CHAPTER 3.3 SCHOOL LEVEL STRATEGIES FOR IMPLEMENTATION OF IT ACROSS THE CURRICULUM

While there have been a lot of efforts at the systems level to support the implementation of IT in schools, factors and strategies at the school level ultimately determine the actual implementation at the school and classroom levels. This chapter reports on an analysis of school level strategies and their changes through the first two years of the 5-year implementation plan (98-00) based on an analysis of the proposals schools submitted during this period to the Education Department for the various IT in Education initiatives: the IT Pilot Scheme and MMLC scheme launched in '98, and the two rounds of applications for the ITC scheme in '99 and '00. This analysis will also attempt to identify school level factors that may be more conducive to achieving the goals of the 5-year plan.

3.3.1 Data source

The applications from schools for the various IT in education initiatives are a valuable source of data for understanding not only the status of implementation in the schools submitting those applications. More importantly, it provides valuable information about the schools' understanding of the nature of the change that they are implementing in relation to IT in education as well as their goals and aspirations in such endeavors. While what schools report in terms of the kinds of teaching and learning activities that were going on in the schools may not reflect the "true picture" (in the sense of reports made by a third party, based on clearly laid out, explicit criteria), the self reports on past activities and future plans nevertheless reflect the direction of development that is good and appropriate for the school.

Generally, the proposals will contain information on the kind of ICT infrastructure already existed in the school, the kinds of teaching and learning activities involving the use of ICT that have taken place in the school, the plans for such activities in the near future (if given the requisite resource applied for), the kinds of IT-related training the teachers have received, as well as the IT team membership. Sometimes, the proposals will also include statements about the history and background of the school, the school's vision and goals for implementing IT in the curriculum, the perceived/desired impact of IT on the school curriculum, as well as the kinds of function that the IT team is expected to play.

3.3.2 Method of analysis

The approach taken in this part of the research is that of qualitative document analysis. We have identified several dimensions to be key dimensions for interpreting and analyzing the school applications:

- Aims for implementing IT in education in the school
- The plans for teaching and learning activities using ICT
- The existing teaching and learning activities using ICT
- The curriculum goals for implementing ICT in the teaching and learning activities
- The history and background of the school
- The ICT infrastructure: existing and planned
- IT team features
- Teacher professional development plans

In analyzing each application, the document was scrutinized and coded according to a coding scheme based on the variety of features found in the applications. Each statement would be given a code if the content refers to any one of the features in the coding scheme. After the document has been fully coded, then the number of occurrence of each code in the document is then counted. (See tables 3.3.1 a-h)

The coding scheme

Table 3.3.1a Codes related to declared aims for implementing IT in education.

Code	Content
A – LLL	aim - lifelong learning: analytical enquiry, critical thinking, creativity, collaboration
A – ITL	aim - IT technological literacy: able to use IT tools to enhance productivity
A – INL	aim - information literacy: able to search for information and communicate findings
A – Teach	aim - as a tool to enhance ability of teachers to present information effectively/ interestingly
A – CUR	aim - IT as a tool for curriculum change

Table 3.3.1b Codes related to plans for teaching and learning activities using ICT.

Code	Content
T&L-P - cogtool	T&L – ICT as cognitive tool
T&L-P - project	T&L – ICT as project work
T&L-P - exp	T&L - ICT as expository/presentation tool
T&L-P - infosearch	T&L – using ICT for information search
T&L-P - commtool	T&L – using ICT as communication/presentation tool for students
T&L-P - tec	T&L – using ICT to develop students' technical abilities
T&L-P - empower	T&L - to support students' extra-curricular activities, as students' empowering/ productivity tool

Table 3.3.1c Codes related to existing teaching and learning activities using ICT.

Code	Content
T&L - cogtool	T&L – ICT as cognitive tool
T&L - project	T&L – ICT as project work
T&L - exp	T&L - ICT as expository/presentation tool
T&L - infosearch	T&L – using ICT for information search
T&L - commtool	T&L – using ICT as communication/presentation tool for students
T&L - tec	T&L – using ICT to develop students' technical abilities
T&L - empower	T&L - to support students' extra-curricular activities, as students' empowering/ productivity tool

Table 3.3.1d Codes for specific curriculum goals for using ICT in the teaching and learning activities.

Code	Content
CUR - integ	curriculum - teaching of technological literacy integrated with other curriculum content
CUR - indiv	curriculum – using technology to cater for individual differences in learning

Table 3.3.1e Codes related to the history and background of the school.

Code	Content
H&B - innov	School has a tradition of curriculum innovation, focusing on changing goals & practices
H&B - IT	School has a long history of using ICT, e.g. SAMS, CAPS, Computer Studies, etc.
H&B - partner	School has a tradition of community partnership, with parents, past students, etc.

Table 3.3.1f Codes related to the ICT infrastructure in the school, both existing and planned.

