

OECD/CERT ICT PROGRAMME  
A Case Study of ICT and School Reform at School 1  
June 2001

Amran Noordin, Team Leader  
Calvin Ong, Asst Team Leader  
Adeline Chong  
Rahima bte Abdul Rahman  
Gary Tsu

IT Training Branch  
Educational Technology Division

Content Page

|                          |     |
|--------------------------|-----|
| Overview                 | 3   |
| The Past                 | 7   |
| The Present              | 10  |
| Hypothesis 1             | 15  |
| Hypothesis 2             | 16  |
| Hypothesis 3             | 18  |
| Hypothesis 4             | 19  |
| Hypothesis 5             | 20  |
| Projection to the Future | 21  |
| Appendix A               | A-1 |
| Appendix B               | B-1 |
| Appendix C               | C-1 |

## Overview

### Description of Institute 1

1. School 1 is part of Institute 1. Institute 1 was established as a post-secondary institution on 1 April 1992, with the task of upgrading technical education in Singapore. The mission of Institute 1 is to create opportunities for school leavers and adult learners to acquire skills, knowledge and values for lifelong learning. Institute 1 takes in students who have completed 10 years of general education in mainstream schools with GCE O and N Level qualifications, and prepares them for the workforce by equipping them with technical and vocational skills at the National Trades Certificate (NTC) or Industrial Technician Certificate (ITC) level. In addition, part-time courses are also offered to adult learners who have completed various levels of primary and secondary education and are seeking to upgrade their technical knowledge and skills.

2. Institute 1's vision of 'A World-Class Technical Education Institution for a Knowledge-Based Economy' [\[1\]](#) is spelled out in their Year 2000 strategic plan, the *Institute 1 Breakthrough* [\[1\]](#) which aims to propel Institute 1 to world-class status in five years' time. In line with this, a change in Institute 1's organisational hierarchy was carried out in January 2001. The 10 technical schools within Institute 1 are grouped into 2 networks of 5 schools each, with a Principal at the helm of each network [\[1\]](#). This change is designed to allow the schools to operate at higher levels of autonomy and efficiency, in order to ensure sustained relevance and effectiveness of the Institute 1's training system in the face of rapid changes in technology and growing forces of globalisation.

## Description of School 1

3. School 1 has a history that dates back over 30 years to 1969 when it started life as School X. In early 1998, School X was renamed School 1 when it moved to its current premises. To date, School 1 has produced 18,000 ITC graduates who are valued for their strong grasp of technical knowledge, skills and positive work attitudes [\[1\]](#). The role of School 1 is best summarised in the mission statement, 'Our mission is to develop competent and excellent engineering technicians at ITC level for engineering industry to enhance Singapore's global competitiveness.' [\[1\]](#) (School 1 Website)

## ICT at School 1

4. In 1998, Institute 1 initiated its 5-year IT Master Plan with the vision of creating a community of connected online learning Schools [\[1\]](#). The Plan seeks to:

- connect all its schools through a wide area network

- provide hardware and software resources
- develop web-based content and learning resources and
- prepare all staff through training and defining the staff's role and orientation.

5. School 1 was selected, as part of the IT Master Plan, to pilot an online learning IT project known as School Online from Jul-Sep 98 which involved the use of multimedia and web-based technologies. The Institute's Headquarters (HQ) conceptualised this online project. The HQ worked with a commercial vendor to use the Lotus Learning Space platform for the digital content that was to be created. The hardware and infrastructure needs of School 1 were also considered when the School 1 was built. The pilot project provided Institute 1 with a study of the impact of an IT-based learning environment on staff and students. Its key findings<sup>[1]</sup> were used for the full development of the Master Plan. The findings indicated that 80% of the staff surveyed found that:

- they taught better using School Online
- School Online could raise their professional standing
- it benefits the students and help them to learn better and
- students are more motivated to learn.

