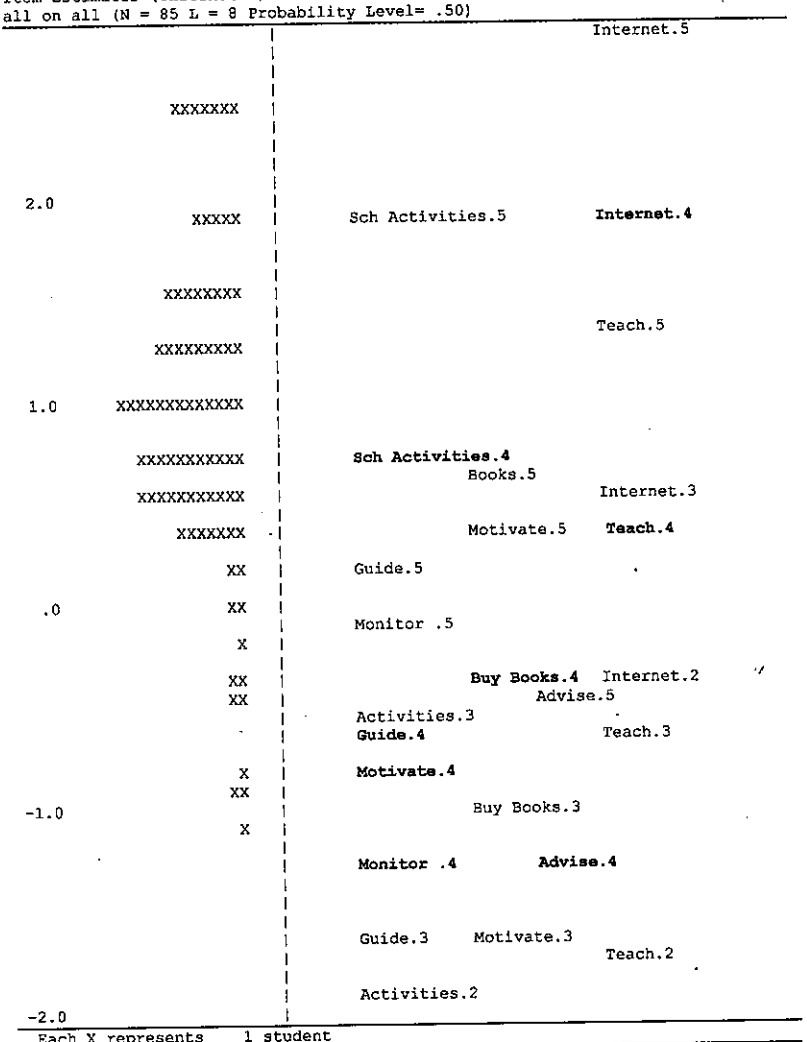


Figure 4: Variable map of the perceived involvement of parents

The case details showed that the mean estimate for parents' involvement for students with higher SES was found to be higher than that of their peers from lower SES. With the effect size of 0.75, the difference was considered to be medium. It is concluded that parents with higher SES involved more with the education of their children. It was also found that parents gave *guidance* and *motivation* to their learning, provided children with reference *books* and materials, involved themselves in *teaching* and learning in school, and took part in *activities* such as sports and parent-teacher association.

The Needs and Problems for Curriculum Implementation

ICT Hardware and Software Needs

The summary of the open-ended responses of the teachers' questionnaire indicated that ICT hardware (11 out of 19, 57.9%) and software (57.9%) top the list of the needs for the curriculum implementation. This need was also highlighted by a few teachers when they were interviewed. These needs were highlighted by Teacher 4, Teacher 9, Teacher 10 as well as the principal.

Teachers' Needs and Problems

Apart from ICT hardware and software, another aspect highlighted by teachers (7 out of 19, 36.8%) was needs related to training of Smart School Curriculum teachers. Few teachers highlighted this problem during interviews. For example, Teacher 9 said that the teachers were still not skilful enough in assessment and evaluation and more in-depth courses should be useful. Echoing this view, Teacher 10 said that teachers without any training found it hard to familiarise themselves in the new teaching situation. She suggested that the authorities such as Education Department should give us more exposure on the curriculum to the teachers. Teacher 2 made special emphasis on the need for training of teachers, citing that the fast turn-over of teachers posed a challenge to the curriculum implementation.

The new teaching and learning approach was said to be more time consuming in terms of the preparation of the teaching and learning materials and the implementation of the processes. Time constraint was the concern of many of the teachers who were interviewed. Teacher 2 stated that that teachers are bogged down with a lot of work because a lot of preparation is needed. Teacher 4 reminded that it was impossible to implement the curriculum in a rush and a lot of time is needed. Teacher 10 singled out that preparation of packages consume a lot of time. She gave an example where four weeks were needed for her to prepare a package with Authorware.

As a performing school, the school was pressured by the expectations of the community to perform in public examinations. The implementation of the Smart School Curriculum generated uncertainties in keeping up with the performance in the past. For instance, Teacher 4 said that at the end of the day, the teachers were not able to engage a lot of *bestari* approach because they need to finish the syllabus so that the students were able to face the examination.

In the light of these concerns, there is therefore a need to review the present assessment system and to come out with a new type of student assessment and evaluation policy that will emphasise learning instead of performance in examinations.

Parental Support

Though the subsection on parental support earlier indicates that there was considerable parental support, teachers who were interviewed expressed the need for more support of these parents. Teacher 9 suggested that parents can contribute by giving the school assistance or providing financial assistance for the procurement of computer hardware. Teacher 10 highlighted that parents could provide moral support to their children and purchase computers for the use of their children.

Having concluded that parental support was imperative, the support might not be easy to come by as these students come from all over the state. There were not many parents who lived near the school where optimum support could be rendered.

CONCLUSION

Generally the Principal and the teachers perceived the Smart School Curriculum as the extension of the Secondary School Integrated Curriculum (KBSM) with additional emphases on information technology and with new approach of teaching. Effect size calculations showed that experienced teachers had much higher context scores than inexperienced teachers. It was found that teachers who were more familiar with the Smart School Curriculum documents scored much lower in the context scores compared with those who were less document-familiar. There was no difference in the context scores of the teachers who were more ICT competent and those who were less ICT competent. Teachers who stayed on in the curriculum team were found to have slightly higher preparedness than those who joined in half way during the evaluation period.

Among the needs of the school for the curriculum implementation are the increase of ICT hardware and software. The needs of the teachers involved include training, more time allocation, teamwork, and commitment. There were also concerns that the implementation of the curriculum might affect the school performance in public examinations.

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