Code	Content
INFR - cen	Provision of general purpose centralized computer room with projection facility
INFR - dist	Provision of distributed computing facilities in different classrooms
INFR - subj	Provision of specialized resources in various subject curriculum rooms
INFR - note_t	Infrastructure - provision of notebook computers for teachers' use
INFR - note_c	Infrastructure - provision of notebook computers for mobile use in classrooms
INFR - lib	Provision of a large no. (>8) of internet-enabled computers in the library/other rooms for student open access
INFR - access	Provision of after school hours access to computing facilities for students

Table 3.3.1g Codes related to features of the IT team.

Code	Content
teamL - tec	IT team leader has strong technical background
teamL - acad	IT team leader has responsibility for curriculum leadership in school
teamM - tec	all IT team members are technically competent & with science/math/technology backgrounds
teamM - broad	IT team members include those from humanities & language areas
teamF - tec	IT team function - technical development & support
teamF - sd	IT team function - staff development – technical
teamF - cur	IT team function – curriculum leadership & support

Table 3.3.1h Codes related to teacher professional development plans in the school.

	Content
TPD – cur	Plans are related/focused on curriculum development
TPD - share	Plans to provide for experience sharing with other schools
TPD – inh	Plans to provide in-house professional development programs

Data preparation for further analysis

In order that further analysis of the coded applications, the frequency counts for the occurrence of the various codes in each application is converted into a quantitative indicator (a reference point) for the intensity of each code in the application document according to the following conversion table 3.3.2:

Table 3.3.2 Conversion table for the intensity coding for the various features of the school applications based on the frequency of occurrence of each code in the document.

Intensity indicator	Frequency of occurrence of code in document [1]
0	0
1	1
2	2-5
3	6-15
4	>15

[1] The frequency (range) determination is qualitatively based on the content of the school applications. ‘ 1’ refer to ‘ low’ intensity and is assigned when the frequency of code occurrence was 1, a frequency of ‘ 2-5’ is assigned to ‘ medium’ intensity (2), and a frequency of ‘ 6-15’ is assigned ‘ high’ intensity (3) and a frequency of ‘ >15’ is coded as very high intensity (4).

3.3.3 Numbers and distribution of applications analyzed

Based on the list of sampled schools in our survey, the Education Department helped the research team to locate and provide copies of the applications made by these schools for the four initiatives as detailed below. Altogether 204 applications were supplied by the Education Department. With the exception of the pilot scheme where only the successful applications were provided for analysis, both successful and unsuccessful applications were included in the sample of applications provided for analysis. The distribution of these applications is summarized as follows:

Table 3.3.3 Distribution of the school applications provided by ED for analysis.

Application type	Outcome of application		Total
	successful	unsuccessful	
Pilot Scheme	12	0	12
MMLC	15	35	50
ITC99	30	36	66
ITC00	18	58	76
Total	75	129	204

Owing to the shortage of time, we were not able to code all 204 applications and the team had to develop some form of heuristic for reducing the total number of applications to be analyzed. A scan through the applications reveal that there is much greater similarity amongst the ITC applications submitted in ' 99 and ' 00. Thus the team decided to code all the Pilot scheme and MMLC proposals that were provided at the time when the analysis was under taken as these encompasses a wider diversity of views than the later two initiatives. Only 17 % of the ITC applications were randomly selected and analyzed. The distribution of the analyzed applications is as follows:

Table 3.3.4 Distribution of the analyzed applications.

Plan type	Outcome of application		Total
	successful	Unsuccessful	
Pilot scheme	12	0	12
MMLC	15	35	50
ITC99	4	3	7
ITC00	2	15	17
Total	33	53	86

Since this part of the study is essentially a qualitative study, the subsequent analysis using quantitative methods to explore the features of the analyzed applications is essentially an attempt to provide a representation of the variety of situations and strategies used in schools.

3.3.4 Status of development and aspirations for using IT in education

This section explores the development and aspirations for using IT in education revealed in the applications through an inspection of the distribution of intensities for the various parameters found in the 86 applications coded.

Aims for implementing IT in the school curriculum

The most popular aims for implementing IT in the curriculum were coded. It can be seen from Table 3.3.5 that the most popular aim for implementing IT in education in schools was

to use the technology as a tool to enhance the ability of teachers to present information effectively/ interestingly. On the other hand, the least popular aim was to use the integration of IT in the curriculum as an opportunity for bringing about a broader curriculum change. However, if the aim of implementing IT in education is part and parcel of the wider education reform for helping our students to be lifelong learners and capable of riding on the tides of change in the information age as laid out in the 5-year strategy document, the school level IT related teaching and learning activities must go hand-in-hand with efforts to promote curriculum renewal and change in the school.

Table 3.3.5 Profile of intensities in the various aims for IT in education expressed in the collection of applications analyzed.

Intensity	A - LLL	A - ITL	A – INL	A - Teach	A - CUR
0	43	52	56	37	68
1	18	20	23	22	11
2	20	8	7	20	7
3	1	5	0	2	0
4	4	1	0	5	0

Kendall's tau b correlations (Table 3.3.6) were calculated for expressed intensities for the various aims. It is note-worthy that amongst the other aims, the highest correlation for the aim related to life-long learning was in fact the one for using IT as an effective presentation tool, which is conceptually the least related to developing students' abilities to undertake self-directed learning activities. This indicates that schools generally do not have a good understanding of the meaning of "developing lifelong learning abilities in students" and that it requires taking on curriculum change and innovation to achieve. Another indication of the lack of sufficient understanding of the nature of the IT in education initiative is the relative lack of interest in developing students' information skills as this aims is the second least popular amongst the five that were spontaneously put forward by schools.