6. Since most of the staff agreed on the effectiveness and usefulness of the system, the IT Coordinating Committee which undertook the study recommended that Institute 1 increase the student PC ratio from 8:1 to 4.5:1. The IT Coordinating Committee also recommended that proper pedagogic training and facilitation skills be given to the staff to allow them to operate in the new web-based environment<sup>7</sup>.

7. Under the School Online project, selected staff used a web-based platform Lotus Learning Space to create and manage online digital content for delivery on the Internet. A full-time system administrator was provided to manage the network and hardware as well as render other forms of technical support. During formal lessons at the computer laboratories, each student was given the use of a computer. In addition, students were able to access online content at the library during their free periods.

### The Reform

8. The subject of our study is a reform that is taking place at School 1. The reform is to enhance teaching and learning, anytime, anywhere. This involves the use of multimedia and web-based technologies. In such resource-rich interactive web-based learning environments, students collaborate to access and process information and construct knowledge. Teachers utilise online resources to deliver content, administer assignments and interact with students.

9. School Online is the platform upon which the reform is carried out. This relationship is captured in the vision statement for School Online, which is To provide quality training anytime, anywhere through technology (1998). School Online enables students to learn by allowing them

to participate in group discussions, browse Internet sites, submit project work electronically, review recorded lectures and refer to past years examination papers. While it is possible to extend the use of School Online outside School 1, the researchers observed that the platform is only a prototype to facilitate anytime, anywhere learning and the planned scope of the pilot did not extend beyond the vicinity of the School. As such, the for the purpose of this study, the term anytime, anywhere would refer to access to web-based resources within the School only.

## Other Developments at School 1

10. In July 2000, changes in the curriculum and pedagogical models were concurrently introduced because they were deemed essential to prepare Institute 1 s students for the new economy. [1] The philosophy of the changes was to prepare students to be thinking doers and knowledge workers (Speech by Minister of Education, 28 June 2000). Existing modules were to be modified to reflect the teaching and learning of employability skills (Admin 1, 29 November 2001). These skills, which include creative thinking, problem-solving and collaboration skills, were introduced to the core content as part of the curriculum change.

11. The new pedagogical model to support changes in the curriculum is the introduction of new teaching and learning processes such as case studies, problem-based learning and collaborative work. Institute 1 believes that these processes require students to be more proactive, inquiring as well as independent and that ICT will serve as a tool to facilitate the adoption of these processes. *Admin 1* said ..use of ICT came in, so that these employability modules can now be used and taught through the use of ICT... (29 November 2000)

### The Past

## History of ICT at Institute 1

12. Institute 1 has been using ICT as a tool to teach some of the courses offered. For example, computer-aided design (CAD) software has been used in the design and drafting courses. The engineering courses have also been traditionally at the forefront of ICT use. Nevertheless, a more concerted effort to harness ICT for teaching and learning was made in 1998 with the launch of the Institute 1 s 5-year IT Master Plan which was initiated to prepare its graduates for the future.

13. According to *Admin 1*, it is the arrival of the knowledge based economy (KBE), which clearly tells that the kind of graduates we produce must no longer be the kind that thinks that when I [referring to individual students] have the skills now, I can stay forever (29 November 2000). Hence, beyond technical skills, Institute 1 identified that future graduates would need skills in "continual learning, problem solving and communication" (Speech by Senior Minister of State (Education), 25 February 1999). In this respect, the Institute 1's management believes that

the key to equipping students with these skills is in effective harnessing of ICT for teaching and learning.

## History of Reform at School 1

14. The reform involving the use of School Online at School 1 was seen as the pilot to facilitate the development of the IT Master Plan for the whole of the Institute 1. Hence, School 1 was setup with facilities to carry out online learning. Structured cabling, ATM backbone, various servers and video chargers formed part of the building plans. In the words of *Admin 3*. ...it started with the Master Plan, and they were looking for a [school] to start the pilot... , ...when they developed this [School 1], they also have a plan to wire up the whole school (23 November 2000).