Table 3.3.6 Correlation between the expressed intensities for the various aims for IT in education in the collection of applications analyzed.

		A - CUR	A - INL	A - ITL	A - LLL	A - Teach
A - CUR	Cor[2]	1.000	.341	.292	.311	.271
	Sig.		.001	.004	.002	.006
	N	86	86	86	86	86
A - INL	Cor	.341	1.000	.311	.338	.277
	Sig.	.001	.	.002	.001	.005
	N	86	86	86	86	86
A - ITL	Cor	.292	.311	1.000	.583	.558
	Sig.	.004	.002	.	.000	.000
	N	86	86	86	86	86
A - LLL	Cor	.311	.338	.583	1.000	.625
	Sig.	.002	.001	.000	.	.000
	N	86	86	86	86	86
A - Teach	Cor	.271	.277	.558	.625	1.000
	Sig.	.006	.005	.000	.000	.
	N	86	86	86	86	86

[2] 'Cor' statistically denotes correlation coefficients, 'Sig.' statistically refers to significant p-values and 'N' points to the number of sampled school applications.

Teaching and learning activities involving the use of ICT

As is obvious from the data in both Tables 3.3.7 & 3.3.8, using ICT to support project-based learning was the least popular while using ICT to support expository type of teaching activities was the most popular teaching and learning activity in terms of planned activities. This is consistent with the earlier observation that schools do not fully understand the curriculum reform implications for a successful implementation of IT in education. The schools are still most comfortable with adhering to existing expository modes of teaching. The 5-year strategy document mentioned the need for a paradigm shift in school education. It is not obvious from the above data that there is a common understanding of what this means in terms of the kinds of change that is being demanded. It is evident that many schools interpret the use of IT per se (or in other words, simply technologizing education) as opposed to just using conventional chalk and board to be a sufficient qualifier for paradigm shift. These observations are also consistent with the findings reported in Law et al. (2000) that pedagogical practices do differ amongst schools that all exhibit a high level of confidence, willingness and actual applications in using ICT for teaching and learning. Pedagogical practices that exhibit "emerging" features that are congenial to the development of lifelong learning abilities were only found in reform-oriented schools that have a strong leadership for promoting curriculum change.

Table 3.3.7 Profile of intensities in the types of planned teaching and learning activities using ICT expressed in the collection of applications analyzed.

Intensity	T&L-P - cogtool	T&L-P - project	T&L-P - exp	T&L-P – infosearch	T&L-P - commtool	T&L-P - tec	T&L-P - empower
0	45	67	40	45	57	43	49
1	20	9	20	21	17	16	19
2	19	8	20	15	9	20	15
3	2	2	3	5	3	6	3
4	0	0	3	0	0	1	0

Table 3.3.8 Profile of intensities in the types of existing teaching and learning activities using ICT expressed in the collection of applications analyzed.

Intensity	T&L - cogtool	T&L - project	T&L - exp	T&L – infosearch	T&L - commtool	T&L - tec	T&L - empower
0	52	73	45	57	60	43	36
1	20	8	22	21	21	25	28
2	13	4	16	8	5	17	20
3	1	1	3	0	0	1	2
4	0	0	0	0	0	0	0

In comparing the intensities for the various types of activities planned with the respective intensities for the existing activities, it is not surprising to note that there is a general increase in the intensities for most of the different types of activities. This indicates that schools are preparing to extend their use of ICT in all types of teaching and learning activities. However, there is one exception. There is a marked decrease in the intensity expressed for using ICT to support students' extra-curricular activities or as students' empowering/productivity tool. Using ICT for this latter type of activity was in fact the most popular in terms of existing activities reported - 58% (50 out of 86), while only 43% (37 out of 86) of schools has plans to use ICT for this type of activities in their application proposal. One most plausible

explanation for this is that this type of activity was popular only when the ICT infrastructure was not good enough to support use of ICT in formal classrooms. Thus when the infrastructure and support for using ICT in the formal school curriculum has been improved, this type of activity is no longer considered important. This means that schools may not see using ICT as an empowering tool for students in all aspects of their life and work as an important educational goal.

3.3.5 School factors influencing ICT developments

The several aspects of school level differences that are potentially important in determining the status of development and aspirations for using ICT in education in a school are: the history and background of the school, the IT team structure and function, the ICT infrastructure of the school as well as the kinds of teacher professional development opportunities provided by the school. This section attempts to explore the possible relationships between these school level factors and school level developments as revealed in the applications analyzed.

ICT infrastructure in schools

Table 3.3.9 Profile of intensities of in relation to the ICT infrastructure(existing or planned) as mentioned in the collection of applications analyzed.