15. The choice of modules to be in this pilot was decided on the basis of whether they are core modules and therefore would involve as many students as possible. The management of School 1 then identified some teachers to assume the role of ET Champions . The ET Champions were expected to be the pioneers in the use of the new learning and teaching environment that was envisaged by the Institute 1. In addition, they were expected to share their expertise with the rest of the staff in the School. Selection of the ET Champions was based on the attitude and aptitude [of the staff] for this kind of work courseware development (Admin 3, 23 November 2000). This view is also supported by Admin 1 who said that the ET Champions were willing to try , willing to experiment , willing to share, and willing to help (29 November 2000). They tended to be staff with engineering background and with keen interest in ICT.

16. All ET Champions were trained at the HQ on various types of authoring tools and web-based technologies, so that they are able to develop web-based multimedia digital content to be used with the Lotus Learning Space platform. An example of such a content is the use of animation to teach the basics of logic gates and their application in electronic display boards. Students are able to manipulate web-based logic gates to explore the basics and workings of the actual logic gates, and also to apply the understandings of logic gates by manipulating many different gates to produce different types of electronic displays. The training was intended to cover key pedagogical principles as well as technical skills in various authoring and multimedia tools. According to *Teacher 1*, upon completion, the ET Champions were expected to promote the use of ICT among their colleagues by developing digital content and sharing key learning points (21 November 2000).

17. Strong management support was evident, with *Admin 2* giving them all the necessary help (23 November 2000). In addition, *Admin 2* believes that close communication with the staff on the reform was essential to buy all the staff over (23 November 2000), and that the management needs to walk the talk by taking the lead, for example, when a Principal comes in and do a presentation, you don't expect everybody to fix everything up for you and then you do it... (23 November 2000)

## Barriers to Overcome

18. There were staff who were not confident in using technology. According to Admin 1, these are usually experienced staff members who are typically above 40 years of age with fixed mindsets and are uncertain of the value of technology. Often, they would prefer to see the results first, before using technology.

### The Present

19. School Online is the main platform that is used to drive the reform in School 1 and it is based on the Lotus Learning Space. Staff work with commercial developers to develop the digital content that is to be housed on the platform although the bulk of the work is done by the staff of School 1. School Online now features three modules offered at School 1.

### Content Development

20. *Admin 1* and two teachers articulated what they saw as a strong belief of Institute 1, that content development should be done with pedagogy in mind. Hence, teachers who are identified as ET Champions serve as developers of digital content for School Online. *Admin 2* acknowledged that creating digital content is time consuming, 1 hour of curriculum material requires 70-80 hours of preparation (this includes time spent on learning new software, experimentation with the software and creating the lesson) (23 November 2000). This view is supported by Teacher 6 when she said "To produce the one hour you might need 80 or more 100 hour[s], (Laughter) it's very tedious...." (Teacher 6, 18 January 2001). *Admin 1* said that the management assists these teachers by outsourcing to vendors or to specialists at HQ some aspects of content development which require high level of ICT skills.

### Staff's Involvement in the Reform

21. According to *Teacher 1*, staff involved in the reform, either to develop the content or to teach with technology were generally competent due to their engineering background. *Admin 1* said that "...consciously HR side has ensured that new hire, new teaching staff come in will have certain IT skills..." (29 May 2001). Hence, possession of ICT skills is one of the criteria for selecting new staff and they have to undergo a certification in education program where they are introduced to teaching with technology.

22. Teachers interviewed indicated a high degree of management support and understanding both at the Institute 1 HQ and at School 1 where the reform is implemented. Training is progressive for each teacher and is at a pace that he is comfortable with, as reflected by *Admin 1* "...if these older staff, they felt that they only want to use Powerpoint, so we let them, we don't say you must

do the more interactive type (29 November 2001). *Admin 2* concurred by recognising that not all teachers are able to achieve the same standards of ICT skills. Teachers can avail themselves to various forms of learning viz workshops, seminars and peer support that best meet their needs.

23. ET Champions were off-loaded in terms of workload and teaching. External consultants were also hired by management to assist the teachers. However, *Admin 1* and *Teacher 4* suggested more could have been done to support the teachers in terms of time, facilities and technical help. This is supported by *Admin 2* who indicated that we must also recognize the constraints that the staff are faced with, give them all the necessary help (23 November 2000).

### Impact of Reform

24. Teachers interviewed found that School Online allows resources to be put online for sharing among the staff. *Teachers 1, 2* and *3* indicated that School Online has helped them to save time as there is no need to prepare materials as these materials have already been prepared by the ET Champions. *Teacher 2* further elaborated that their role "...has become more broadbase. We need to teach them [the students] how to access knowledge outside the classroom..." (21 November 2000).

25. Students interviewed, *Teacher 6* and *Admin 1* all indicated that students were more motivated as colourful graphics and animation have increased interest and enhanced understanding of concepts. According to one student, Yeh is better than you using the book right otherwise is so boring... Some interesting animation inside [School Online] (Students FGD, 7 March 2001). Students interviewed, *Teachers 1, 2* and *3* and *Admin 1* reported that students are more independent as the School Online allows them to access resources and study on their own anytime and anywhere, including from home. Students also get to learn at their own pace. As one student said, In a way [it] is good [because] when you are free you can just go in there .... when you have doubts you can go in there, sometimes if your teacher is not around, not free, there is someone ready to answer our questions (Students FGD, 7 March 2001).

26. Furthermore, the slower pupils can get to recapitulate on lessons learnt any time they want. According to *Teacher 2*, I think those slow one[s] gain the most because they can actually go in and recap[itulate] whatever they have learnt so maybe the slow learner[s] will benefit more (*Teacher 2*, 21 November 2001).

27. During the period of the study, 3 modules were available in digital format on School Online. Students who offer these modules in their courses are allotted fixed slots during formal curriculum hours to access School Online in the computer laboratories. Students are also supposed to be able to gain access to School Online from the School library or from their homes.

However, there seems to be some problems of access to School Online from home and from within School 1 (refer to Current Limitations below). Students interviewed indicated that the lack of access to computers at the School and at home has limited the use of School Online, as shown in ...because many of us cannot afford to have a computer ....then [the] library ....sometimes there are a lot of people going there also... (Students FGD, 7 March 2001).

28. School Online is meant to be a simple one-stop platform for students to get everything. According to one student, a student can ask [a] teacher for help when encounter difficult question.. and if you are not able to find the teacher, you are able to email to her....she will definitely check her mail, and email back (Students FGD, 7 March 2001). Students also view learning online [as] quite good...a lot of topics...teach us how to do it...and there is some work for us to try... (Students FGD, 7 March 2001). Students are now able to get help from their teachers. Students are also encouraged to be more independent in their learning as indicated by Admin 1, We will give them [students] two more self accessed learning areas so that the independent learning can go on (29 November 2000)

29. School Online also features a threaded discussion board where students can engage in discussion with their peers, consistent with the goal of fostering greater collaboration among students during the learning process. However, the threaded discussion board is hardly utilised. One student described the state of the discussion board as very little people went in there and is very hard for us to chat, hard to find people inside this forum. (Students FGD, 7 March 2001).

### Current Limitations

30. Access to computers is limited to within the School. According to *Admin 2*, 70% of the student population comes from households whose income is below S\$1500 (11 November 2000). Students who were interviewed also indicated that many of [them] cannot afford to have a computer.. (Students FGD, 7 March 2001). Hence by having computers in School 1, students, regardless of social economic status, will have access to computers. However, students have difficulty accessing computers whether for School Online or other purposes as the laboratories are fully booked during curriculum time by the lessons and the library computers are fully utilised. It must be noted that the majority of its students do not use the School Online simply because the modules they are studying have yet to come onboard the School Online.