Intensity	INFR - cen	INFR - distr	INFR - subj	INFR - lib	INFR – note_t	INFR – note_c	INFR - access
0	31	66	70	77	76	79	50
1	32	17	7	8	10	6	23
2	22	3	6	1	0	1	11
3	1	0	2	0	0	0	2
4	0	0	1	0	0	0	0

It is evident from Table 3.3.9 that the most valued infrastructure in schools is that of general-purpose, centralized computer rooms with projection facilities while the provision of large numbers of internet-enabled computers in the library or other rooms for students' open access or the provision of after school hours access to computing facilities for students were the least mentioned (and possibly least valued). This is consistent with the earlier finding that schools value most the use of ICT to support teachers' expository modes of teaching activities. This also supports the observation in the previous section that schools tend not to see using ICT as an empowering tool for students in all aspects of their life and work as an important educational goal.

The correlations shown in Table 3.3.10 reveal that the schools' expressed intensities for the provision of general purpose centralized computer rooms with projection facilities or for the provision of notebook computers for teachers' use have little correlation with plans for specific types of teaching and learning activities. This can be taken to imply that schools need not have a clear understanding or plan for using ICT in education to ask for or set up these two kinds of infrastructure. On the other hand, schools that has clear plans for using ICT in teaching and learning, especially for supporting project-based learning, the development of information skills or even just enhancing the technological competence of students as a personal productivity tool would want to set up distributed computing facilities in different classrooms and to provide after-school-hours access to computing facilities for students. There is thus evidence that the desired ICT infrastructure of a school would reflect the status

of understanding and aspiration of a school in terms of its IT in education developments.

Table 3.3.10 Kendall' s tau b correlation between the expressed intensities for the different types of ICT infrastructure with the expressed intensities in the plans for different types of ICT-using teaching and learning activities in the applications analyzed.

		T&L-P - cogtool	T&L-P - project	T&L-P - exp	T&L-P - infosearch	T&L-P - commtool	T&L-P - tec	T&L-P - empower
INFR - cen	Cor. coef.	.364*	-.049	.102	.110	.033	.161	.002
	Sig.	.000	.618	.282	.250	.736	.091	.986
	N	86	86	86	86	86	86	86
INFR - dist	Cor. coef.	.095	.228*	.024	.241*	.078	.277*	.231*
	Sig.	.349	.027	.811	.017	.447	.005	.022
	N	86	86	86	86	86	86	86
INFR - subj	Cor. coef.	.118	.264*	.146	.246*	.103	.140	.157
	Sig.	.234	.010	.137	.013	.307	.153	.114
	N	86	86	86	86	86	86	86
INFR - lib	Cor. coef.	.092	.287*	.058	.250*	.158	.186	.192
	Sig.	.366	.006	.562	.014	.125	.065	.059
	N	86	86	86	86	86	86	86
INFR - note_t	Cor. coef.	.132	.070	.104	.147	.194	.071	.056
	Sig.	.197	.503	.303	.149	.062	.480	.587
	N	86	86	86	86	86	86	86
INFR - note_c	Cor. coef.	.207*	.260*	.108	.175	.041	.167	.161
	Sig.	.042	.013	.284	.084	.692	.096	.116
	N	86	86	86	86	86	86	86
INFR - access	Cor. coef.	-.114	.337*	-.015	.252*	.026	.286*	.232*
	Sig.	.243	.001	.878	.009	.793	.003	.018
	N	86	86	86	86	86	86	86

The school IT team: leadership, membership and function

The IT team in a school is instrumental to devising and implementing plans on IT in education in the school, often including the tasks of applying for various funds from government and non-governmental organizations and organizing teacher professional development courses. It is thus of interest to find out how schools structure and conceptualize the function of the IT team.

Table 3.3.11 Profile of intensities in relation to the various features of the IT team as mentioned in the collection of applications analyzed.

Intensity	TeamL - tec	TeamL - acad	TeamM - tec	TeamM- br	TeamF - tec	TeamF – sd	TeamF - cur
0	80	81	76	67	60	65	63
1	5	5	9	19	9	14	9
2	1	0	1	0	11	6	10
3	0	0	0	0	6	1	4
4	0	0	0	0	0	0	0

It is apparent from the data shown in Table 3.3.11 that schools have paid most attention to considering the function of the IT team while very few schools mention the issue of leadership at all. It is note-worthy that of those schools that mentioned about the composition of the IT team members, more schools mentioned that the team has members from a wide variety of subject discipline background.

An exploration of the possible correlation in intensities was made of the school IT team features with the plans for the different kinds of IT-using teaching learning activities. As the number of plans that made any mention of leadership was very low, it was not surprising to note that leadership did not come up with any significant difference in correlation with plans for any of the learning activities. On the other hand, as data in Table 3.3.12 reveal, the expressed intensities for any of the features related to team membership or team function were nearly all significantly correlated with plans for using IT in project work, in developing students' information skills, in developing students' technical skills and in helping students to use IT as a personally empowering productivity tool, while such features have no correlation with the plans for using IT as a cognitive tool, as a tool for the teacher in expository presentations and as a tool for communication. This result indicates that the set of teaching and learning activities plans coming from schools that had given more thoughts to and had a better, more consistent understanding of the use of IT in the school curriculum had also given more thoughts to the membership and function of the school IT team.