31. From the teachers viewpoint, technical support should be more readily available. Often teachers who are developing digital content for School Online have to provide their own maintenance and support. Some staff members also feel that preparing web-based lessons requires much more time as it requires knowledge of the software before they are able to create lessons.

### Hypothesis 1

Technology is a strong catalyst for educational innovation and improvement, especially when the World Wide Web is involved. The rival hypothesis is that where true school-wide improvement is found, technology served only as an additional resource and not as a catalyst, that the forces that drove the improvements also drove the application of technology to specific educational problems.

32. There is evidence that technology is a strong catalyst for the reform studied in School 1.

## Technology as a Catalyst

33. *Admin 1* indicated that Institute 1's management started thinking of the reform when they saw the kind of skills that Institute 1 needs to equip its graduates for the workplace of the future. According to him, the advent of the knowledge-based economy sparked the thinking that there must be a paradigm shift in how teaching and learning should be carried out in Institute 1. He said:

So these are new skills required in the KBE. So, that is ... one push. Then ... we ask ourselves ... if our students have to have these skills, can our current teaching methods [suffice].... Is it adequate, is it effective... the current teaching method ... can never be enough ... to meet the objective of KBE.... (Admin 1, 29 November 2001)

34. School Online has become *the* instrument for this reform in teaching and learning that is to take place at the School. In fact, it can be argued that School Online, although a technical platform, has become virtually synonymous with the reform as indicated by interviews with staff for whom use of ICT is often equated with the use of School Online.

35. It is interesting to note that in the interviews, some of the staff, including *Admin 1*, mentioned that School 1 would continue to function as before, if School Online is removed from the scene. What they saw was that the funds could be channeled to a return to the more traditional curriculum. For example, Admin 1 said that the school would continue with the existing industrial attachments for students except perhaps on a larger scale (29 November 2000). Teacher 5 shares the same view too (18 January 2001). Teacher 3 said I suppose we will have to go back to our former way of teaching (Teacher 3, 16 January 2001). This view is echoed by *Admin 2* as follows, ...before technology, reform exists in schools, now the pace of change and the need of change depends on technology (11 November 2000).

36. Based on these facts, it would be fair to say that the paradigm shift in teaching and learning that is to take place in School 1 is very dependent on the platform's existence. After all, the vision of School Online To provide quality training anytime, anywhere through technology , encapsulates School 1's reliance on technology to drive the reform.

Hypothesis 2

The diffusion of the innovation/improvement (and therefore of ICT) followed the traditional diffusion pattern for innovations, as outlined by Rogers (1995). The rival hypothesis is that technology functions differently from traditional innovations and that therefore different diffusion patterns occur.

37. There is little evidence that diffusion of ICT followed Rogers (1995) diffusion pattern

38. In the implementation of the reform, a group of teachers with key attributes and attitude towards technology were identified as ET Champions . Their role is to promote the use of technology in teaching and learning amongst the staff at School 1 and among schools in Institute 1, for example, by conducting workshops.

39. These teachers were typically from an engineering background, were keen on technology and on upgrading themselves through attending courses, some of which were at their own expense. However it must be noted that despite the deliberate selection of the ET Champions, the issue of who comes aboard the reform is purely an administrative one. They were chosen if they displayed these characteristics but of more importance is whether they would be teaching a module which is deemed to be a core module, that is a prerequisite for a module to be ported to School Online. Hence we have, for example, Teacher 5 who was prepared to come onboard but she hardly uses School Online. This is because the department that she belongs to has not been earmarked to use School Online. Although the so-called late adopters were described as teachers in their forties, and skeptical about the benefits about using technology and have adopted a wait-and-see attitude towards the reform, it is apparent that there are also many who have not joined the reform purely on administrative grounds. This also implies that even reluctant teachers would have to come onboard the reform if the management deems that it is time for their department to do so.

40. There are plans to get the departments onboard in phases. There is no evidence of disgruntlement to the shift to the use of School Online. It seems that the teachers are just waiting for the management to tell them their turn to come on board. Once the signal is given, the management will do what has been done with the ET Champions which is to send these teachers for training too so that they will be able to use School Online.

41. The diffusion of the reform is scheduled and depends on administrative criteria, regardless of whether the potential adopter is ready to adopt the reform. Thus, the diffusion pattern is unlike Roger s diffusion pattern.

### Hypothesis 3

Successful implementation of ICT depends mostly upon staff competence in the integration of ICT into instruction and learning. This hypothesis assumes that teachers mediate ICT applications when they are successful, and that ICT s academic value relates positively to teacher competence. The rival hypothesis is that the school technological infrastructure and student ICT competence rather than staff competence determine ICT implementation outcomes.

42. In School 1, due to the web-based nature of the reform, the success of ICT implementation depends not only on teachers competence in designing web-based content and integrating the content into the curriculum, but also on the school having the necessary and reliable

infrastructure / ICT resources. *Admin 1* and teachers interviewed indicated that reliability and availability of ICT has become an increasingly important factor in the use of ICT for teaching and learning. Admin said ....if anything breaks down.... the focus is not on teaching but have to troubleshoot...they say they like to focus on teaching but not handling technical problems.... (29 November 2001). Furthermore, some of them felt that they have become so dependent on ICT, such that when the system is down, there is a sense of loss... what to do next (Admin 1, 29 November 2001). Teacher 3 said .... sometimes the server break down when you are suppose to teach huh then [it] is a problem [since] you can t [get] access [to School Online]....then you may have to go back to your old way of teaching (16 January 2001).

43. At School 1, emphasis is placed on training and developing staff to equip them with the skills required for the reform. This is evident in that there is a framework for staff training, starting with all School 1 teachers undergoing basic training for ICT skills at Institute 1's HQ. Teachers who are more IT savvy are encouraged to proceed to intermediate and a final one-third of teachers will qualify for the advanced courses. Hence, School 1 sees staff competency as an important dimension for the reform. This view is probably accurate as the digital content that they planned to have in School Online is supposed to be media-rich and web-based. To create such content the staff needs to be very competent in ICT. This is even more so as Admin 1 has indicated that as much as Institute 1 wants to farm out the creation of such digital content to private developers, there is a great shortage of such talent in Singapore and therefore much of the development has to be done by the teaching staff themselves.

44. Thus, at School 1, successful implementation of ICT depends heavily on staff competence and school technological infrastructure. There is no evidence for effect of student ICT competence.

#### Hypothesis 4

Gaps in academic performance between high and low ability students will not increase when all students have equal access to ICT. The rival hypothesis is that equal access to ICT will lead to high ability students increasing the performance gap with low ability students.

45. Neither hypothesis 4 nor its rival can be proven. Institute 1 seeks to provide all students with equal access to computers, via free access areas and through the formal curriculum. From some of the teachers interviewed, the key deciding factor in academic performance between high and low ability students who have equal access to technology is not ability but that of motivation and discipline. In the words of *Admin 2*, pupils who are keen and motivated benefited more from School Online (23 November 2000). Teacher 5 concurred when she said It doesn t matter they will pick up because interest still count, if they are interested er no matter how tough we tell them or the task you give it to them they can still do it. (18 November 2000).

#### Hypothesis 5

The use of ICT will lead to the same or higher academic performance. The alternative hypothesis is that ICT use will lead to a lowering of academic standards.

46. In School 1, from the interviews of all teachers and administrators interviewed, the use of

School Online for 3 modules led to an insignificant increase of 2-3% in percentage passes (Notes of Meeting, 11 November 2000) in those modules which is a negligible change. Of more immediate impact perhaps is the enhancement of understanding of certain technical concepts, as *Teachers 3, 4 and 6* remarked, ...some subjects for example ...like machinery or things that involve movement, if we were to have a PC ....understanding will be better, perception will improve (Teacher 4, 16 January 2001). *Admin 1* illustrated this further, ...they can teach better, especially abstract concepts...can illustrate concepts better with multimedia... (29 November 2000). As one student said, Some interesting animation inside....like watching TV .... If she give[s] it to you, you will just like watching TV or watch the book[,] of course you watch TV right? (Students FGD, 7 March 2001).