Table 3.3.12 Kendall's tau b correlation between the expressed intensities for the different school IT team features with the expressed intensities in the plans for different types of ICT-using teaching and learning activities in the applications analyzed.

		T&L-P - cogtool	T&L-P - project	T&L-P - exp	T&L-P – infosearch	T&L-P - commtool	T&L-P - tec	T&L-P - empower
teamM - broad	Cor. coef.	.036	.266*	-.027	.203*	-.036	.258*	.128
	Sig.	.728	.011	.789	.046	.732	.011	.211
	N	86	86	86	86	86	86	86
teamM - tec	Cor. coef.	.029	.229*	.119	.039	-.037	.167	.155
	Sig.	.774	.028	.235	.702	.717	.097	.128
	N	86	86	86	86	86	86	86
teamF - tec	Cor. coef.	-.071	.344*	-.005	.247*	.005	.424*	.299*
	Sig.	.467	.001	.961	.011	.960	.000	.002
	N	86	86	86	86	86	86	86
teamF - sd	Cor. coef.	-.035	.355*	.036	.207*	-.010	.409*	.299*
	Sig.	.723	.001	.713	.037	.924	.000	.003
	N	86	86	86	86	86	86	86
teamF - cur	Cor. coef.	-.088	.287*	.026	.313*	.086	.365*	.280*
	Sig.	.370	.004	.785	.001	.388	.000	.005
	N	86	86	86	86	86	86	86

* Correlation is significant at the .05 level (2-tailed).

Table 3.3.13 explores the relationship between the various features of the school IT teams as desired by the schools. It is evident that the correlations between the expressed intensities in team functionality were all very high (>0.7) and significant. Further, the expressed intensities for the team functionality were much more highly correlated with the expressed intensities for having a broad base of team membership that includes teachers who come from a non-technical, arts or humanities background. This corroborates with the findings in the earlier sections.

Table 3.3.13 Kendall's tau b correlation between the expressed intensities for the different school IT team features in the applications analyzed.

		teamM - broad	teamM - tec	teamF – tec	teamF – sd	teamF - cur
teamM- broad	Cor. coef.	1.000	.248*	.656*	.610*	.550*
	Sig.	.	.022	.000	.000	.000
	N	86	86	86	86	86
teamM - tec	Cor. coef.	.248*	1.000	.304*	.368*	.198
	Sig.	.022	.	.003	.000	.056
	N	86	86	86	86	86
teamF - tec	Cor. coef.	.656*	.304*	1.000	.778*	.788*
	Sig.	.000	.003	.	.000	.000
	N	86	86	86	86	86
teamF - sd	Cor. coef.	.610*	.368*	.778*	1.000	.717*
	Sig.	.000	.000	.000	.	.000
	N	86	86	86	86	86
teamF - cur	Cor. coef.	.550*	.198	.788*	.717*	1.000
	Sig.	.000	.056	.000	.000	.
	N	86	86	86	86	86

* Correlation is significant at the .05 level (2-tailed).

Another exploration was made of the relationship between the IT team features and the kinds of ICT infrastructure desired by the school. The correlation analysis shows that the desire to have ICT facilities distributed in classrooms and the school library for student access and to provide after-school open access to ICT facilities for students were consistently showing the highest correlation with the expressed intensities for the various IT team features like membership and functionality of the IT team. There is thus indication that schools that have given more thoughts to the functions and composition of the IT team are better oriented towards supporting students to use ICT in their own learning, rather than just using ICT as a teaching tool in a centralized room with projection facilities.

History and background of the school

Another characteristic of the school that has potential impact on implementation is the history and background of the school. We have thus coded the intensity of applications may have mentioned the school's history and background in relation to curriculum innovation, in the use of ICT and in community partnership, e.g. with parents, past students, etc. It is no surprise to note that nearly half of the applications mentioned, or even heavily emphasized their history in using ICT in the school. On the other hand, only 10 out of 86 applications mentioned that they had a tradition of community partnership.

Table 3.3.14 Profile of intensities in relation to the history and background of the school as mentioned in the collection of applications analyzed.

Intensity	H&B - Innov	H&B – IT	H&B - partner
0	64	44	76
1	8	18	4
2	13	19	5
3	1	4	1
4	0	1	0

It is most surprising to note that despite the high percentage of schools mentioning their history and background in use of ICT, this feature only exhibited significant positive

correlation with one kind of teaching and learning plans: plans for supporting students' extra-curricular activities as students' empowering/productivity tool, which does not involve any change in the formal school curriculum. It is most surprising, however, to note its significant negative correlation with plans for using ICT as cognitive tools. This possibly reflects that schools that boasted a history of ICT use may have extremely diverse philosophies, visions and understanding of education. As Law et al. (2000) reported, most of ICT-using the pedagogical practices in schools that had made an early start in this area were in fact mainly using ICT for expository types of teaching. One possible explanation for the negative correlation is that schools, which highly emphasize the importance of having a background in ICT, do not really understand the ways of using ICT as cognitive tools. This would make sense in the context of developments in Hong Kong where many schools that have a technological adoption understanding (Law et al. 2000) of ICT implementation tend to emphasize the production of presentation type curriculum resource materials. On the other hand, cognitive tools can only be designed based on well-researched findings about students' learning difficulties and effective strategies to overcome such difficulties. Schools that emphasize the production of expository curriculum resource materials usually emphasize the need for teachers to be technically competent enough to engage in such productions. This may have negatively affected the teachers' attention towards exploring and learning about cognitive tools and effective pedagogical approaches.

Table 3.3.15 Kendall's tau b correlation in expressed intensities between the various aspects of the school history and background with the plans for different types of ICT-using teaching and learning activities in the applications analyzed.

		T&L-P - cogtool	T&L-P - project	T&L-P - exp	T&L-P - infosearch	T&L-P - commtool	T&L-P - tec	T&L-P - empower
H&B - innov	Cor. coef.	.073	.319*	.316*	.479*	.473*	.136	.248*
	Sig.	.459	.002	.001	.000	.000	.166	.013
	N	86	86	86	86	86	86	86
H&B - IT	Cor. coef.	-.205*	.072	-.077	.160	-.006	.172	.247*
	Sig.	.033	.462	.414	.093	.954	.069	.010
	N	86	86	86	86	86	86	86
H&B - partner	Cor. coef.	-.126	.266*	-.014	.226*	.025	.165	.219*
	Sig.	.211	.010	.891	.024	.810	.098	.030
	N	86	86	86	86	86	86	86

* Correlation is significant at the .05 level (2-tailed).

The correlation figures in Table 3.3.15 also reveal that the schools' expressed intensities in their history and background in curriculum innovation were significantly correlated with the intensity of nearly all types of plans for ICT-using teaching and learning activities. The only exceptions were the use of ICT as cognitive tools and for developing students' technical skills. This indicates that a school's history and background in curriculum innovation is a much more important factor in developing effective ICT implementation plans than the school's background in the use of ICT.

3.3.6 How are schools catching up on ICT related developments

The HKSAR government has put up various projects to support the implementation of ICT in schools for teaching and learning across the curriculum since 1998. The applications analyzed in this chapter were submitted by schools over three years: the Pilot Scheme and MMLC applications were submitted in 1998 while the two batches of ITC applications were submitted in 1999 and 2000 respectively. It is thus of great interest to see if there are

significant differences between these four sets of applications. Would the later applications reflect progressively deeper understanding and preparedness for ICT implementation? Would there be differences observed between the MMLC applications and the successful Pilot Scheme applications (the research team only have access to the successful Pilot Scheme proposals) as these were submitted around the same time in1998.

In exploring the possible differences between the four batches of applications, an analysis of variance revealed significant difference across them in the intensities of nearly all of the key aspects coded, except for the intensities related to the aim of using ICT to enhance the ability of teachers to present information effectively/interestingly and intensities for plans to use ICT as expository/presentation tool and as communication/presentation tool for students.

Table 3.3.16 Mean intensities in the key features related to ICT implementation expressed in the four batches of applications analyzed.

	Pilot Scheme	MMLC	ITC99	ITC00
A-CUR *	0.75	0.06	0.29	0.65
A-INL *	1.00	0.16	0.86	0.65
A-ITL *	1.25	0.40	0.71	0.88
A-LLL *	1.67	0.60	1.29	1.06
A-Teach	1.17	0.82	1.71	1.24
T&L-P-cogtool *	1.42	0.70	0.71	0.41
T&L-P-commtool	0.92	0.50	0.43	0.29
T&L-P-empower *	0.92	0.44	1.00	1.06
T&L-P-exp	1.17	1.04	0.43	0.71
T&L-P-infoserch *	1.42	0.56	0.57	1.00
T&L-P-project *	0.67	0.16	0.71	0.59
T&L-P-tec *	1.42	0.56	0.57	1.71
INFR-access *	0.75	0.24	1.14	1.29
INFR-cen *	1.75	0.92	0.43	0.53
INFR-dist *	1.08	0.02	0.29	0.41
INFR-lib *	0.58	0.02	0.00	0.12
INFR-subj *	1.33	0.18	0.00	0.24
teamF-cur *	0.75	0.02	1.14	1.35
teamM-broa *d	0.50	0.00	0.43	0.59
H&B-innov *	1.25	0.32	0.29	0.24
H&B-IT *	1.67	0.40	0.86	1.53

* the between group difference is significant at the .05 level.

An inspection of the data shown in Table 3.3.16 reveals a very consistent and thought-provoking pattern: the mean intensities for most features were found to be highest in the Pilot Scheme applications, the lowest in the MMLC applications, followed by the ITC99 and ITC00 applications respectively. Figure 3.3.1 shows a graph of a few of the key features identified to be most highly correlated with more thoughtful planning and better understanding of IT implementation as revealed in earlier sections of this chapter.