47. Of greater interest to the teachers is that during the implementation of the reform, and when School Online is used, teachers interviewed indicated that while there is no measurable impact of ICT on academic performance, they have noted distinct outcomes. The student s motivation level has increased, and students demonstrated increased interest in their lessons, ...they spend a lot of time, they spent day and night...they re so interested,.... they are fond of doing that... (Teacher 6, 18 January 2001), ...students are more interested in their lessons.... (Teacher 6, 18 January 2001), ..students come to class early for that lesson....students are so engrossed... (Admin 1, 29 November 2000). Furthermore, use of ICT appears to have unlocked students creativity and provided them with opportunities to think out of the box. ...they can come out with all kinds of ideas ....you will be surprised some of them are very creative, we give them let say a subject area ...they can come up with all kinds of things (Teacher 4, 16 January 2001).

#### Projection to the Future

48. From the goals in Institute 1's IT Master Plan, the pilot at School 1 and the subsequent refinement of the Plan, it is evident that Institute 1 is harnessing ICT to enhance teaching and learning in all the schools within Institute 1. From the teachers interviewed for this study, it appears that the rationale for change, the reform and its link with ICT are clearly articulated to all staff. This clearly reflects the management s view that policy alone does not ensure success of reform or ICT implementation in Institute 1. The key lies in the teachers especially with regards to their willingness to accept the changes and upgrade their ICT skills proficiency.

49. As more web-based digital content is created and more teachers and students are involved, it is clear that infrastructure, hardware and other IT resources at School 1 will need to be scaled up if the reform is to continue. This need is indicated in School 1 s evaluation report of the reform being piloted. In it, a key recommendation is the scaling up of the present hardware and infrastructure support.

50. In line with the IT vision of a community of connected learning schools , the operating structure of organising 10 schools within 2 networks is meant to allow for greater collaboration across schools, multidisciplinary and cross-training, synergising of ideas and resources amongst staff. ICT then becomes an even more powerful catalyst that promotes multi-disciplinary projects across schools, pooling of resources, brainstorming for new ideas and sharing of innovative teaching strategies. The management believes, in the words of *Admin 1*, ...the reform is

entrenched...and becomes more and more important... (29 November 2000). Therefore, there is a high probability that the reform in School 1 will not only continue but is expected to grow, even beyond School 1 s boundaries.

51. Recently in April 2001, Institute 1 initiated a more advanced platform than School Online [\[1\]](#). Key concepts and functions behind School Online have been brought over to a new e-Tutor learning system, which will be fully implemented in 2004. This new learning system is designed to handle pooling of resources by staff and delivery of lessons to many students across all 10 schools in Institute 1 at the same time. It serves as a back-end application to 2 new staff and student portals. Besides for teaching and learning purposes, the portals are also used for administrative purposes. The creation of these portals by Institute 1 clearly indicates that ICT is intended to be a way of life for all staff and students of Institute 1.

52. From this study, the reform s transferability and scalability beyond School 1, to across all schools in the Institute 1 is driven by a central body with a clear vision. Though a very much top-down approach, there is a realisation that articulating the vision to all staff is crucial to the success of the reform when it is implemented across all schools in Institute 1 as it prepares the staff for the changes that they would have to face which in turn prepares them for the upgrading of competencies that is necessary for the reform to continue or grow.

Based on the above consideration, the reform is expected to be sustainable and transferable.

## **Appendix A**

# Research Team

The research team from the Ministry of Education comprised the following 5 members

|                          |   |
|--------------------------|---|
| Amran Noordin (Leader)   | Senior IT Instructors<br>IT Training Branch, Educational<br>Technology Division |
| Adeline Chong            |   |
| Rahima Abdul Rahim       |   |
| Gary Tsu                 |   |
| Calvin Ong (Asst Leader) |   |

## Summary of Time Spent at the School

| Contact Period   | Date(s) and/or Duration  |
|--|--------------------------|
| First Meeting  | 10 Nov 2000              |
| Data Collection Period   | 14 Nov 2000 – 7 Mar 2001 |
| Follow-up contact ( verification of data)                            | 8 Mar – 30 May 2001      |
| Total number of hours spent on interviews and focus group discussion | 10 x 2 hrs = 20 hrs      |
| Total number of hours spent on classroom observations                | 3 x 3 = 9 hrs            |

# Summary of Data Collected

| Type and Quantity of Data  | Average Time Spent                | People Involved  |
|--|-----------------------------------|--|
| 9 Interviews   | 2 hours per interview             | Staff at Institute s HQ<br>Principal<br>Head of Department<br>6 Teachers |
| 1 Focused Group Discussion   | 2 hours                           | 6 pupils   |
| 3 Classroom Observations   | 3 hours per observation           | 3 Teachers and 95 Students   |
| 3 Meetings   | 10 hours                          | Principal<br>Head of Department<br>Teacher involved in Reform            |
| 1 Email  | 15 min                            | Head of Department   |
| 1 Telephone Conversation   | Half an hour                      | Head of Department   |
| Newsletters,<br>Institute s website,<br>Evaluation Report of Pilot Project,<br>Public Speeches by Minister and<br>Senior Minister of State | 20 hours reading<br>and analysing | NA   |

A-2

## Legend of Data Sources

|              |  |
|--------------|--|
| Admin 1      | Educational Technology Staff at Institute 1 s HQ |
| Admin 2      | Principal of School 1                            |
| Admin 3      | Head of Department of School 1                   |
| Teacher 1, 2 | 2 key teachers identified as ET Champions        |
| Teacher 3, 6 | 2 other teachers involved in reform              |
| Teacher 4, 5 | 2 teachers not involved in reform                |
| Students     | 6 Students during Focus Group Discussion         |

Estimate of Average Time spent per person on coding, analysis and writing

|                             |                                  |
|-----------------------------|----------------------------------|
| Coding                      | 10 x 2 hrs = 20 hrs              |
| Analysis and Cross Analysis | 10 x 4 hrs = 40 hrs              |
| Writing the Report          | 40 hrs<br>(30 Apr - 1 June 2001) |

A-3

**Appendix B**

Data and graphs from the Teacher ICT Practices Survey



B-2

## Appendix C

## Supporting Evidence

C-1

---

<sup>1</sup> <http://www.ite.edu.sg/~crweb/aboutITE.htm> - ITE's Corporate Information Website

<sup>2</sup> <http://www.ITE.edu.sg/breakthrough/> - *ITE Breakthrough* Plan Website<sup>[e]</sup>

<sup>3</sup> *The Quality Workforce*<sup>[1]</sup> online newsletter dated Dec 2000 / Jan 2001

<sup>4</sup> Speech by Senior Minister of State (Education), Mr Peter Chen, dated 25 Feb <sup>[1]</sup>1999, Official Opening of ITE Tampines

<sup>5</sup> <http://www.ite.edu.sg/~tpweb/tp.htm><sup>[ ]</sup>

<sup>6</sup> *TechPlus* - School <sup>[1]</sup> newsletter dated February 1999

<sup>7</sup> Post Evaluation Findings of IT Pilot Project at ITE Tampines (Campus Online) R<sup>[1]</sup> Report dated Sep 1998

<sup>8</sup> Speech by Minister for Education, Radm Teo Chee Hean, dated 28 Jun 2000, National Skills Competitio<sup>[n]</sup>

<sup>9</sup> [http://www.gov.sg/ps21/challenge/issues/2001\\_03mar/default.htm](http://www.gov.sg/ps21/challenge/issues/2001_03mar/default.htm) - *Challenge*<sup>[1]</sup> magazine, Portals in ITE to make life a breeze