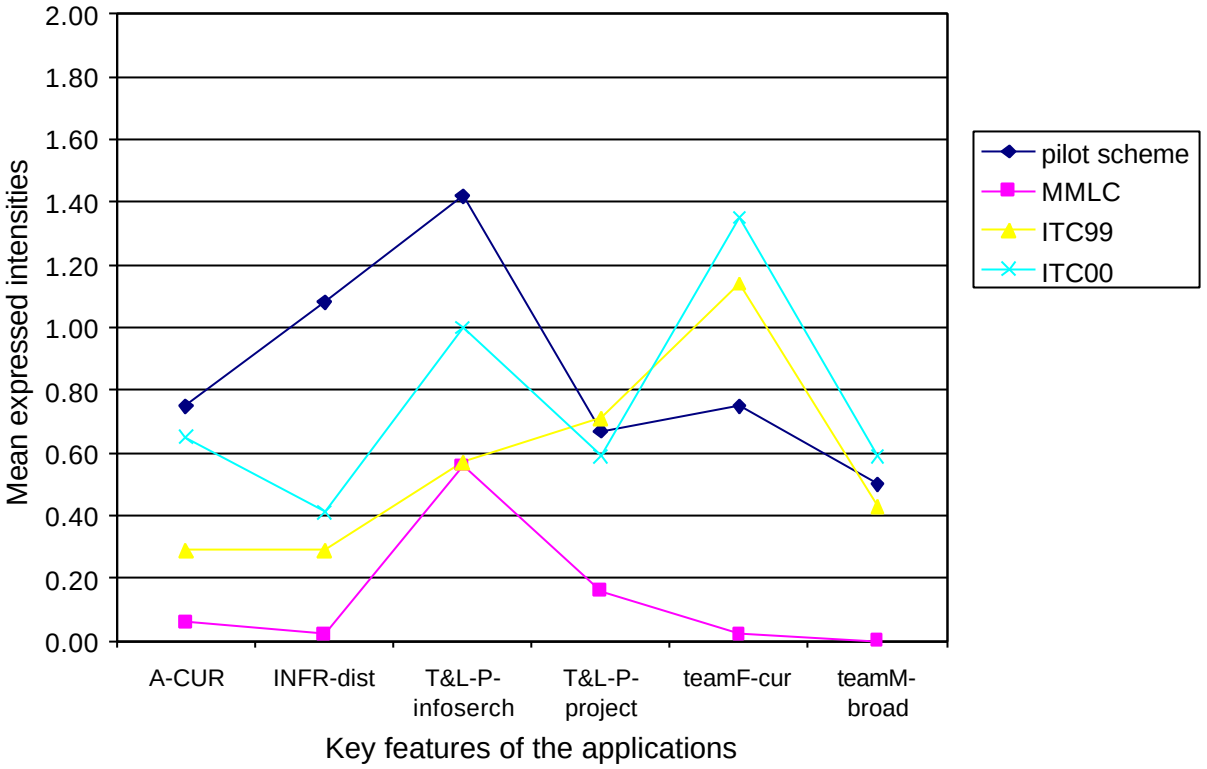

Figure 3.3.1 Graph showing the expressed intensities in 6 key features for the four batches of applications.

The results shown in Figure 3.3.1 indicate that schools that applied for the MMLC schemes were poorly prepared for IT implementation. The later two batches of applications showed progressively better understanding of the role of ICT in the school curriculum and had more student-oriented plans for using ICT, though still at a lower or similar level to the successful Pilot Scheme applications. This is an important point to take note of when considering the gaps between schools in relation to IT implementation. However, in terms of the understanding of and thoughts put towards the function and composition of the school IT team, the ITC00 applications were more highly developed.

3.3.7 What distinguishes successful applications from unsuccessful ones?

Another interesting question to explore on the basis of the analysis of the school applications is whether and in what aspects do the successful applications differ from the unsuccessful ones. Such explorations should ideally be done on each batch of applications individually. However, as the total number of analyzed applications in each batch was too low to provide meaningful statistics for such an exploration, a very preliminary exploratory analysis of variance was performed on the entire set of all analyzed applications. Results from this exploration revealed significant differences in nearly all aspects of the schools' existing or planned ICT infrastructure (only the provision of after school hours access to computing facilities for students did not show significant difference between the successful and unsuccessful applications) while the use of ICT as cognitive tools was the only non-ICT infrastructure feature that showed significant difference.

Table 3.3.17 Mean intensities in the key features related to IT implementation for the successful and unsuccessful applications analyzed.

	Successful applications	Unsuccessful applications
A-CUR	0.39	0.23
A-INL	0.55	0.36
A-ITL	0.67	0.62
A-LLL	0.88	0.91
A-Teach	0.85	1.13
T&L-P-cogtool *	1.03	0.57
T&L-P-commtol	0.67	0.42
T&L-P-empow	0.61	0.72
T&L-P-exp	0.88	0.98
T&L-P-infoserch	0.88	0.70
T&L-P-project	0.33	0.38
T&L-P-tec	1.06	0.81
INFR-access	0.67	0.55
INFR-cen *	1.33	0.66
INFR-dist *	0.52	0.11
INFR-lib *	0.21	0.06
INFR-subj *	0.61	0.17
teamF-cur	0.55	0.43
teamL:-acad	0.09	0.04
teamM-broad	0.27	0.19
H&B-innov	0.45	0.42
H&B-IT	0.82	0.85

* the between group difference is significant at the .05 level.

As mentioned earlier, the data shown in this table 3.3.17 just indicates that when all the applications are taken as a whole, the main difference between successful and unsuccessful applications lies with the ICT infrastructure (existing and planned) in the schools submitting those applications, which might thus be interpreted as an indicator of ICT readiness used in the selection process. However, this does not necessarily mean that these are the only significant difference between successful and unsuccessful applications for each round of application as the numbers of applications analyzed in each round is too small for this latter analysis to be conducted.

3.3.8 Summary of findings

The set of school applications provide a good database for us to understand the image and understanding that schools had for how ICT should be used in the curriculum and the kind of strategies that were being used to implement such uses. The analysis of the applications reveals understandings and strategies that are not in line with the aims and vision (esp. on paradigmatic shifts) for ITEd expressed in the Government's 5-year strategy document.

Vision and aims for implementing IT in education at the school level

If the aim of implementing IT in education is part and parcel of the wider education reform for helping our students to be lifelong learners as laid out in the 5-year strategy document, the school level IT related teaching and learning activities must go hand-in-hand with efforts to promote curriculum renewal and change in the school. However, based on the school applications analyzed, it is apparent that schools generally do not have a good understanding of the meaning of "developing lifelong learning abilities in students" and that it requires taking on curriculum change and innovation to achieve. The most popular aim for implementing IT in education in schools was to use ICT as a tool to enhance the ability of teachers to present information effectively/interestingly. Another indication of the lack of sufficient understanding of the nature of the IT in education initiative is the relative lack of interest in developing students' information skills as this aim is the second least popular amongst the five that were spontaneously put forward by schools.

Existing and planned teaching and learning activities involving the use of ICT

In their applications, schools also listed the kinds of teaching and learning activities that were going on in the school as well as the planned activities in the near future. The findings reveal that the most popular activities are those using ICT as an expository tool for the teacher, coincides with the finding from Law et. al. (2000) that the most popular pedagogical approach for teachers in using ICT in classroom settings was the expository approach. The least popular activities were to use ICT for project-based learning, an approach to teaching and learning that is being advocated by the current curriculum reform. This again indicates that many schools interpret the essence of implementing IT in education as an effort to technologize education, equating the "paradigm shift" mentioned in the 5-year strategy to a reduction in the use of conventional chalk and board and to switch to using multimedia presentations/animations. Another noteworthy observation is that there is a marked decrease in the intensity expressed for using ICT to support students' extra-curricular activities or as students' empowering/productivity tool in the planned activities as compared to the existing activities. This probably indicates that schools considered the use of ICT outside of the planned classroom activities as an interim measure for students to get access to ICT when the school's ICT infrastructure is not yet sufficiently established to support teachers' use in class settings. This may also indicate that schools do not consider helping students to use ICT as a pervasive empowering tool in all aspects of their life and work as an important educational goal.

School level strategies

Establishing a good ICT infrastructure in the school is an important component in the implementation process. The contents of the applications reveal that the most valued infrastructure in schools is that of general-purpose, centralized computer rooms with projection facilities while the provision of large numbers of internet-enabled computers in the library or other rooms for students' open access or the provision of after school hours access to computing facilities for students were the least mentioned. This is totally consistent with the popularity of the expository type of teaching activities found in the applications.

The analysis also revealed that there is no identifiable pattern of understanding or plan for using ICT in education amongst schools that is related to the schools' desire for or ownership of a centralized computer room. On the other hand, schools that had clear plans for using ICT in teaching and learning tended to set up distributed computing facilities in different classrooms and to provide after-school-hours access to computing facilities for students.

The school IT team is generally the most important organizational setup for the implementation of IT across the curriculum at the school level. The analyzed applications reveal that most schools have paid attention to considering the function of the IT team, while only very few schools mentioned the leadership of the school IT team at all. It was also found that schools that had given more thoughts to the functions and composition of the IT team were better oriented towards supporting students to use ICT in their own learning, rather than just using ICT as a teaching tool in a centralized room with projection facilities. Further, schools that had given more thoughts to the functionality of the IT team were much more likely to have a broad base of IT team membership that included teachers from non-technical, arts or humanities backgrounds.

History of curriculum innovation is the key to successful implementation

The analyzed applications reveal that most schools did not perceive the purpose for the implementation of IT across the curriculum to be related to curriculum innovation and reform, a finding that is consistent with the earlier observation that most schools understood the nature of the implementation as one of technologizing education. On the other hand, it was found that schools that described their history and background in curriculum innovation the applications were able to describe a much wider range of plans for teaching and learning activities using ICT. This again corroborates with the findings that pedagogical practices exhibiting "emerging" features that are congenial to the development of lifelong learning abilities were only found in reform-oriented schools that have a strong leadership for promoting curriculum change (Law et al. 2000).